

# UNDERGRADUATE COURSES 1991

## INTRODUCTION

*Undergraduate Courses 1991* has been prepared to help registered undergraduates choose their courses for 1991. You should read it before completing your conditional registration form. There are three separate tables which you may wish to read in parallel with the individual course descriptions. While every effort is made to ensure accuracy, the material in *Undergraduate Courses 1991* is subject to later alteration in the light of changes in regulations, policy or financial or other constraints. You will be informed before the 1991 academic year of any changes that affect you.

## SECTION 1 CHOOSING COURSES

### GENERAL ADVICE

There are more than 130 courses in the undergraduate programme, each one interesting in its own way. How will you choose between them? Obviously you will have to abide by the BA degree regulations but, unlike students on many degree courses offered by other institutions, you have to decide which courses will make up your degree. So, how will you choose: individual courses which interest you, or a pattern of courses developing a central theme? Perhaps you want to build on your past experience and knowledge, or to work towards the fulfilment of a goal by developing a particular skill or combination of skills. What might appear to someone else to be a sequence of unrelated courses may well be – given your circumstances and aims – the logical and right choice for you.

Your reasons for studying are quite likely to change as you progress. It might therefore be useful to look ahead to the time when you obtain your degree and ask yourself what you would like to see as a result of having studied with the Open University.

#### Things to consider in choosing courses

- **Subject coherence** Do you want, or need, to choose courses so that you can, as far as possible, obtain a degree in a single subject? If so you should consult the faculty-recommended related courses which are listed in Table II, and also note the 'complementary courses' mentioned in many of the descriptions of individual courses.
- **Recommended prerequisites** It is difficult to take certain courses if you know virtually nothing about the subject, although it can be done. Prerequisites are an indication of what you should already know (i.e. what the course team assumes you know) and are strongly recommended. Clearly if you do not have the prerequisites you are quite likely to fail. And if you have not studied the prerequisites for a particular course or acquired the relevant knowledge or skills elsewhere, you may find that this makes a half-credit course demand as much work and effort as a full-credit one. Drop-out and failure, in particular from third-level courses, are matters of real concern: not just for the student for whom the experience may be painful in itself and a waste of time, but also for the University. We therefore advise that, if you are in doubt about your preparedness to take a particular course, you air those doubts with your tutor-counsellor or make use of 'diagnostic quizzes' and preparatory material as suggested by the course team, so that you can assess your position for yourself. Your tutor-counsellor may also be able to put you in touch with other students who have studied the course, with course tutors or a staff tutor. Note carefully the academic objectives of individual courses and do not be misled by attractive-sounding titles.
- **Requirements of professional bodies; postgraduate training** Each professional body sees itself as maintaining 'the integrity of the profession' and therefore stipulates which subjects must be studied to enter it. In the context of

the Open University, and with the limited number of credits you can take, this means that if you wish to gain membership you will have to take certain courses and set aside others which may interest you. Indeed, almost the whole of your degree may be prescribed in this way. It is worth remembering that 'professional membership' is not the same thing as being able to get a job in the profession. If you intend to go on to a postgraduate degree or undertake some other form of professional training, you should consult the appropriate Recognition Information Leaflets, the titles of which are given on page 3.

#### Practical considerations

At a different level – but still important – there are other things to be taken into account when choosing courses. Some short-term considerations might include:

- What sort of study and assessment methods are used? Is there a home experiment kit? Will you need access to a computer? Is the course included in the home computing policy?
- Will you have to attend a residential or summer school? Are there optional Saturday day-schools? Is travel going to be difficult?
- Do you know of other students who are planning to do the same course? Have you a potential study group?
- Will you need access to large or specialized libraries? This may be especially important for some of the courses which have a substantial project element. Such courses can be of particular value if you intend to go on to postgraduate study.
- What sort of work-load can you reasonably carry? (Remember that two half credits probably make a greater demand, if only in terms of sheer organization, than one full credit.) Remember also that as you progress to higher level courses the work becomes more exacting. If you intend to attempt more than one full credit equivalent in 1991, you are strongly advised to discuss this with your tutor-counsellor.
- What are the fees and the likely cost of set books? Will there be other expenses such as summer school fees or purchasing a home computer as well as the incidental costs of travelling, materials or getting a babysitter while you attend tutorials?
- Are you likely to get any support from your local education authority, or from your employer (in the form of both money and time off for study and examinations)?

#### Thinking ahead

Questions to do with your more general plans may arise such as:

- Does your choice fit in with current degree and advanced standing regulations? Should you do a second foundation course, and if so should it follow immediately after your first one, or would it be better to pursue some of the topics you have found particularly interesting in your first foundation course? There are arguments for and against any strategy, and your tutor-counsellor may be able to help you decide which approach is most sensible for you.

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### Section 3 1991 Undergraduate courses

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A204	18	E208	34	S341	52
A205	18	E241	34	S342	52
A228	18	E271	35	S343	52
A241	18	E324	35	S344	52
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A282	19	E333	35	S442	53
A293	19	E355	36	SM355	53
A294	20	E362	36	SMT356	54
A310	20	EH207	36	ST291	54
A311	20	EH232	36		
A314	21	EM235	37		
A315	21			T102	55
A317	22			T201	56
A318	22			T202	56
A319	22	M101	39	T233	56
A324	23	M203	39	T234	57
A331	23	M205	39	T235	57
A341	23	M245	40	T244	58
A353	23	M261	40	T247	58
A361	24	M332	40	T253	58
A362	24	M343	40	T254	58
A403	24	M345	41	T255	58
		M353	41	T263	58
		M355	41	T274	59
D103	26	M357	41	T281	59
D205	27	M371	42	T292	59
D209	27	M381	42	T301	59
D210	28	M386	42	T322	60
D211	28	MA290	42	T326	60
D251	28	MDST242	42	T331	61
D307	28	ME234	43	T333	61
D308	29	MS283	43	T334	61
D309	29	MS323	43	T353	61
D310	29	MST204	44	T362	62
D312	29	MST322	44	T363	62
D314	30			T392	62
D321	30			T393	63
D345	30	S102	46	T394	63
D437	31	S203	47	T401	63
DE304	31	S236	47	TM222	64
DE325	31	S237	47	TM282	64
DE354	32	S238	48	TM361	64
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- Are you working for the BA degree, or for the BA degree with honours? If you want honours, will the class of degree you get be important to your plans and does this affect the number of credits you can reasonably take given your other commitments? If you are aiming just for the BA degree, should you be taking any third- or fourth-level courses, or would you be satisfied with second-level and foundation courses?

- Will the course you want be available in future years? Are other courses, which are more suitable for you, planned for presentation later?

- Would it be sensible to plan for a year off? Significant numbers of students take a break on completion of their BA degree before going on to honours, and others find it necessary for various reasons to take a year off before reaching their degree. But remember that it may be difficult to discipline yourself to start to study again after such a break.

- Do you expect changes in your personal circumstances, such as being sent abroad by your employer, pregnancy, transferring to full-time education or undertaking a shorter course of vocational training, perhaps for financial reasons?

You will no doubt think of other questions which are peculiar to your own situation: but if you feel you need more advice before making your choice for 1991, or wish to discuss the possibilities with someone, then the person to ask within the Open University is your tutor-counsellor. Sources of further information and advice are given below.

## Linking your studies with your future plans

Students join the Open University for the same wide variety of reasons that make them choose to study a particular course. But a survey of our graduates showed that two thirds of them gave a job-related reason: the expectation of promotion or change of occupation were the most commonly mentioned. By the time these people actually graduated, most (again two thirds) reported that their studies had had a beneficial effect upon their career. The value of a degree for most jobs is that it is a shorthand way of indicating that you have acquired skills, knowledge and personal qualities which are seen as important by employers. The content of your degree will also clearly be important, but attitudes to this vary from employer to employer, and from one type of work to another. If this is of concern to you, it might be useful to speak to people (or to their employers) who are doing the sort of work that interests you in order to get their advice about courses which may be appropriate.

You will be aware that the Open University does not offer a degree in any single subject. Which courses you study is for you to decide: you have to select the particular combination of, say, chemistry with mathematics, physics and perhaps poetry as well, that will meet your needs. Certainly, there are many examples of useful 'blending of dissimilar skills': the numerate arts graduate; the artistically talented social worker; the engineer with a sound business sense.

For a further discussion about linking your studies with your career, see the booklet *Career Choices and Degree Planning*, or the Occupational Information Leaflet 'What OU graduates have done', free copies of which are available on request from your Regional Centre.

## How to choose

You can make a choice intuitively or rationally, but you will probably want to set out quite explicitly what criteria you will use in selecting your courses, and why those particular criteria are the important ones. Choosing courses certainly provides an occasion to re-assess your values and priorities: it is an opportunity to influence, if only to a small extent, the direction your life will take. There are probably several reasons why you choose a particular course: either because it is the next logical course to take, or just because it would be interesting to study. But whatever the mixture of reasons, it is unique to you, and known only by you. It could be useful to talk over your reasons with someone else so that what you intend to get from studying does not remain just a private set of hopes.

Your tutor-counsellor can discuss with you such longer-term educational goals, or your career plans, but only from his or her experience and knowledge. Quite probably in your own field you already know more than anyone else does about the intricacies, say, of promotion within your own organization. But you might need information and advice about other matters, such as how to get on to an over-subscribed course of professional training, entry to a particular postgraduate course, moving between organizations, between types of industry, or moving geographically. No-one knows everything there is to know about all these matters, but you could talk about your plans – even if tentative – with your tutor-counsellor, not simply to get advice but because the process of talking is important in itself. It encourages the vague plan to become a possible reality: something which could actually happen, if you still want it to, when the time comes.

## Study at other institutions under schemes of academic collaboration

Schemes of academic collaboration provide opportunities for Open University undergraduates to receive credit towards the BA degree for study in subject areas not offered by the Open University. Undergraduates who have obtained certain specified course credits may be able to transfer to another institution for a period of study to follow an approved programme of undergraduate-level courses. Successful completion of collaborative scheme study can lead to an award of advanced standing credits towards the BA degree, at the rate of 2.0 credits for a full-time academic year of study. The credits are titled and graded, and can count towards honours degree classification.

Collaborative schemes are currently available at fourteen higher education institutions in the United Kingdom. Some provide for full-time study at the other institution, some for part-time study. In most cases the period of study is the conventional academic year (October to July), but some schemes follow an academic year similar to that of the Open University (January to November).

An information sheet which is available from the Central Enquiry Service, The Open University, PO Box 71, Milton Keynes MK7 6AG gives a list of the current schemes and indicates for each scheme the faculty or Regional Centre from which further details can be obtained.

Applications for admission to collaborative schemes are made initially through the faculty or region, and arrangements vary from scheme to scheme. For some schemes, applications for entry in October can be made as late as May of the same year; for most the closing date is much earlier. For all schemes, a proposed programme of study must be constructed and submitted to the Advanced Standing Office for approval at least three months before the period of study would begin.

The numbers of places available on these schemes are limited and decisions on admission are taken by the other institution, not by the Open University. If you apply for one of the schemes, you are strongly advised to register conditionally for the Open University course which you wish to take should you not obtain a place on the collaborative scheme.

## TRANSFER TO OTHER INSTITUTIONS

The Open University degree, even the honours degree, is essentially interdisciplinary. This has its own strengths which are recognized by many employers: very substantial numbers of Open University graduates have also gone on to do higher degrees or professional diplomas. But if, for your own reasons, you want a traditional 'single subject' degree (or need to graduate more quickly) then it might be wise to consider transferring to a full-time course. This is often possible after as few as one or two Open University credits have been completed. For example, if you think your age may be against you, transferring to a course which has a more immediate vocational relevance could make sense for your career, without removing the possibility of completing your Open University degree at a later date.

More information about transfer to other courses and educational institutions is included in the University's *Undergraduate and Degree-level Associate Student Handbook* and the appropriate Recognition Information Leaflet. If you are in doubt, approach the relevant educational institutions directly yourself, since all applications are decided on the merits of the individual case.

## FURTHER INFORMATION AND ADVICE

### Regulations

Consult your 1990 *Student Handbook* and its *Supplement* for restrictions on course choice, allocation to and availability of courses, and fees (see also the next section, particularly for the change in policy about second foundation courses).

### Courses

Read the appropriate course guides, look at course units and assessment materials and consult samples of the recommended reading for the course. It may be useful to talk to students who have taken the course and to read the edition of *Sesame* issued at about the time of conditional registration.

### Career planning

*Career Choices and Degree Planning* offers help with career decisions and choosing courses. It explains the various types of help available to you locally and gives information about the Open University's vocational guidance service. The reference section includes a comprehensive guide to further reading (about grants, postgraduate study, career choices etc.). Copies of this booklet are available from your Regional Centre.

## Occupational information

The leaflet *Career Planning* is a brief guide to the written material available to help you in your choice of occupation. It is included in the conditional registration mailing.

The Open University, through its membership of the Association of Graduate Careers Advisory Services, can provide you with the Association's graduate careers information booklets. These booklets are written with the needs of new graduates in their early twenties in mind but they nevertheless contain useful information about a wide range of careers. The Open University has produced a booklet *Prospects for Mature Students* which is designed to be read alongside the AGCAS booklets and to alert you to considerations which affect mature students in particular. Individual supplements to eleven of the AGCAS booklets have also been produced. They are listed in *Career Planning* and can be obtained from your Regional Centre.

## Sources of advice

In the first instance you should raise any questions about your choice of courses with your tutor-counsellor. In addition, many 'conditional registration and course choice evenings' are held at study centres in June. These sessions give you an opportunity to look at the course materials and talk to other students, as well as to members of the tutorial and counselling or full-time staff. Also, if necessary, feel free to ask your tutor-counsellor to meet you at some other mutually convenient time to discuss your own situation.

## Potential study difficulties for students with disabilities

While the Open University can be the most suitable means of study for people with some disabilities, all Open University courses have a large amount of visual material which you must read in order to complete your studies successfully; some also have audio materials. If you have a visual or aural handicap the University makes special provision, described below, to help overcome this. In the 'Notes' section of each course description under 'Students with Disabilities', we have indicated where the course team foresees particular problems in addition to those normally experienced by students with impaired sight or hearing. You should read the individual course descriptions for brief details, but for more specialist advice write to the *Adviser on the Education of Students with Disabilities, Regional Academic Services*, The Open University, Milton Keynes, MK7 6AA. If students with disabilities are not mentioned in the 'Notes' no particular difficulty is expected.

### Course units and set books on audio cassette

We try to make most of our course material available on audio cassette, but because of the print production schedules for new courses and inevitable delays in recording, course materials, except for foundation courses, are not available on audio cassette in the first year of presentation. If you are unable to study from conventional written materials, you are advised not to take a course other than a foundation course in its first year of presentation.

Course and supplementary materials are available on tape from the Office for Students with Disabilities for all except the following courses in 1991: A314, A315, A319, A403, D251, D345, D437, E271, E325, EH232, EM325, M203, M343, M345, M357, M381, M371, M386, ME234, MS323, MST322, S203, S256, S298, S325, S330, S338, S341, S342, S343, S344, S442, SM355, SMT356, T201, T233, T235, T247, T253, T254, T255, T263, T292, T301, T322, T331, T333, T334, T353, T362, T363, T392, T393, T394, T401, U206. This is indicated by a footnote in Table 1 and in the individual course descriptions. If you have any questions about the availability of course material on tape, please ask the Office for Students with Disabilities, The Open University, PO Box 79, Milton Keynes MK7 6AR.

If you rely on tapes and wish to include any of the courses currently not available on tape in your degree profile in 1992 or later, please ask the Office for Students with Disabilities for information. Recording priorities are determined by demand, so it is helpful if you let us know early about your interest in particular courses. As a general rule, requests for the recording of courses not currently on tape need to be made at least twelve months before the course begins.

Most set books and course readers in cassette form are available from the Royal National Institute for the Blind Students Cassette Library, Customer Services, PO Box 173, Peterborough PE2 0WS. If you do not qualify for RNIB services, the Office for Students with Disabilities may be able to help you; please ask. You are advised to place requests for set books and course readers as early as possible so that they can be copied and sent to you before your course begins.

An audio cassette containing extracts from *Undergraduate Courses 1991* has been sent to students who usually receive their course material on tape and is available on request from the Office for Students with Disabilities.

### Transcripts

Transcripts of most radio and television programmes and most audio and video cassettes are available for all courses



except those in their first year of presentation. If you have any questions about transcripts please ask the Office for Students with Disabilities.

#### Summer schools

Special facilities can be provided at summer schools. If necessary, you can be accompanied by your own personal helper or you may be considered for excusal from summer school on grounds of disability. If you have mobility problems and would like information about particular summer school sites you can obtain leaflets from the Administrative Assistant (Summer Schools), Residential Schools Section, The Open University, Milton Keynes, MK7 6AA.

#### Recognition Information Leaflets

These leaflets give information about academic, vocational and professional areas where Open University degrees and course credits are recognized as qualifications equivalent to those offered by other educational institutions of the United Kingdom.

Regional Centres have supplies of the leaflets and your tutor-counsellor has a complete set for reference. They can also be obtained from the Central Enquiry Service, The Open University, PO Box 71, Milton Keynes MK7 6AG. They are designed to help you in choosing courses rather than in choosing a career. The leaflets will be revised as further information becomes available, and additional leaflets may be prepared. You are invited to inform the Assistant Registrar (Advanced Standing and External Recognition), at Walton Hall, of any successes or problems you have met in seeking recognition for your studies from employers and external bodies.

The leaflets are grouped as follows:

##### Group 1 Recognition of Open University qualifications: particular careers

- 1.1 Teaching: training and salaries (England, Wales and Northern Ireland)
- 1.2 Teaching: training and salaries (Scotland)
- 1.3 Social work, community work, probation and after-care
- 1.4 Civil Service, Armed Forces, Merchant Navy, Police, public corporations and nursing

##### Group 2 Recognition of Open University qualifications: transfer to higher education elsewhere

- 2.1 Entry to undergraduate and postgraduate courses: general
- 2.2 Credit transfer and collaboration at undergraduate level
- 2.3 Entry to medical and veterinary science schools
- 2.4 Transfer to higher education and employment overseas
- 2.5 Credit transfer at postgraduate level

##### Group 3 Recognition of Open University qualifications: membership of professional bodies

- 3.1 British Psychological Society
- 3.2 Royal Town Planning Institute
- 3.3 Professional engineering institutions
- 3.4 Institution of Water and Environmental Management
- 3.5 Not issued this year: the Institute of Measurement and Control is now included in leaflet 3.3
- 3.6 Institute of Mathematics and its Applications
- 3.7 College of Radiographers
- 3.8 Scientific institutions (including Institute of Biology, Royal Society of Chemistry, Institute of Physics, Institute of Food Science and Technology)
- 3.9 Accountancy and financial institutions (including accountancy bodies, Institute of Actuaries, Institute of Internal Auditors, Institute of Bankers)
- 3.10 Administration and management institutions (including Institute of Chartered Secretaries and Administrators, Institute of Health Service Management, Institute of Personnel Management, Institute of Administrative Management, Institute of Management Services, Institute of Marketing)
- 3.11 Other bodies (including British Computer Society, Institution of Analysts and Programmers, Institute of Production Control, Institute of Statisticians, Royal Institution of Chartered Surveyors, the legal profession and music conservatories)

##### Group 4 Recognition of Open University qualifications: grants and other sources of support

- 4.1 Employer support
- 4.2 Grants and other sources of support for study (including postgraduate study)

There is also a leaflet *A Guide for Employers - How to make Use of the Open University*.

## SECTION 2: RESTRICTIONS ON COURSE CHOICE

Before choosing your courses for next year and completing a conditional registration form you are strongly advised to read the sections on registration and progress (sections 4 and 6) in your 1990 *Student Handbook and Supplement(s)*. Although there are relatively few restrictions on which courses you may take, the following points are worth emphasizing.

#### Allocation to courses

The vast majority (98%) of students are allocated to their first choice conditional registration course(s). However, the University cannot guarantee allocation to a particular course preference - unless that preference is for a foundation level course. If more students wish to take a post-foundation level course than there are places available, the University is obliged to put a quota on the course. This is a limit set on the number of offers made, after taking into account predictions of how many students are likely to decline an offer or fail to register. Students are considered for offers according to (i) their year of final registration in the BA degree programme and (ii) their personal identifier number. This means that your chance of being offered a place on an over-subscribed course will depend on how long you have been an undergraduate student. For example, students who completed final registration with the University in 1984 will have priority over those who did so in 1986. If you are competing for a place with someone who entered the undergraduate programme in the same year as yourself, the person with the lower personal identifier number will be given preference. If you are currently studying a course which is known to be over-subscribed and have chosen to repeat it in 1991 if you fail or withdraw, you are very unlikely to get a place in 1991. In this situation, the University takes the view that first-time applicants should get preference over those who wish to repeat the course. A few courses have allocation procedures which differ from these; they are explained in the course descriptions.

#### Availability of courses

The University reserves the right to withdraw, postpone or change a previously publicized course. As much notice as possible will be given to registered students if such changes have to be made.

If you took a course in its last year of presentation in 1990 and are permitted to resit the examination, you will have the opportunity to resit the examination in 1991 even though the course itself is no longer available.

#### Foundation course requirements

From 1990 you are no longer required to complete two foundation courses for the award of a BA degree. You will need to complete one foundation course, but can choose whether or not to study a second. You will still need six credits for a BA degree and a foundation course must be one of those credits.

If you have an award of advanced standing, your foundation course requirement will remain unchanged unless your award is 0.5 general credit exemptions or 0.5 directly transferred credits, in which case you can now choose whether to include one foundation course or two in your degree.

It is now up to you to decide whether or not to take a second foundation course, but this is not a decision you can make in isolation. There are many things to consider. If you intend to specialize, for personal or career reasons, and might have difficulty fitting all the courses you want into your degree, you may be wise to concentrate on higher-level courses. But the educational arguments for taking a second foundation course remain. Indeed, you may need two foundation courses to give you the necessary breadth of study from which to select the courses you want to study at a higher level. Two foundation courses are also valuable if you do not have an extensive educational background, because they can prepare you more thoroughly for future study and reinforce the distance learning methods which the University uses. A second foundation course will introduce a variety of subjects which you might have overlooked and may encourage you to develop a different degree profile than you had in mind when you first registered as a student. Foundation courses offer much more local tutorial support than you can expect from second- and third-level courses. Support from fellow students is also greater on foundation courses: there may not be anyone in your area studying the same higher-level course as you. Summer schools are a part of all foundation courses but not of many higher-level courses. You will need to consider all these things carefully as you decide whether or not to study a second foundation course.

In the 'overview' section at the beginning of each faculty's

course descriptions more specific advice is given about foundation course requirements for courses in the faculty. It is important that you read this advice carefully. Recommended prerequisites for courses are not affected by the changes in the foundation course requirements and, for some courses, it is still necessary to have studied two foundation courses.

If, after reading the advice in this section about how to build up a degree profile, the advice in the faculty overview and the recommended prerequisites for a particular course, you are still in any doubt about whether you ought or need to take a second foundation course you should consult your tutor-counsellor, who will be able to discuss your study plans and direct you to the best advice. But the decision whether or not to study a second foundation course now rests with you.

#### Honours degree requirements

To qualify for the BA (Honours) degree, at least two of your course credits must be at third or fourth level.

You must complete your credit requirements at third or fourth level within the maximum permitted number of credits (including any advanced standing award): ten for students who finally registered between 1971 and 1976 inclusive, and eight for students who finally registered in 1977 or later. If you do not complete at least two third- or fourth-level full course credits (or equivalent) within the maximum number of credits, you will not be eligible for the award of the BA (Honours) degree.

#### Number and level of courses

You may not register for any course at post-foundation level unless you have obtained at least one course credit at foundation level. M5283 *An introduction to calculus* and TM282 *Modelling with mathematics: an introduction* do not count as foundation courses for this purpose. Although you may register for a course at any level once you have passed a foundation course, we advise that you should not attempt a course at third or fourth level unless you have passed at least one course at second or third level respectively. You are strongly urged to discuss your study plans very carefully with your tutor-counsellor if you are thinking of ignoring this advice.

You may register for a maximum of two full-credit courses (or full/half-credit combinations) and a minimum of one half credit in any one academic year. (Resit examinations count towards the number of courses for which you can register in any one year.) You may not register in the same year for courses from both the undergraduate and the associate student programmes of study which together exceed 68 units of work or the equivalent of two full-credit courses. You are not allowed to take courses that would take you over a total of ten full credits if you are an undergraduate who finally registered in 1971-76, or eight full credits if you are an undergraduate who finally registered in 1977 or later.

#### Course combinations

Certain courses have a substantial overlap of academic content and you may not count more than one of them for credit purposes: these courses are called *excluded combinations* and are indicated in the course descriptions and in Tables I and III (see also 'Remakes' below).

If you have an advanced standing award of directly transferred credits you will not be allowed to count for credit any course which substantially overlaps with the previous studies on which the award was based.

Regulations governing excluded combinations also apply to course credits transferred from the associate student programme to the undergraduate programme, and to courses taken for a previous BA degree of the University.

#### Remakes

After a number of years some courses are remade. Because the 'remade' course will normally have a significant amount of common material with the original version, the two courses will usually be designated as an excluded combination and the restriction described above will apply. There are a few exceptions which are explained in the relevant course description. The Table of Discontinued Courses (Table III) lists all past courses and the courses (both discontinued and current) with which they form excluded combinations.

#### Repetition of courses

You may not register for a course which you have already passed, and may not count a particular course credit towards more than one degree.

#### Second BA degree

You will not be accepted for admission to a second BA degree of the University until you have completed the requirements of the BA degree for which you first registered.

#### Fees and other costs

You will be told the 1991 fees as soon as they are decided (probably in November/December). You may have some



expenses in addition to tuition and summer school fees. As well as television and radio, some courses require access to audio cassette, video cassette or record players, or to a home computer, as mentioned in the course descriptions. Set books for some full-credit courses can cost over £55. Prices are not usually given in course descriptions, but the number listed may give a rough indication of costs. Prices will be given in the *Set Book List* sent to you in November or December.

### Academic progress

Your right as a finally registered student to register for courses in subsequent years of your choice, until you have completed the maximum number of credits permitted for the award of a BA (Honours) degree, depends on your making satisfactory academic progress. 'Satisfactory academic progress' is defined as passing at least one foundation course or either MS283 or TM282 after four years of study in the undergraduate programme. Failure to achieve this level of progress will result in the University cancelling your registration for the BA degree. As long as you satisfy this minimum requirement, your registration will not be affected by your subsequent academic progress, except that the University may limit the numbers of credits you may take if you fail to pass a course after three years of study. Your right of future registration is also subject to your not being in debt to the University. See the sections on registration and fees in your 1990 *Student Handbook*.

### Continuing your studies overseas

If you take up permanent or temporary residence abroad and wish to continue with your studies, you should not underestimate the problems that may arise. You may have no access to television and radio programmes; you may not be able to take a home experiment kit overseas; you may have problems with your home computer. If you wish to continue your studies from an overseas address, read carefully the course descriptions and also the information given in Section 3 of this publication and in the 1990 *Student Handbook*.

## SECTION 3: 1991 UNDERGRADUATE COURSES

Included in this section are details of all the undergraduate courses available in 1991 as listed in Table I. To help you make your choice each faculty and the 'U' area has provided a general overview of its courses.

Please refer to the previous section for advice on choosing courses and for a summary of the regulations which may affect your choice.

### Explanatory notes

You are advised to read these notes before turning to individual course descriptions.

**Course codes** A list of the codes of current courses and their titles is given in Table I. The following information about courses can be derived from the course codes:

**Faculty** The letter(s) which prefix the course code represent the faculty or faculties responsible for the production of a particular course.

- A = Arts Faculty
- D = Social Sciences Faculty
- E = School of Education
- H = Institute of Educational Technology
- K = Department of Health and Social Welfare
- M = Mathematics Faculty
- S = Science Faculty
- T = Technology Faculty
- U = U Area (University-wide)

They are not intended as a guide to the suitability of including a course in a particular degree programme, nor should they be taken as a definitive indication of the course content. Many courses, although produced by one faculty, are of an interdisciplinary nature and can be of interest to a wide variety of students. You are strongly advised to read the detailed course descriptions rather than to make assumptions about their content on the basis of the course code and title alone.

**Course levels** The first figure in the course code indicates the course level. Course codes for foundation courses begin with 1, e.g. D103, S102. Second-level courses begin with 2, e.g. T234, third-level with 3, e.g. D321, and fourth-level with 4, e.g. A403.

We have tried to design second-level courses for the student in search of breadth, and have given as wide a choice of subject matter as possible. Often third-level courses will be more specialized, or they may depend on skills you have acquired in earlier studies with the University. At this level, as at the fourth level, your work will be assessed at honours degree standard and you may accordingly expect courses to be more exacting than the work at previous levels.

**Credit rating** The credit rating of a course is shown by the middle figure of the code. Full-credit courses have an '0' or '1' in the middle; any other figure usually indicates a half-credit course, e.g. DE304 and A311 are full-credit courses; SM352 and M371 are half-credit courses.

**Course presentation** All courses have a limited period of presentation, at the end of which they are either withdrawn altogether or remade. The planned period of presentation is given in Table I if it is known, but the University reserves the right to defer or change the last year of presentation. A change in the University's policy means that some courses are now listed as having an indefinite life. These will be kept up to date by the course teams throughout their presentation.

**Notes for prospective students** Under this heading are given the more practical details of each course, such as the recommended prerequisites, broadcasts, summer school, set books, etc. If any such details are not given you can assume that they do not apply to that course. Students with disabilities should also read the notes in Section 1.

**Excluded combinations** (See Section 2) These are indicated in the course descriptions and in Tables I and III. Courses which are now discontinued are in square brackets (see below).

**Recommended prerequisites** Before registering for certain post-foundation level courses, you are advised that you should already have obtained a credit for another particular course (or courses). These 'recommended prerequisites' are indicated in Table I and in the detailed description of each course. Under 'Notes for Prospective Students' discontinued courses are identified by square brackets; their titles and dates of presentation are listed in Table III. Unless otherwise stated, you can assume that the predecessor/s of a current course will serve as an alternative prerequisite. Further information about recommended prerequisites is given in the faculty overviews.

**Tuition** The amount of face-to-face tuition is more limited on higher-level courses and varies according to the nature of the course. Because of regional variations little information about individual courses can be given here.

**Assessment** Before you begin your studies you will receive a Broadcast and Assignment Calendar telling you when your broadcasts are, the dates by which your tutor-marked assignments (TMAs) and computer-marked assignments (CMAs) are to be submitted (cut-off dates), and how many are necessary for assessment purposes.

We realize that you will not always be able to complete all the assignments: you may, for good reasons, get behind with your work; or you may find some parts of the course more difficult or less interesting. We do not wish to penalize you in such cases and so we have adopted assessment strategies which allow some flexibility in the submission of assignments. Full details of assessment strategies and the substitution rule are given in the Assignments and Examinations section of the 1990 *Student Handbook*.

**Broadcasts and cassettes** The course descriptions and Table I give brief details of television and radio programmes and video and audio cassettes. Fuller details are given in the Broadcast and Assignment Calendar for your course(s). For courses which have audio and video cassettes you will need access to cassette players. The importance of the cassette player, either video or audio, in the course work is indicated in the notes. For some courses, a cassette player is necessary because video or audio material is designed to interact with course units. For others, while a cassette player is desirable, it will not be detrimental to your studies if you do not have access to one. If you have difficulty in gaining access to video replay machines you should seek advice from your Regional Centre. Some videos have to be returned at the end of your studies: this will be mentioned in the course description. More information will appear in the *Conditional Registration Supplement* sent to you in August.

**Home kit** Courses which have a home kit are indicated in Table I and in course descriptions. The kits for some courses may not be taken or sent outside the United Kingdom; if this is known at the time of going to press it is indicated in the course description.

More information will appear in the *Conditional Registration Supplement* sent to you in August.

**Residential school** For some courses you must attend a residential summer school or week or weekend school in order to complete the course for credit. This is indicated in the course description and in Table I. The residential schools fall into two categories:

**Course-based** One residential school is an integral part of the course.

**Discipline-based** One residential school serves, and satisfies the requirements of, more than one course in the same discipline.

Full details of all residential school requirements are given in the relevant section of the 1990 *Student Handbook*.

**Computing** Some courses use computing facilities, although in some cases this is optional. These courses fall into the following categories:

Courses in the home computing policy

Courses for which the University provides a home experiment kit

Courses using study centre terminal facilities

Courses for which computing facilities are provided at residential schools

Other courses for which students must arrange access to particular equipment.

The course descriptions explain which category courses fall into. Included in this mailing is *Information about home computing for 1991*, which sets out the home computing policy specification and explains the schemes for hiring or buying a suitable microcomputer.

If you will be resident overseas in 1991, some of the courses with a home computing element may present you with additional problems. Although there are no technical difficulties with on-line access, it may be expensive and outside Western Europe there may be restrictions on the University's licence for some of the proprietary course software. The hire scheme will not be available to you, and if you take advantage of a purchase scheme while in the UK you must both check local regulations about import of particular machines to your country of residence and make sure that you can obtain compatible power supplies, maintenance and consumables. (See also Section 2.)

**Students with disabilities** See Section 1 'Potential study difficulties for students with disabilities'.

**Set books** The *Set Book List* is sent to you in November or December. As you will need the books throughout the course you are advised to buy them, rather than to borrow them from public libraries. Do not delay your purchase or you may have to start your course without the set books.

**Preparatory reading** Some course teams have suggested work which you might like to do before you start studying the course. If you ought to purchase preparatory reading material, this has been indicated in the notes. Otherwise, you can assume that you can borrow the books just for your work before the course begins.



# TABLE OF 1991 UNDERGRADUATE COURSES

## TABLE I

Table I lists all the courses planned for the undergraduate programme in 1991. Full details of these courses are given in Section 3 of *Undergraduate Courses 1991*; you should refer to these detailed descriptions before making your choice; please read also the footnotes to this Table. The titles of courses that are planned for first presentation in 1991 appear in bold type; the planned presentation dates of those courses that may no longer be available after 1991 and 1992 are underlined; the codes of discontinued courses appear in square brackets (please refer to Table III for a list of discontinued courses and their replacements). Unless otherwise stated, you can assume that the predecessor(s) of a current course will serve as an alternative prerequisite to the course in question (but see footnote to part-credit science courses in Table III). Because of a change in policy many courses will now continue indefinitely. Our intention is that courses which have an indefinite life will be continuously rewritten and kept up to date throughout their presentation.

Course code	Course title	Credit rating	Excluded combination	Recommended prerequisite	Total number of TMAs	Project work	Number of programmes	Cassettes	Home experiment kit	Summer school course based or discipline based	Computing element	Other components and notes	Planned presentation <sup>7</sup> dates (inclusive)	Course code
A102 <sup>1</sup>	An arts foundation course	Full	[A100] [A101]	—	8	—	32 16	Yes	—	—	—	—	1987–1996	A102
A204	The Enlightenment	Full	—	—	8	—	16 33	—	—	—	—	Long-playing records provided. Day schools.	1980–1992	A204
A205	Culture and belief in Europe 1450–1600	Full	—	A102	8	—	24 16	Yes	—	—	—	—	1990–1999	A205
A228	The religious quest	Half	[AD208]	—	4	—	6	Yes	—	—	—	—	1986–1992	A228 <sup>6</sup>
A241	Elements of music	Half	—	—	8	—	8	Yes	—	Yes*	—	*Electronic reed organ (optional) provided. Long-playing records provided; recorder required.	1977–1993	A241
A281	Technology and change 1750–1914	Half	[AST281]	—	4	—	11	Yes	—	Yes	—	—	1984–1991	A281
A282	Science, technology and everyday life 1870–1950	Half	—	—	4	—	8	Yes	—	—	—	—	1989–1998	A282
A293	Rome: the Augustan age	Half	[A291]	—	4	—	8	Yes	—	—	—	—	1982–1992	A293
A294	Fifth-century Athens: democracy and city state	Half	[A292]	A102	4	—	8	Yes	—	—	—	—	1989–1998	A294
A310 <sup>1</sup>	Life and death	Full	—	A102	8	—	—	Yes	—	—	CB	—	1988–1997	A310
A311 <sup>1</sup>	Reason and experience	Full	—	—	8	—	—	Yes	—	—	CB	—	1983–1991	A311
A314 <sup>1,5</sup>	From Baroque to Romantic: studies in tonal music	Full	—	A241	8	—	—	Yes	—	—	CB	—	1984–1996	A314
A315 <sup>1,5</sup>	Modern art and Modernism: Manet to Pollock	Full	—	—	8	—	32 32	—	—	—	CB	—	1983–1992	A315
A317 <sup>1</sup>	Themes in British and American history: a comparative approach c1760–1970	Full	—	A102 and [A203] or A204	8	—	8	Yes	—	—	—	—	1985–1994	A317
A318 <sup>1</sup>	War, peace and social change: Europe 1900–1955	Full	[A301] [A309]	See course description	8	—	—	Yes	Yes	—	CB	—	1990–1999	A318
A319 <sup>1,5</sup>	Literature in the modern world	Full	—	A102 A204 A205	8	—	16 16	Yes	—	—	CB	—	1991–2000	A319
A324 <sup>1</sup>	Liberation and reconstruction: politics, culture and society in France and Italy 1943–54	Half	—	[A203] A204 A293/A294	5	—	—	Yes	Yes	—	—	—	1990–1999	A324
A331 <sup>1</sup>	Religion in Victorian Britain	Half	—	See course description	4	—	—	Yes	—	—	—	—	1989–1998	A331
A341 <sup>1</sup>	Beethoven	Half	—	A241	4	—	—	Yes	—	—	—	—	1988–1998	A341
A353 <sup>1</sup>	Art in fifteenth-century Italy	Half	—	—	4	—	12	Yes	—	—	—	Visits to local art galleries recommended.	1986–1996	A353
A361 <sup>1</sup>	Shakespeare	Half	—	A102 and [A203] or A204	4	—	12 8	Yes	—	—	—	—	1984–1991	A361
A362 <sup>1</sup>	Romantic poetry	Half	—	See course description	4	—	4 12	Yes	—	—	—	—	1984–1991	A362 <sup>6</sup>
A403 <sup>1,4,5</sup>	Arts and society in Britain since the thirties	Full	—	See course description	5	—	—	—	—	—	—	Independent research undertaken for project.	1983–1992	A403
D103 <sup>4</sup>	<b>Society and social science: a foundation course</b>	Full	[D100] [D101] [D102]	—	8	—	16 16	Yes	—	—	CB	—	1991–1998	D103
D205	Changing Britain, changing world: geographical perspectives	Full	—	—	7	—	14	—	—	—	—	—	1985–1994	D205
D209 <sup>1</sup>	State and society	Full	—	—	6	—	12 8	Yes	—	—	—	—	1984–1991	D209
D210	Introduction to economics	Full	[D222] [D282] [D284]	—	7	—	—	Yes	Yes	—	—	—	1985–1994	D210
D211	Social problems and social welfare	Full	—	[D102] D103	7	—	16	Yes	—	—	—	—	1988–1997	D211
D251 <sup>5</sup>	Issues in deafness	Half	—	—	4	—	—	—	Yes	—	—	—	1991–1994	D251
D307	Social psychology: development, experience and behaviour in a social world	Full	[D305]	[D102] D103 and D5E202 [D5262]	7*	—	—	Yes	Yes	—	—	See course description *One TMA will be a double-weighted project.	1985–1994	D307



Course code	Course title	Credit rating	Excluded combination	Recommended prerequisite	Total number of TMAs	CMAAs	Project work	Number of programmes	TV	Radio	Cassettes	Audio	Video	Home experiment kit	Summer school course based or discipline based	Computing element	Other components and notes	Planned presentation <sup>7</sup> dates (inclusive)	Course code
D308	Democratic government and politics	Full	—	D208 and/or D209	7	7	—	8	—	—	Yes	—	—	—	See course description	—	—	1987-1996	D308
D309	Cognitive psychology	Full	[D303]	DSE202 [DS262]	8	—	Yes	—	—	—	—	—	—	—	CB	*	*Computing element at day schools and summer schools.	1986-1995	D309
D310	Crime, justice and society	Full	See course description	See course description	6	—	—	—	—	—	Yes	—	—	—	—	—	Research outline component in double-weighted compulsory non-substitutable TMA 06.	1988-1995	D310
D312	Global politics	Full	—	See course description	6*	—	Yes	—	—	—	Yes	—	—	—	CB	—	*One TMA will be a double-weighted project.	1989-1996	D312
D314	Restructuring Britain	Full	—	See course description	7	—	—	—	—	—	Yes	—	—	—	—	—	—	1989-1996	D314
D321	Professional judgment	Half	—	—	4	2*	—	11	—	—	Yes	—	—	—	—	—	*Part of TMAs.	1988-1995	D321
D345 <sup>5</sup>	Economics and government policy	Half	[D323]	D210	4	—	—	—	—	—	Yes	—	—	—	—	—	—	1988-1995	D345
D437 <sup>4,5</sup>	Conflict and change in the countryside	Half	—	See course description	6	—	—	—	—	—	—	—	—	—	—	—	No printed unit texts.	1989-1992	D437
DE304	Research methods in education and the social sciences	Full	[E341]	See course description	8.5	—	Yes*	—	—	—	Yes	—	—	—	—	Study centre	*Three double-weighted non-substitutable projects.	1979-1991	DE304
DE325	Work and society	Half	[DE351]	See course description	4	—	—	1	—	—	Yes	—	—	—	—	—	—	1985-1992	DE325
DE354	Beliefs and ideologies	Half	—	D207 or any second level D course	4	—	—	—	—	—	Yes	—	—	—	—	—	—	1986-1993	DE354
DSE202	Introduction to psychology	Full	[DS261] [DS262]	[D102] D103	8	—	Yes	8	—	—	Yes	—	—	—	CB	—	Calculator/timer required.	1990-1999	DSE202
DT200	An introduction to information technology: social and technological issues	Full	—	[D102] D103 or T102	7	—	Yes	16	8	—	Yes	—	—	Yes*	—	Home	*Modem supplied.	1988-1993	DT200
E206 <sup>2</sup>	Personality, development and learning	Full	[E201] [E281]	—	7	—	Yes	12	—	—	Yes	—	—	—	—	—	—	1985-1992	E206
E208 <sup>2</sup>	Exploring educational issues	Full	[E200] [E220] EP228 <sup>9</sup>	Any foundation course	7	—	—	15	7	—	Yes	—	—	—	—	—	—	1989-1996	E208
E241 <sup>2</sup>	Special needs in education	Half	—	—	5	—	—	9	—	—	Yes	—	—	—	—	—	End of course essay (TMA 05).	1982-1991	E241
E271 <sup>2,5</sup>	Curriculum and learning	Half	[E203] [E204] [E283]	—	3	—	—	8	—	—	Yes	—	—	—	—	—	—	1991-1998	E271
E324 <sup>2</sup>	Management in post-compulsory education	Half	—	—	4	—	—	8	—	—	Yes	—	—	—	—	—	—	1984-1991	E324
E325 <sup>2,3</sup>	Managing schools	Half	[E321] [E323]	—	4	—	—	8	2	—	Yes	—	—	—	—	—	—	1988-1995	E325
E333 <sup>2</sup>	Policy making in education	Half	[E222]	—	4	—	Yes	4	2	—	Yes	—	—	—	—	—	—	1986-1993	E333
E355 <sup>2</sup>	Education for adults	Half	—	—	4*	—	Yes	8	6	—	Yes	—	—	—	—	—	*5,000 word project report.	1984-1991	E355
E362 <sup>2</sup>	Cognitive development: language and thinking from birth to adolescence	Half	—	[D102] D103 or DSE202 [DS262] or E206	4	—	Yes	7	—	—	Yes	—	—	—	—	—	Access to at least 2 children essential for project.	1979-1995	E362
EH207 <sup>2</sup>	Communication and education	Full	—	—	8	—	—	12	2	—	Yes	—	—	—	—	—	—	1987-1994	EH207
EH232 <sup>2,5</sup>	Computers and learning	Half	[EH221]	See course description	4	—	Yes	—	—	—	Yes	Yes	—	—	—	Home	Access to a group of learners essential for project.	1991-1994	EH232
EM235 <sup>2,5</sup>	Developing mathematical thinking	Half	—	—	4	—	Yes	—	—	—	Yes	Yes	—	—	—	—	Access to a group of not less than 6 children for 2-3 weeks is essential.	1982-1991	EM235
M101 <sup>4</sup>	Mathematics: a foundation course	Full	[M100] MS283 [MST281] [TM281] TM282	—	11	6	—	32	16	—	Yes	—	—	—	CB	Summer school	Calculator required.	1978-1995	M101
M203 <sup>9</sup>	Introduction to pure mathematics	Full	[M202] [M211] [M212] [M231]	M101	8	—	—	29	—	—	Yes	—	—	—	CB	—	Scientific calculator required.	1980-indef. <sup>10</sup>	M203
M205	Fundamentals of computing	Full	See course description	—	8	—	—	16	—	—	Yes	—	—	—	—	Home	—	1988-1993	M205
M245	Probability and statistics	Half	—	M101 or MS283	4	4	—	16	—	—	Yes	—	—	—	—	—	Calculator required.	1984-1993	M245
M261	Mathematics in computing	Half	—	M101 or M205 or MS283/TM282	4	—	—	—	—	—	Yes	—	—	—	—	—	—	1988-1995	M261
M332	Complex analysis	Half	—	See course description	4	—	—	—	—	—	Yes	Yes	—	—	—	—	—	1975-1992	M332
M343 <sup>9</sup>	Applications of probability	Half	—	M245 and MST204	4	—	—	—	—	—	Yes	Yes	—	—	—	—	Calculator required	1988-indef. <sup>10</sup>	M343
M345 <sup>9</sup>	Statistical methods	Half	—	M245	4	—	—	—	—	—	Yes	—	—	Yes	—	Kit	Calculator required.	1987-1996	M345



Course code	Course title	Credit rating	Excluded combination	Recommended prerequisite	Total number of TMA's	CMA's	Project work	Number of programmes TV	Radio	Cassettes Audio	Video	Home experiment kit	Summer school course based or discipline based	Computing element	Other components and notes	Planned presentation <sup>7</sup> dates (inclusive)	Course code
M353	Programming and programming languages	Half	—	See course description	4	—	—	—	—	Yes	—	—	—	Home		1986-1996	M353
M355	Topics in software engineering	Half	—	See course description	4	—	—	—	—	Yes	—	—	—	—		1990-1995	M355
M357 <sup>5</sup>	Data models and databases	Half	[M352]	M205	4	—	—	8	—	Yes	—	—	—	Home*	*See also course description.	1990-1995	M357
M371 <sup>5</sup>	Computational mathematics	Half	[M351]	See course description	4	—	—	—	—	Yes	—	—	—	Home	Scientific calculator required.	1988-1995	M371
M381 <sup>5</sup>	Number theory and mathematical logic	Half	See course description	M101 and a second level M course	4	—	—	—	—	Yes	—	—	—	—	Calculator desirable.	1986-1996	M381
M386 <sup>5</sup>	Metric and topological spaces and geometric topology	Half	See course description	M101 and a second level M course	4	—	—	8*	—	Yes	—	—	—	—	*For geometric topology. Calculator desirable.	1986-1991	M386
MA290	Topics in the history of mathematics	Half	See course description	—	4	—	—	8	—	Yes	—	—	—	—		1987-1998	MA290
MDST 242 <sup>3</sup>	Statistics in society	Half	—	—	4	5	—	8	—	Yes	—	—	—	—	Calculator required.	1983-1994	MDST42
ME234 <sup>3</sup>	Using mathematical thinking	Half	—	—	4	—	—	—	—	Yes	Yes	—	—	Yes*	Calculator desirable. *See course description.	1989-1996	ME234
MS283	An introduction to calculus	Half	[M100] M101 [MST281] TM282	—	4	6	—	17	—	Yes	—	—	CB	—	Calculator required.	1979-1999	MS283
MS323 <sup>3</sup>	Introduction to non-linear dynamics	Half	—	MST204	4	—	—	—	—	—	—	—	—	—		1991-1998	MS323
MST204	Mathematical models and methods	Full	[M201] [MST282]	M101 or MS283 or TM282	8	7	Yes	32	—	Yes	—	—	CB	Summer school	Calculator required.	1982-1997	MST204
MST322 <sup>5</sup>	Mathematical methods and fluid mechanics	Half	—	See course description	4	—	—	—	—	Yes	Yes	—	—	—		1984-1995	MST322
S102 <sup>4</sup>	A science foundation course	Full	[S100][S101]	—	8	10	—	35	—	Yes	—	Yes	CB	Summer school	Calculator.	1988-1995	S102
S203 <sup>5</sup>	<b>Biology: form and function</b>	Full	[S202] [S221] [S223] [S225]	—	8	8	—	32	—	Yes	—	Yes	CB	Yes		1991-indef. <sup>10</sup>	S203
S236	Geology	Half	[S23-]	S102	4	5	—	16	—	Yes	—	Yes	CB	—	Outdoor fieldwork.	1983-indef. <sup>10</sup>	S236
S237	The Earth: structure, composition and evolution	Half	See course description	S102	4	4	—	17	—	Yes	—	Yes	—	—		1981-1991 <sup>9</sup>	S237
S238	The Earth's physical resources	Half	[S266] [S26-]	S102	4	4	—	17	—	Yes	—	—	CB	—	Calculator. Field visits.	1984-1992	S238
S246	Organic chemistry	Half	[S24-]	S102	4	4	—	8	4	Yes	Yes	Yes	DB	*	*CALCHEM programs available on disc.	1981-indef. <sup>10</sup>	S246
S247	Inorganic chemistry: concepts and case studies	Half	[S25-]	S102	4	5	—	11	—	Yes	—	Yes	DB	—		1981-indef. <sup>10</sup>	S247
S256 <sup>5</sup>	Matter in the Universe	Half	—	See course description	4	5	—	8	—	Yes	Yes	—	—	Study centre	Access to a computer terminal desirable.	1985-1992	S256
S271	Discovering physics	Half	—	S102 or M101 or T102	5*	5	—	16	—	Yes	—	Yes	CB	—	*Summer school grade is included as TMA 05 but no TMA activity involved.	1982-indef. <sup>10</sup>	S271
S272	The physics of matter	Half	[ST285]	S271 and M101 or MS283 or TM282	4	5	—	11	—	Yes	—	—	CB	—		1986-1996	S272
S298 <sup>5</sup>	Genetics	Half	[S299]	S102	4	6	—	10	—	Yes	—	Yes	—	Study centre	Access to a computer terminal desirable.	1987-1994	S298
S324	Animal physiology	Half	[S321]	S102 and [S202]/S203	4	4	Yes	10	—	Yes	—	—	DB	—	One day school.	1985-indef. <sup>10</sup>	S324
S325 <sup>5</sup>	Biochemistry and cell biology	Half	[S322]	See course description	4*	3	Yes	8	—	—	Yes	—	DB	—	*TMA 03 extended essay.	1986-1993	S325
S326	Ecology	Half	[S323]	S102 and [S202]/S203	4	4	Yes	16	—	Yes	—	See course description	CB*	—	Two TMA's relate to project. *Held during April and May.	1986-indef. <sup>10</sup>	S326
S330 <sup>5</sup>	Oceanography	Half	[S334]	See course description	4	5	—	9	—	Yes	—	—	—	—		1989-1996	S330
S338 <sup>5</sup>	Sedimentary processes and basin analysis	Half	[S333] [S335] [S337]	See course description	4	4	—	—	—	—	Yes	Yes	CB*	—	*Also field trips. See course description.	1987-1995 <sup>7</sup>	S338
S341 <sup>5</sup>	Photochemistry: light, chemical change and life	Half	—	S102 and S246	4	4	Yes	11	—	Yes	—	—	CB	Summer school		1982-1991	S341
S342 <sup>5</sup>	Physical chemistry: principles of chemical change	Half	—	S102 and S247	4	5	—	7	—	Yes	—	—	CB	Summer school*	Scientific calculator required. *Part of summer school work.	1985-indef. <sup>10</sup>	S342



Course code	Course title	Credit rating	Excluded combination	Recommended prerequisite	Total number of TMA's	CMA's	Project work	Number of programmes TV	Radio	Cassettes Audio	Video	Home experiment kit	Summer school course based or discipline based	Computing element	Other components and notes	Planned presentation <sup>7</sup> dates (inclusive)	Course code
S343 <sup>5</sup>	Inorganic chemistry	Half	[S304] [S351] [S352]	S102/S246/S247	4	4	—	—	—	Yes	Yes	Yes*	DB	—	*See course description.	1989-1996	S343
S344 <sup>5</sup>	Organic chemistry: a synthesis approach	Half	[S304] [S351] [S352]	S246	4	4	—	—	—	Yes	Yes	Yes	DB	Summer school		1989-1996	S344
S354	Understanding space and time	Half	—	See course description	4	6	—	17	—	Yes	—	—	—	—		1979-1995	S354
S442 <sup>5</sup>	NMR spectroscopy in chemistry and the life sciences	Half	—	See course description	2	—	Yes	—	—	—	—	—	CB*	—	*Weekend school in April: attendance essential **No presentations in 1993 and 1995	1991-1996**	S442
SM355 <sup>5</sup>	Quantum mechanics	Half	[SM351]	MST204 and S271	4	6	—	—	—	Yes	Yes	—	CB	Summer school	See course description.	1986-indef. <sup>10</sup>	SM355
SMT356 <sup>5</sup>	Electromagnetism	Half	[SM352]	MST204 S271	4	6	—	—	—	—	Yes	—	—	Day school	Calculator required.	1991-indef. <sup>10</sup>	SMT356
ST291	Images and information	Half	—	See course description	4	5	—	17	—	Yes	—	Yes	—	Study centre*	*Access to computer terminal for 'MERLIN' tutorials desirable.	1977-indef. <sup>10</sup>	ST291

For all references to T102 in the recommended prerequisites column, T101 is an acceptable alternative.

T102 <sup>4</sup>	Living with technology: a foundation course	Full	[T100] [T101] ET217 <sup>11</sup>	—	6	6	—	16	8	Yes	—	—	CB	Home	End of course report additional to TMA's.	1989-	T102
T201 <sup>5</sup>	Materials in action	Full	[T252] T253 or T254 T255 [TS251]	T102 and T281 or S102 and S271	8	8	—	8	—	—	Yes	—	CB	—	Calculator required. See also course description.	1990-1999	T201
T202	Analogue and digital electronics	Full	[T283] [TS282]	T281 and TM282	8	8	—	—	—	Yes	—	Yes	CB	Home	Scientific calculator and multimeter required.	1990-1999	T202
T233 <sup>5</sup>	Thermofluid mechanics and energy	Half	[T231]	[T232] or T235 or TM282 or MST204	8	8	Yes	8	—	Yes	—	Yes	—	—	Scientific calculator essential. Project work involves HEK.	1982-1991	T233
T234	Environmental control and public health	Half	[PT272]	T102 or S102 or T281	4	4	Yes	8	—	Yes	—	Yes	—	—	Calculator an advantage.	1985-1992	T234
T235 <sup>5</sup>	Engineering mechanics: solids	Half	[T231] [T232]	M101 or [TM281] or TM282	4	8	—	8	—	Yes	—	—	CB	—	Scientific calculator and set of drawing instruments required.	1990-1999	T235
T244	Managing in organizations	Half	[T242] [T243]	—	4	—	—	5	—	Yes	—	—	DB	—	Additional TV programmes associated with summer school - see Broadcast and Assignment Calendar.	1985-1993	T244
T247 <sup>5</sup>	Working with systems	Half	[T241]	—	4	2	Yes	4	—	Yes	—	—	—	Home		1991-1998	T247
T253 <sup>5</sup>	Materials for electronics	Half	T201 [T252] T254 T255 [TS251]	T102 and T281 or S102 and S271	4	4	—	—	—	—	Yes	—	CB	—	See notes for T201: joint school.	1990-1999	T253
T254 <sup>5</sup>	Stress on materials	Half	T201 [T252] T253 T255 [TS251]	T102 and T281 or S102 and S271	4	4	—	—	—	—	Yes	—	CB	—	See notes for T201: joint school.	1990-1999	T254
T255 <sup>5</sup>	Materials in manufacturing	Half	T201 [T252] T253 T254 [TS251]	T102 and T281 or S102 and S271	4	4	—	—	—	—	Yes	—	CB	—	See notes for T201: joint school.	1990-1999	T255
T263 <sup>5</sup>	Design: processes and products	Half	[T262]	See course description	5	—	—	8	—	Yes	—	Yes	—	—	Audio-visual packages provided.	1983-1991	T263
T274	Food production systems	Half	[T273]	T102 or S102 or D102	4	6	—	8	—	Yes	—	—	—	—	Half-day school. Calculator an advantage.	1987-1994	T274
T281	Basic physical science for technology	Half	—	T102	4	4	—	8	—	Yes	—	—	CB	—	Calculator required.	1984-1993	T281
T292 <sup>5</sup>	Instrumentation	Half	[T291]	See course description	4	4	—	3	—	—	—	—	CB	—		1986-1993	T292
T301 <sup>5</sup>	Complexity, management and change: applying a systems approach	Full	[T341] [TD342]	—	8	1	Yes	—	—	Yes	—	—	—	Yes*	Access to a personal computer with MS DOS essential for hard systems project option.	1984-1999	T301
T322 <sup>5</sup>	Digital telecommunications	Half	[T321]	See course description	4	5	—	—	—	Yes	—	—	—	—		1990-1997	T322
T326	Electronic signal processing	Half	—	See course description	4	5	—	—	—	Yes	—	—	—	—	Calculator with sine, cosine and exponential functions and their inverses essential.	1984-1991	T326
T331 <sup>5</sup>	Engineering mechanics: solids and fluids	Half	—	[T232] T235 and M101 or TM282	4	4	—	2	—	Yes	—	—	—	—	Scientific calculator essential.	1985-1994	T331
T333 <sup>5</sup>	Heat transfer: principles and applications	Half	—	T233	4	4	—	—	—	—	—	—	—	Home		1991-1998	T333



Course code	Course title	Credit rating	Excluded combination	Recommended prerequisite	Total number of TMA's CMA's	Project work	Number of programmes TV	Radio	Cassettes Audio	Video	Home experiment kit	Summer school course based or discipline based	Computing element	Other components and notes	Planned presentation <sup>7</sup> dates (inclusive)	Course code
T334 <sup>5</sup>	Environmental monitoring and control	Half	—	[PT272] or T234	5	—	Yes	—	Yes	—	Yes*	—	—	Access to T234 units and set books and scientific calculator essential. * Optional	1989–1996	T334
T353 <sup>5</sup>	Failure of stressed materials	Half	[T351]	See course description	7	—	Yes	8	—	—	Yes	—	—		1983–1994	T353
T362 <sup>5</sup>	Design and innovation	Half	—	See course description	4	—	Yes	8	—	Yes	—	—	—	CB	1986–1994	T362
T363 <sup>5</sup>	Computer-aided design	Half	—	T263	4	—	—	—	—	Yes	Yes	—	Home*	*See course description.	1987–1994	T363
T392 <sup>5</sup>	Engineering product design	Half	—	See course description	4	4	Yes	11	—	Yes	Yes	—	—		1984–1991	T392
T393 <sup>5</sup>	Electronic materials and devices	Half	—	See course description	4	6	—	—	Yes	Yes	—	—	—		1985–1994	T393
T394 <sup>5</sup>	Control engineering	Half	[T391]	See course description	4	5	Yes	—	—	Yes	—	—	Yes*	*Part of a home kit.	1986–1993	T394
T401 <sup>4,5</sup>	Technology project	Full	—	See course description	—	—	Yes*	—	—	See course description	—	See course description	—	*Three project reports and oral examination.	1979–	T401
TM222	The digital computer	Half	[TM221]	See course description	5	—	Yes	—	—	Yes	—	—	—	Television required for use with HEK.	1983–1991	TM222
TM282	Modelling with mathematics: an introduction	Half	[M100]/M101 [MST281]/ MS283 [TM281]	See course description	7	5	—	8	—	Yes	—	—	—	Scientific hand-held calculator required.	1985–1997	TM282
TM361	Graphs, networks and design	Half	—	See course description	4	6	—	16	—	Yes	—	—	—	Day schools.	1981–1995	TM361
U204	Third World studies	Full	—	—	8	—	Yes	18	—	Yes	—	—	—		1983–1991	U204
U205	Health and disease	Full	—	—	7	—	—	11	—	Yes	—	—	—		1985–indef. <sup>10</sup>	U205
U206 <sup>5</sup>	The environment	Full	—	Any foundation course	8	4	Yes	8	—	Yes	—	—	—		1991–1998	U206
U221	The changing experience of women	Half	—	—	4	—	—	8	—	Yes	—	—	—	CB	1983–1991	U221
U235	Nuclear weapons: inquiry, analysis and debate	Half	—	—	4	—	—	8	8	Yes	—	—	—		1986–1993	U235
K254	Working with children and young people	Half	—	—	4	—	Yes	—	—	Yes	Yes	—	—		1990–1996	K254

## FOOTNOTES TO TABLE 1

**1 Third and fourth level arts courses**

The Arts Faculty advises students not to attempt a third or fourth-level arts course before successfully completing at least one arts course at second level. It is felt that most students need the practice offered at second level to acquire the high standard of written expression needed for the higher level courses.

**2 Education studies courses**

The courses in the School of Education are open not only to professional workers but to anybody who is interested in education. They provide an opportunity for teachers, social workers, parents and others to study together. It should be noted that the courses in the School of Education are not intended to qualify

students as teachers. Students who intend to take the School of Education courses must, like all other students, take a foundation level course in their first year of study, although there is no foundation level course in the School of Education.

**3 MDST242**

This course, as well as any course with 'E' in the code, may be chosen as part of an approved programme of study in educational studies by students who finally registered with the University before 1981 and who are eligible for the award of a discretionary credit exemption on the basis of approved teaching qualifications.

**4 Associate student programme**

We do not plan to include these courses in the associate student programme in 1991.

**5 Students with disabilities**

Course and supplementary materials (not set books) are available on tape in 1991 from the Office for Students with Disabilities for all courses with the exception of those marked (5). If you rely on tapes and wish to include any of those marked (5) in your degree profile in 1992 or later, please read the section on course units and set books on audio cassette on page 2.

6 Faculties hope to extend the presentation dates of these courses. Please see your *Conditional Registration Supplement* (sent to you in August) for further information.

**7 S338 and S33**

S338 *Sedimentary processes and basin analysis* and S339 *Understanding the continent: tectonic and thermal processes of the lithosphere* will be presented in alternate years, S338 in odd-numbered and S339 in even-numbered years.

8 EP228 *Frameworks for teaching* is only available in the associate student programme. See Section 5 for further information.

9 A replacement course for S257 will be presented for the first time in 1993.

**10 Indefinite course lives**

Because of a change in the University's policy about course lives, some courses may now be listed as having an indefinite life (indef.) Such courses will be kept up to date by the course teams throughout their presentation.

**11 ET217**

ET217 is only available in the associate student programme but can be counted as a full credit towards the BA degree, where it is treated as a foundation course both for the purpose of the foundation course requirement and for degree classification.



# TABLES OF RELATED COURSES

These tables should be used in conjunction with the other sections of Undergraduate Courses 1991

Unlike other universities, where students are admitted to read a particular degree programme with only a limited range of options, the Open University presents you with an extremely wide and flexible choice of courses.

These tables have been devised to show the areas of study which are available to Open University undergraduate students; their purpose is to help you to find a combination of courses which will meet your particular needs and interests.

Courses are grouped into 45 tables, each one indicating an area of study. Most of the tables are in two sections, with courses that are central to the area of study appearing in the first section, and courses which although not central are relevant to that area appearing in the second. *The order of the courses within each section is not significant: some courses are naturally of a greater relevance than others and it is important to read the General Advice, the Faculty Overviews and the individual course descriptions so that you can judge for yourself which combination of courses to study and in which order to study them; this is particularly advisable in the case of science courses.* In U-courses, the subject matter crosses both faculty boundaries and the usual discipline boundaries within faculties, and as a result offers linkings with other courses in a more than usually varied way. You will need to examine the content of a U-course to get an indication of how it actually connects with other relevant courses.

You should also be aware that *the way in which each table is set out does not indicate prerequisite courses or excluded combinations and you must consult individual course descriptions for this information.*

You should not assume that, by obtaining

any of the combinations of courses indicated in the tables, it will necessarily be possible for you to obtain recognition by professional or other bodies outside the University in the subject areas concerned. For this purpose the tables should be used in conjunction with the Recognition Information Leaflets (see General Advice Section 1).

A further limit to the scope of the tables is that they include only those undergraduate courses planned for 1991, and those which we hope to present in 1992. You may have gained credits in courses which are not listed here. Table III, the list of discontinued courses and their excluded combinations, will help you to judge whether a discontinued course you have taken is a suitable substitute.

There are obviously hundreds of tables that could be constructed and it should be stressed that the tables in this section are in no sense intended as prescriptive degree profiles; rather they are a way of suggesting groupings of courses which you might have overlooked. We hope that these tables will help you, but *please remember* that their scope is limited: they are designed to be used in conjunction with all other sections in *Undergraduate Courses 1991*.

If you need more advice about choosing your courses, you should discuss your position with your tutor-counselor.

These tables have been prepared by the Academic Administration (Students) Division on the basis of information provided by the appropriate academic areas of the University.

## 1 ART HISTORY

Courses central to area of study:

- A102 An arts foundation course
- A204 The Enlightenment
- A205 Culture and belief in Europe 1450-1600
- A315 Modern art and Modernism: Manet to Pollock
- A353 Art in fifteenth-century Italy
- A403 Arts and society in Britain since the thirties (project course)

Other relevant courses:

- A293 Rome: the Augustan age
- A294 Fifth-century Athens: democracy and city state

## 2 BIOLOGY

(See also *Science Overview*, Fig. 1)

Courses central to area of study:

- S102 A science foundation course
- S203 Biology: form and function
- S298 Genetics
- S324 Animal physiology
- S325 Biochemistry and cell biology
- S326 Ecology
- S365 Evolution
- SD206 Biology: brain and behaviour

**Biology with chemistry**

(See also *Science Overview*, Fig. 2)

Courses central to area of study in addition to those under main heading:

- S246 Organic chemistry
- S247 Inorganic chemistry: concepts and case studies
- S341 Photochemistry: light, chemical change and life

**Biology with physics**

(See also *Science Overview*, Fig. 3)

Courses central to area of study in addition to those under main heading:

- S236 Geology
- S238 The Earth's physical resources
- S330 Oceanography

The courses underlined will be in their last year of presentation in 1991; those in *italics* are planned for first presentation in 1992.

- S338 Sedimentary processes and basin analysis
- \*S339 Understanding the continents: tectonic and thermal processes of the lithosphere

Other relevant courses:

- DSE202 Introduction to psychology
- M245 Probability and statistics
- MDST242 Statistics in society
- T234 Environmental control and public health
- T274 Food production systems
- U205 Health and disease
- U221 The changing experience of

women

\*Presented in alternate years with S338

See also Recognition Information Leaflet 3.8 about associate or full membership of the Institute of Biology. \*

## 3 CHEMISTRY

(See also *Science Overview*, Fig. 2)

Courses central to area of study:

- S102 A science foundation course
- S246 Organic chemistry
- S247 Inorganic chemistry: concepts and case studies
- S256 Matter in the Universe
- S341 Photochemistry: light, chemical change and life
- S342 Physical chemistry
- S343 Inorganic chemistry
- S344 Organic chemistry: a synthesis approach
- S442 NMR spectroscopy

**Chemistry with biology**

(See also *Science Overview*, Fig. 1)

Courses central to area of study in addition to those under main heading:

- S203 Biology: form and function
- S298 Genetics
- S325 Biochemistry and cell biology

**Chemistry with Earth sciences**

(See also *Science Overview*, Fig. 3)

Courses central to area of study in addition to those under main heading:

- S236 Geology
- S237 The Earth: structure, composition and evolution

- S238 The Earth's physical resources
- S330 Oceanography
- S338 Sedimentary processes and basin analysis

- S339\* Understanding the continents: tectonic and thermal processes of the lithosphere

\*Presented in alternate years with S338 \*

**Chemistry with physics**

(See also *Science Overview*, Fig. 4)

Courses central to area of study in addition to those under main heading:

- M101 Mathematics: a foundation course
- M5283 An introduction to calculus
- S271 Discovering physics
- S272 The physics of matter
- SM355 Quantum mechanics
- T201 Materials in action
- T253 Materials for electronics
- T254 Stress on materials
- T255 Materials in manufacturing
- T353 Failure of stressed materials

Other relevant courses:

- T234 Environmental control and public health
- T274 Food production systems
- TM282 Modelling with mathematics: an introduction

See also Recognition Information Leaflet 3.8 for professional recognition by the Royal Society of Chemistry.

The courses underlined will be in their last year of presentation in 1991; those in *italics* are planned for first presentation in 1992.

## TABLE II

### 4 CLASSICAL STUDIES

Courses central to area of study:

- A102 An arts foundation course
- A204 The Enlightenment
- A293 Rome: the Augustan age
- A294 Fifth-century Athens: democracy and city state

Other relevant courses:

- A228 The religious quest
- MA290 Topics in the history of mathematics

### 5 COMPUTING AND COMPUTERS

Courses central to area of study:

- DT200 An introduction to information technology
- M101 Mathematics: a foundation course
- M205 Fundamentals of computing
- M261 Mathematics in computing
- M353 Programming and programming languages
- M355 Topics in software engineering
- M357 Data models and databases
- M371 Computational mathematics
- T223 Microprocessor-based computers
- T401 Technology project
- TM222 The digital computer
- EH232 Computers and learning

Other relevant courses:

- M345 Statistical methods
- M372 Numerical methods and applications
- MS283 An introduction to calculus
- MS1204 Mathematical models and methods
- ST291 Images and information
- T102 Living with technology: a foundation course
- T202 Analogue and digital electronics
- T247 Working with systems
- T292 Instrumentation
- T322 Digital telecommunications
- T326 Electronic signal processing
- T363 Computer aided design
- T394 Control engineering
- TM361 Graphs, networks and design
- TM282 Modelling with mathematics: an introduction

### 6 DESIGN

Courses central to area of study:

- T263 Design: processes and products
- T362 Design and innovation
- T363 Computer aided design
- T392 Engineering product design

- TM361 Graphs, networks and design

Other relevant courses:

- DT200 An introduction to information technology
- T102 Living with technology: a foundation course
- T201 Materials in action
- T202 Analogue and digital electronics
- T235 Engineering mechanics: solids
- T247 Working with systems
- T253 Materials for electronics
- T254 Stress on materials
- T255 Materials in manufacturing
- T301 Complexity, management and change: applying a systems approach
- T353 Failure of stressed materials
- T401 Technology project

### 7 EARTH SCIENCES

(See also *Science Overview*, Fig. 3)

Courses central to area of study:

- S102 A science foundation course
- S236 Geology
- S237 The Earth: structure, composition and evolution
- S238 The Earth's physical resources
- S330 Oceanography

The courses underlined will be in their last year of presentation in 1991; those in *italics* are planned for first presentation in 1992.

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- 28 Mathematics, pure
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- 31 Methodology
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- 41 Sociology
- 42 Statistics
- 43 Systems
- 44 Technological systems
- 45 Town planning



- 5338 Sedimentary processes and basin analysis  
5339 Understanding the continents: tectonic and thermal processes of the lithosphere

#### Earth sciences with biology

(See also Science Overview, Fig. 1)

Courses central to area of study in addition to those under main heading:

- 5203 Biology: form and function  
5298 Genetics  
5326 Ecology  
5365 Evolution  
T274 Food production systems  
U205 Health and disease

#### Earth sciences with chemistry

(See also Science Overview, Fig. 3)

Courses central to area of study in addition to those under main heading:

- 5247 Inorganic chemistry: concepts and case studies  
5256 Matter in the Universe  
5341 Photochemistry: light, chemical change and life  
5342 Physical chemistry  
5343 Inorganic chemistry  
SM355 Quantum mechanics  
T254 Stress on materials  
T255 Materials in manufacturing

#### Earth sciences with physics

(See also Science Overview, Fig. 4)

Courses central to area of study in addition to those under main heading:

- M101 Mathematics: a foundation course  
MS283 An introduction to calculus  
MST204 Mathematical models and methods  
5256 Matter in the Universe  
5271 Discovering physics  
5272 Physics of matter  
S354 Understanding space and time  
T201 Materials in action  
T202 Analogue and digital electronics  
T253 Materials for electronics  
T254 Stress on materials  
T255 Materials in manufacturing  
T292 Instrumentation  
T353 Failure of stressed materials

Other courses relevant to studies in Earth sciences:

- S246 Organic chemistry  
SM355 Quantum mechanics  
T234 Environmental control and public health  
TM282 Modelling with mathematics: an introduction  
U206 The environment

#### 8 ECONOMICS

Courses central to area of study:

- D103 Society and social science: a foundation course  
D209 State and society  
D210 Introduction to economics  
D212 *Running the country*  
D321 Professional judgment  
D345 Economics and government policy  
DE304 Research methods in education and the social sciences  
M245 Probability and statistics  
MDST242 Statistics in society  
U204 Third World studies  
U208 *The end of the Third World?*

Other relevant courses:

- D312 Global politics  
D314 Restructuring Britain  
DE325 Work and society  
E333 Policy making in education  
ED356 *Race, education and society*  
M101 Mathematics: a foundation course  
M345 Statistical methods  
MST204 Mathematical models and methods

- S238 The Earth's physical resources  
T244 Managing in organizations  
T263 Design: processes and products  
T274 Food production systems  
T362 Design and innovation  
U205 Health and disease

#### 9 EDUCATION AND SOCIETY

Courses central to area of study:

- E208 Exploring educational issues  
E241 Special needs in education  
E242 *Learning for all*  
E271 Curriculum and learning  
E333 Policy making in education  
E355 Education for adults  
ED356 *Race, education and society*  
EH207 Communication and education  
EH266 *Learning through life: education and training beyond school*

Other relevant courses:

- D213 *Understanding modern societies*  
D321 Professional judgment  
DE304 Research methods in education and the social sciences  
DE325 Work and society  
DE354 Beliefs and ideologies  
DT200 An introduction to information technology  
E206 Personality, development and learning  
K254 Working with children and young people  
MDST242 Statistics in society  
U205 Health and disease  
U207 *Issues in women's studies*  
U221 The changing experience of women

#### 10 EDUCATION FOR YOUTH AND ADULTS

Courses central to area of study:

- E324 Management in post-compulsory education  
EH266 *Learning through life: education and training beyond school*  
E355 Education for adults

Other relevant courses:

- E208 Exploring educational issues  
E333 Policy making in education  
ED356 *Race, education and society*  
K254 Working with children and young people

#### 11 EDUCATION, PSYCHOLOGY OF

Courses central to area of study:

- E206 Personality, development and learning  
E241 Special needs in education  
E242 *Learning for all*  
E271 Curriculum and learning  
E362 Cognitive development: language and thinking from birth to adolescence  
EM235 Developing mathematical thinking  
EM236 *Teaching for attainment in mathematics*  
DE304 Research methods in education and the social sciences

Other relevant courses:

- E208 Exploring educational issues  
EH207 Communication and education  
EH232 Computers and learning  
D103 Society and social science: a foundation course  
D307 Social psychology  
D309 Cognitive psychology  
D321 Professional judgment  
DSE202 Introduction to psychology  
MDST242 Statistics in society  
ME234 Using mathematical thinking

#### 12 EDUCATIONAL POLICY AND MANAGEMENT

Courses central to area of study:

- E324 Management in post-compulsory education  
E325 Managing schools  
E333 Policy making in education  
Other relevant courses:  
D212 *Running the country*  
D321 Professional judgment  
E208 Exploring educational issues  
E241 Special needs in education

- E242 *Learning for all*  
E271 Curriculum and learning  
E355 Education for adults

- ED356 *Race, education and society*  
EH207 Communication and education  
EH266 *Learning through life: education and training beyond school*  
DE304 Research methods in education and the social sciences

MDST242 Statistics in society

- T244 Managing in organizations  
T301 Complexity, management and change: applying a systems approach

#### 13 EDUCATION - CURRICULUM AND TEACHING STUDIES

Courses central to area of study:

- E241 Special needs in education  
E242 *Learning for all*  
E271 Curriculum and learning  
ED256 *Race, education and society*  
EH232 Computers and learning  
EM235 Developing mathematical thinking

- EM236 *Teaching for attainment in mathematics*  
ME234 Using mathematical thinking

Other relevant courses:

- E208 Exploring educational issues  
EH207 Communication and education  
DE304 Research methods in education and the social sciences  
MDST242 Statistics in society

#### 14 ELECTRONICS

Courses central to area of study:

- T102 Living with technology: a foundation course  
T202 Analogue and digital electronics  
T223 *Microprocessor-based computers*  
T281 Basic physical science for technology  
T292 Instrumentation  
T326 Electronic signal processing  
T393 Electronic materials and devices  
T394 Control engineering  
T401 Technology project  
TM222 The digital computer

- TM282 Modelling with mathematics: an introduction  
DT200 An introduction to information technology  
M101 Mathematics: a foundation course  
MS283 An introduction to calculus  
S102 Science: a foundation course

Other relevant courses:

- M205 Fundamentals of computing  
M353 Programming and programming languages  
M355 Topics in software engineering  
M357 Data models and databases  
M371 Computational mathematics  
MST204 Mathematical models and methods  
S271 Discovering physics  
S354 Understanding space and time  
SM355 Quantum mechanics  
SMT356 Electromagnetism  
ST291 Images and information  
T201 Materials in action  
T235 Engineering mechanics: solids

- T253 Materials for electronics  
T254 Stress on materials  
T255 Materials in manufacturing  
T263 Design: processes and products

- T322 Digital telecommunications  
T331 Engineering mechanics: solids and fluids  
T362 Design and innovation  
T363 Computer-aided design  
T392 Engineering product design

- TM361 Graphs, networks and design

See also Recognition Information Leaflet about the requirements of the IEE.

#### 15 ENGINEERING DESIGN

Courses central to area of study:

- T102 Living with technology: a foundation course  
T201 Materials in action  
T202 Analogue and digital electronics  
T233 Thermofluid mechanics and energy

- T235 Engineering mechanics: solids  
T253 Materials for electronics  
T254 Stress on materials  
T255 Materials in manufacturing  
T263 Design: processes and products

- T281 Basic physical science for technology  
T292 Instrumentation  
T362 Design and innovation  
T363 Computer aided design  
T392 Engineering product design

- T401 Technology project  
M101 Mathematics: a foundation course

Other relevant courses:

- T223 *Microprocessor-based computers*  
T234 Environmental control and public health  
T244 Managing in organizations  
T326 Electronic signal processing  
T331 Engineering mechanics: solids and fluids  
T333 Heat transfer: principles and applications  
T334 Environmental monitoring and control  
T353 Failure of stressed materials  
T393 Electronic materials and devices  
T394 Control engineering  
TM222 The digital computer  
TM361 Graphs, networks and design  
DT200 An introduction to information technology  
M205 Fundamentals of computing  
M355 Topics in software engineering  
ST291 Images and information

#### 16 ENGINEERING MECHANICS

Courses central to area of study:

- T102 Living with technology: a foundation course  
T201 Materials in action  
T233 Thermofluid mechanics and energy

- T234 Environmental control and public health  
T235 Engineering mechanics: solids  
T253 Materials for electronics  
T254 Stress on materials  
T281 Basic physical science for technology  
T292 Instrumentation  
T331 Engineering mechanics: solids and fluids  
T333 Heat transfer: principles and applications  
T334 Environmental monitoring and control  
T353 Failure of stressed materials

The courses underlined will be in their last year of presentation in 1991; those in italics are planned for first presentation in 1992.

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The courses underlined will be in their last year of presentation in 1991; those in italics are planned for first presentation in 1992.



T392	Engineering product design
T394	Control engineering
T401	Technology project
TM282	Modelling with mathematics: an introduction
M101	Mathematics: a foundation course
S102	A science foundation course
Other relevant courses:	
T223	Microprocessor-based computers
T255	Materials in manufacturing
T263	Design: processes and products
T363	Computer aided design
TM222	The digital computer
MST204	Mathematical models and methods
MST322	Mathematical methods and fluid mechanics

See Recognition Information Leaflet 3.3 on engineering institutions.

## 17 EUROPEAN STUDIES

Courses central to area of study:	
A204	The Enlightenment
A205	Culture and belief in Europe 1450-1600
A293	Rome: the Augustan age
A294	Fifth-century Athens: democracy and city state
A311	Reason and experience
A314	From Baroque to Romantic: studies in tonal music
A315	Modern art and Modernism: Manet to Pollock
A318	War, peace and social change: Europe 1900-1955
A319	Literature in the modern world
A324	Liberation and reconstruction: politics, culture and society in France and Italy 1943-54
A353	Art in fifteenth-century Italy
Other relevant courses:	
A228	The religious quest
A281	Technology and change c 1750-1914
A310	Life and death
A317	Themes in British and American history: a comparative approach c1760-1970
A341	Beethoven
D310	Crime, justice and society
D312	Global politics
DE325	Work and society
L205	Health and disease
U207	Issues in women's studies
U221	The changing experience of women

## 18 GEOGRAPHY

Courses central to area of study:	
D103	Society and social science: a foundation course
D205	Changing Britain, changing world: geographical perspectives
D314	Restructuring Britain
D437	Conflict and change in the countryside
S326	Ecology
U208	The end of the Third World?
Other relevant courses:	
D212	Running the country
D312	Global politics
DE304	Research methods in education and the social sciences
M345	Statistical methods
MDST242	Statistics in society
T234	Environmental control and public health
T274	Food production systems
U204	Third World studies
U205	Health and disease
U206	The environment

See also Table 7 *Earth sciences* for courses covering aspects of physical geography, e.g. S236 *Geology*, S237 *The Earth's structure, composition and evolution*, and S238 *The Earth's physical resources*; and Table 43 *Systems*.

## 19 GEOLOGY

See courses listed under Table 7 *Earth sciences*

## 20 GOVERNMENT

Courses central to area of study:	
D103	Society and social science: a foundation course
D209	State and society
D211	Social problems and social welfare
D212	<i>Running the country</i>
D308	Democratic government and politics
D310	Crime, justice and society
D312	Global politics
D314	Restructuring Britain
D345	Economics and government policy
DE354	Beliefs and ideologies
A403	Arts and society in Britain since the thirties (project course)
E333	Policy making in education
U208	<i>The end of the Third World?</i>
Other relevant courses:	
DE304	Research methods in education and the social sciences
DE325	Work and society
DT200	An introduction to information technology
ED356	<i>Race, education and society</i>
T244	Managing in organizations
T301	Complexity, management and change: applying a systems approach
U205	Health and disease

## 21 HISTORY

Courses central to area of study:	
A102	An arts foundation course
A204	The Enlightenment
A205	Culture and belief in Europe 1450-1600
A317	Themes in British and American history: a comparative approach c1760-1970
A318	War, peace and social change: Europe 1900-1955
A324	Liberation and reconstruction: politics, culture and society in France and Italy 1943-54
A403	Arts and society in Britain since the thirties (project course)
Other relevant courses:	
A281	Technology and change 1750-1914
A293	Rome: the Augustan age
A294	Fifth-century Athens: democracy and city state
A331	Religion in Victorian Britain
A353	Art in fifteenth-century Italy
D312	Global politics
ED356	<i>Race, education and society</i>
MA290	Topics in the history of mathematics
U204	Third World studies
U208	<i>The end of the Third World?</i>
U235	Nuclear weapons: inquiry, analysis and debate

## 22 HISTORY OF IDEAS

Courses central to area of study:	
A204	The Enlightenment
A205	Culture and belief in Europe 1450-1600
A293	Rome: the Augustan age
A294	Fifth-century Athens: democracy and city state
A310	Life and death
A311	Reason and experience
A403	Arts and society in Britain since the thirties (project course)

DE354	Beliefs and ideologies
MA290	Topics in the history of mathematics
U205	Health and disease
U207	<i>Issues in women's studies</i>
U221	The changing experience of women

## 23 HISTORY OF SCIENCE AND TECHNOLOGY

Courses central to area of study:	
A204	The Enlightenment
A205	Culture and belief in Europe 1450-1600
A281	Technology and change c1750-1914
A282	Science, technology and everyday life, 1870-1950
A403	Arts and society in Britain since the thirties (project course)
MA290	Topics in the history of mathematics
S102	A science foundation course
T281	Basic physical science for technology
U205	Health and disease
Other relevant courses:	
E362	Cognitive development: language and thinking from birth to adolescence
EH207	Communication and education

## 25 LITERATURE

Courses central to area of study:	
A102	An arts foundation course
A204	The Enlightenment
A205	Culture and belief in Europe 1450-1600
A319	Literature in the modern world
A361	Shakespeare
A362	Romantic poetry
A403	Arts and society in Britain since the thirties (project course)
U221	The changing experience of women
Other relevant courses:	
A293	Rome: the Augustan age
A294	Fifth-century Athens: democracy and city state
A315	Modern art and Modernism: Manet to Pollock
A324	Liberation and reconstruction: politics, culture and society in France and Italy 1943-54
EH207	Communication and education
U204	Third World studies

## 26 MANAGEMENT

Courses central to area of study:	
T102	Living with technology: a foundation course
T244	Managing in organizations
T247	Working with systems
T301	Complexity, management and change: applying a systems approach
T401	Technology project
TM282	Modelling with mathematics: an introduction
D103	Society and social science: a foundation course
D210	Introduction to economics
D321	Professional judgment
D1200	An introduction to information technology
E324	Management in post-compulsory education
E325	Managing schools
M245	Probability and statistics
M345	Statistical methods
M355	Topics in software engineering
M357	Data models and databases
MDST242	Statistics in society

Other relevant courses:  
DE325 Work and society  
K254 Working with children and young people

## 27 MATERIALS

Courses central to area of study:	
T102	Living with technology: a foundation course
T201	Materials in action
T233	Thermofluid mechanics and energy
T235	Engineering mechanics: solids
T253	Materials for electronics
T254	Stress on materials
T255	Materials in manufacturing
T281	Basic physical science for technology
T353	Failure of stressed materials
T392	Engineering product design
T393	Electronic materials and devices
T401	Technology project
TM282	Modelling with mathematics: an introduction
S102	Science: a foundation course
Other relevant courses:	
T244	Managing in organizations
T263	Design: processes and products
T292	Instrumentation
T331	Engineering mechanics: solids and fluids
T333	Heat transfer: principles and applications
T334	Environmental monitoring and control
M101	Mathematics: a foundation course
MST204	Mathematical models and methods
S238	The Earth's physical resources
S271	Discovering physics
ST291	Images and information

## Physics of materials

Courses central to area of study:	
T102	Living with technology: a foundation course
T201	Materials in action
T202	Analogue and digital electronics
T253	Materials for electronics
T254	Stress on materials
T255	Materials in manufacturing
T292	Instrumentation
T353	Failure of stressed materials
T393	Electronic materials and devices
TM282	Modelling with mathematics: an introduction
MS283	An introduction to calculus
MST204	Mathematical models and methods
S102	A science foundation course
S271	Discovering physics
S272	The physics of matter
SM355	Quantum mechanics
SMT356	Electromagnetism
ST291	Images and information

## 28 MATHEMATICS, PURE

Courses central to area of study:	
M101	Mathematics: a foundation course
M203	Introduction to pure mathematics
M332	Complex analysis
M381	Number theory and mathematical logic
M386	Metric and topological spaces and geometric topology
M431	<i>The Lebesgue integral</i>
Other relevant courses:	
M205	Fundamentals of computing
M245	Probability and statistics
M261	Mathematics in computing
M343	Applications of probability
M345	Statistical methods
M353	Programming and programming languages
M355	Topics in software engineering
M357	Data models and databases
M371	Computational mathematics

The courses underlined will be in their last year of presentation in 1991; those in italics are planned for first presentation in 1992.

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- MA290 Topics in the history of mathematics
- MDST242 Statistics in society
- ME234 Using mathematical thinking
- MS283 An introduction to calculus
- MS323 Introduction to non-linear dynamics
- MST204 Mathematical models and methods
- MST322 Mathematical methods and fluid mechanics
- T322 Digital telecommunications
- T326 Electronic signal processing
- TM361 Graphs, networks and design

## 29 MATHEMATICS, APPLIED AND MATHEMATICAL PHYSICS

Courses central to area of study:

- M101 Mathematics: a foundation course
- M371 Computational mathematics
- M372 *Numerical methods and applications*
- MS283 An introduction to calculus
- MS323 Introduction to non-linear dynamics
- MST204 Mathematical models and methods
- MST322 Mathematical methods and fluid mechanics
- SM355 Quantum mechanics
- SMT356 Electromagnetism
- T326 Electronic signal processing
- TM282 Modelling with mathematics: an introduction

Other relevant courses:

- M203 Introduction to pure mathematics
- M205 Fundamentals of computing
- M245 Probability and statistics
- M261 Mathematics in computing
- M332 Complex analysis
- M343 Applications of probability
- M345 Statistical methods
- M353 *Programming and programming languages*
- M355 Topics in software engineering
- M357 Data models and databases
- M381 Number theory and mathematical logic
- M386 Metric and topological spaces

and geometric topology

- M431 *The Lebesgue integral*
- MDST242 Statistics in society
- ME234 Using mathematical thinking
- S102 A science foundation course
- S271 Discovering physics
- S354 Understanding space and time
- T223 *Microprocessor-based computers*
- T401 Technology project
- TM222 The digital computer

TM361 Graphs, networks and design

Many of the courses listed under the following main headings are also relevant: Engineering mechanics; Materials; Physics.

## 30 MATHEMATICS EDUCATION

Courses central to area of study:

- EM235 *Developing mathematical thinking*
- EM236 *Teaching for attainment in mathematics*
- ME234 Using mathematical thinking

Other relevant courses:

- M101 Mathematics: a foundation course
- M261 Mathematics in computing
- MA290 Topics in the history of mathematics
- MS283 An introduction to calculus
- EH232 Computers and learning
- TM282 Modelling with mathematics: an introduction

Many of the courses listed under the main heading Education-Curriculum and Teaching Studies are also relevant.

## 31 METHODOLOGY

Courses central to area of study:

- D103 Society and social science: a foundation course

- D321 Professional judgment
- DE304 Research methods in education and social sciences

- M245 Probability and statistics
- M345 Statistical methods
- M355 Topics in software engineering
- M357 Data models and databases
- MDST242 Statistics in society
- MST204 Mathematical models and methods
- T244 Managing in organizations
- T247 Working with systems
- T301 Complexity, management and change: applying a systems approach
- U205 Health and disease

## 32 MODERNISM IN THE ARTS

Courses central to area of study:

- A102 An arts foundation course
- A315 Modern art and Modernism: from Manet to Pollock
- A403 Arts and society in Britain since the thirties (project course)

## 33 MUSIC

Courses central to area of study:

- A102 An arts foundation course
- A204 The Enlightenment
- A241 Elements of music
- A314 From Baroque to Romantic: studies in tonal music
- A341 Beethoven
- A403 Arts and society in Britain since the thirties (project course)

Other relevant courses:

- A205 Culture and belief in Europe 1450-1600

## 34 PHILOSOPHY

Courses central to area of study:

- A102 An arts foundation course
- A204 The Enlightenment
- A205 Culture and belief in Europe 1450-1600
- A310 Life and death
- A311 Reason and experience
- A403 Arts and society in Britain since the thirties (project course)

Other relevant courses:

- A293 Rome: the Augustan age
- A294 Fifth-century Athens: democracy and city state
- A228 The religious quest
- MA290 Topics in the history of mathematics
- U205 Health and disease
- U235 Nuclear weapons: inquiry, analysis and debate

## 35 PHYSICS

(see also Science Overview, Fig. 4)

Courses central to area of study:

- S102 A science foundation course
- M101 Mathematics: a foundation course
- MS283 An introduction to calculus
- MST204 Mathematical models and methods
- MST322 Mathematical methods and fluid mechanics
- S256 Matter in the Universe
- S271 Discovering physics
- S272 Physics of matter
- S354 Understanding space and time
- SM355 Quantum mechanics
- SMT356 Electromagnetism
- ST291 Images and information

Physics with chemistry

(see also Science Overview, Fig. 2)

Courses central to area of study in addition to those under main heading:

- S247 Inorganic chemistry: concepts and case studies
- S342 Physical chemistry
- S343 Inorganic chemistry

Physics with Earth sciences

(see also Science Overview, Fig. 3)

Courses central to area of study in addition to those under main heading:

- S237 The Earth: structure, composition and evolution
- S330 Oceanography
- S338 Sedimentary processes and basin analysis
- S339 Understanding the continents: tectonic and thermal processes of the lithosphere
- Other courses relevant to studies in Physics:
- There are many such courses, for example:
- T233 Thermofluid mechanics and energy
- T281 Basic physical science for technology
- T292 Instrumentation
- T331 Engineering mechanics: solids and fluids
- T393 Electronic materials and devices

Details of a wide variety of coherent degree profiles that include physics courses (including study routes) have been sent to current students of the courses starting with S in 'Courses central to area of study' above, except S102. If you would like these details please send a medium-sized stamped self-addressed envelope marked 'coherent degree profiles' to Course Support Staff, Physics Department, The Open University, Walton Hall, Milton Keynes MK7 6AA.

You can also write to the same address, sending a similar envelope marked 'IOP', for information about membership of the Institute of Physics.

## 36 PRODUCTION ENGINEERING

See Recognition Information Leaflet 3.3 concerning the requirements of the Institution of Production Engineers.

## 37 PSYCHOLOGICAL STUDIES

Courses central to area of study:

- D103 Society and social science: a foundation course
- D307 Social psychology
- D309 Cognitive psychology
- DE304 Research methods in education and the social sciences

- DSE202 Introduction to psychology
- E206 Personality, development and learning
- E362 Cognitive development: language and thinking from birth to adolescence
- SD206 *Biology: brain and behaviour*

See also Recognition Information Leaflet concerning the British Psychological Society

## Educational psychology

See under main heading and Table 11

## Psychology with sociology

Courses central to area of study in addition to those under main heading:

- D213 *Understanding modern societies*
- D310 Crime, justice and society
- D321 Professional judgment
- DE325 Work and society
- DE354 Beliefs and ideologies
- K254 Working with children and young people
- MDST242 Statistics in society
- U205 Health and disease
- U207 *Issues in women's studies*
- U221 The changing experience of women

## 38 PUBLIC ADMINISTRATION

Courses central to area of study:

- D103 Society and social science: a foundation course
- D211 Social problems and social welfare
- D212 *Running the country*
- D310 Crime, justice and society
- D321 Professional judgment
- D345 Economics and government policy

- DE325 Work and society
- DT200 An introduction to information technology
- E324 Management in post-compulsory education

- E325 Managing schools
- E333 Policy making in education
- ED356 *Race, education and society*
- EH207 Communication and education
- K254 Working with children and young people

- MDST242 Statistics in society
- T234 Environmental control and public health
- T244 Managing in organizations
- T301 Complexity, management and change: applying a systems approach

- U205 Health and disease
- U208 *The end of the Third World?*

## 39 RELIGIOUS STUDIES

Courses central to area of study:

- A102 An arts foundation course
- A205 Culture and belief in Europe 1450-1600
- A228 The religious quest
- A293 Rome: the Augustan age
- A331 Religion in Victorian Britain
- A403 Arts and society in Britain since the thirties (project course)

Other relevant courses:

- A204 The Enlightenment
- A294 Fifth-century Athens: democracy and city state
- D103 Society and social science: a foundation course

## 40 SOCIAL STUDIES, APPLIED

Courses central to area of study:

- D103 Society and social science: a foundation course
- D205 Changing Britain, changing world: geographical perspectives
- D209 State and society
- D211 Social problems and social welfare
- D212 *Running the country*
- D213 *Understanding modern societies*
- D251 Issues in deafness
- D310 Crime, justice and society
- D312 Global politics
- DE325 Work and society
- DE354 Beliefs and ideologies
- E241 *Special needs in education*

- E242 *Learning for all*
- E271 Curriculum and learning
- E333 Policy making in education
- E355 Education for adults

- ED356 *Race, education and society*
- EH207 Communication and education
- EH266 *Learning through life: education and training beyond school*

- K254 Working with children and young people
- T234 Environmental control and public health
- U205 Health and disease
- U208 *The end of the Third World?*
- U221 The changing experience of women
- U235 Nuclear weapons: inquiry, analysis and debate

Other relevant courses:

- D321 Professional judgment
- DE304 Research methods in education and the social sciences
- DT200 An introduction to information technology
- T244 Managing in organizations
- T247 Working with systems
- T301 Complexity, management and change: applying a systems approach
- T362 Design and innovation
- U204 Third World studies

The courses underlined will be in their last year of presentation in 1991; those in italics are planned for first presentation in 1992.

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The courses underlined will be in their last year of presentation in 1991; those in italics are planned for first presentation in 1992.



#### 41 SOCIOLOGY

Courses central to area of study:

- D103 Society and social science: a foundation course  
D209 State and society  
D211 Social problems and social welfare  
D213 *Understanding modern societies*  
D310 Crime, justice and society  
D314 Restructuring Britain  
DE304 Research methods in education and the social sciences  
DE325 Work and society  
DE354 Beliefs and ideologies  
E355 Education for adults  
ED356 *Race, education and society*  
EH266 *Learning through life: education and training beyond school*  
U204 Third World studies  
U207 *Issues in women's studies*  
U208 *The end of the Third World?*  
U221 The changing experience of women

Other relevant courses:

- D212 *Running the country*  
D307 Social psychology  
D308 Democratic government and politics  
D312 Global politics  
DT200 An introduction to information technology  
A228 The religious quest  
E241 *Special needs in education*  
E242 *Learning for all*  
E271 Curriculum and learning  
E333 Policy making in education  
EH207 Communication and education  
K254 Working with children and young people  
T244 Managing in organizations  
T247 Working with systems  
T301 Complexity, management and change: applying a systems approach  
U205 Health and disease

#### 42 STATISTICS

Courses central to area of study:

- M245 Probability and statistics  
M343 Applications of probability  
M345 Statistical methods  
MDST242 Statistics in society

Other relevant courses:

- D321 Professional judgment  
DE304 Research methods in education and the social sciences  
M101 Mathematics: a foundation course  
MS283 An introduction to calculus  
MST204 Mathematical models and methods  
S326 Ecology  
TM361 Graphs, networks and design  
U205 Health and disease

#### 43 SYSTEMS

Courses central to area of study:

- T244 Managing in organizations  
T247 Working with systems  
T274 Food production systems  
T301 Complexity, management and change: applying a systems approach  
TM282 Modelling with mathematics: an introduction

#### Systems management and decision making

Other relevant courses in addition to courses under main heading:

- D212 *Running the country*  
D321 Professional judgment  
E324 Management in post-compulsory education  
E325 Managing schools  
E333 Policy making in education  
M355 Topics in software engineering  
M357 Data models and databases

M245 Probability and statistics

M345 Statistical methods

MDST242 Statistics in society

#### Systems, society and environment

Other relevant courses in addition to courses under main heading:

- T234 Environmental control and public health  
T263 Design: processes and products  
T362 Design and innovation  
T401 Technology project  
D205 Changing Britain, changing world: geographical perspectives  
D312 Global politics  
DT200 An introduction to information technology  
U205 Health and disease  
U208 *The end of the Third World?*  
U235 Nuclear weapons: inquiry, analysis and debate

#### 44 TECHNOLOGICAL SYSTEMS

Courses central to area of study:

- T102 Living with technology: a foundation course  
T234 Environmental control and public health  
T244 Managing in organizations  
T247 Working with systems  
T274 Food production systems  
T281 Basic physical science for technology  
T292 Instrumentation  
T301 Complexity, management and change: applying a systems approach  
DT200 An introduction to information technology  
M101 Mathematics: a foundation course

Other relevant courses:

- DE325 Work and society  
T223 *Microprocessor-based computers*  
T263 Design: processes and products  
T322 Digital telecommunications  
T326 Electronic signal processing  
T362 Design and innovation  
T363 Computer-aided design  
T394 Control engineering  
T401 Technology project  
TM222 The digital computer  
A281 Technology and change 1750-1914  
M345 Statistical methods  
MST204 Mathematical models and methods  
U235 Nuclear weapons: inquiry, analysis and debate

#### 45 TOWN PLANNING

Courses central to area of study:

- D103 Society and social science: a foundation course  
T102 Living with technology: a foundation course

Other relevant courses:

- D205 Changing Britain, changing world: geographical perspectives  
D212 *Running the country*  
D437 *Conflict and change in the countryside*  
MDST242 Statistics in society  
T263 Design: processes and products  
T362 Design and innovation  
See Recognition Information Leaflet 3.2 concerning the Royal Town Planning Institute.

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The courses underlined will be in their last year of presentation in 1991; those in italics are planned for first presentation in 1992.



# TABLE OF DISCONTINUED COURSES WHICH FORM EXCLUDED COMBINATIONS — 1991

This table shows all BA degree courses that have been discontinued, together with their years of presentation and the courses (if any) with which they form excluded combinations. Only courses previously or currently in presentation are included in the lists of excluded combinations; no proposed courses

described in Section 4 of this publication are listed.

As well as helping you to recognize excluded combinations in relation to a discontinued course you may have taken, the table will help you to assess whether a discontinued

course serves as a recommended prerequisite for a course you are thinking of taking. In Table I, Table II and the 'Notes for Prospective Students' in each course description, discontinued courses are identified by square brackets ([ ]). Unless otherwise stated, you can assume that the predecessor/s of a cur-

rent course will serve as an alternative prerequisite to the course in question (*but please see footnote to part-credit science courses*). More advice about recommended prerequisites is given in the overviews to each faculty and the U area, and it is important that you read this advice before registering for a course.

TABLE III

DISCONTINUED COURSES	PRESENTATION	EXCLUDED COMBINATIONS	DISCONTINUED COURSES	PRESENTATION	EXCLUDED COMBINATIONS
A100 Humanities: a foundation course	1971-1977	[A101] A102	D426 <sup>a</sup> Sociology and psychoanalysis	1983-1984	
A101 Arts: a foundation course	1978-1986	[A100] A102		1986-1987	
A201 Renaissance and Reformation	1972-1980			1983-1984	[D433]
A202 The age of revolutions	1972-1979		D428 <sup>a</sup> Housing, residential and social change in the city	1984-1985	
A203 Seventeenth-century England: a changing culture 1618-1689	1981-1989		D429 <sup>a</sup> Political economy in China since the death of Mao Tse Tung	1985-1986	D310
A291 The early Roman Empire and the rise of Christianity	1974-1981	A293	D430 <sup>a</sup> Kinship, marriage and family: anthropological perspectives	1985-1986	
A292 Greece 478-336 BC	1979-1988	A294	D431 <sup>a</sup> The sociology of youth, crime and violence	1985 only	
A301 War and society	1973-1979	[A309] A318	D432 <sup>a</sup> Rural geography in England and Wales 1855-1985	1985 and 1987 only	[D428]
A302 The nineteenth-century novel and its legacy	1973-1983	[A312]		1986-1987	[D423]
A303 Problems of philosophy	1973-1980	[A313]	D433 <sup>a</sup> Housing in Britain 1885-1985	1988-1989	
A304 The development of instruments and their music	1974-1983		D434 <sup>a</sup> Wales: a study of cultural and national identity	1988-1989	
A305 History of architecture and design 1890-1939	1975-1982		D435 <sup>a</sup> Perspectives in family studies	1988-1989	
A306 Twentieth-century poetry	1976-1983		D436 <sup>a</sup> Australian perspectives: social issues and the British connection	1989-1990	
A307 Drama	1977-1981		D438 Current issues in public services management	1978-1983	
A308 The rise of modernism in music 1890-1935	1979-1986		DE206 Social work, community work and society	1976-1981	DE325
A309 Conflict and stability in the development of Modern Europe c1789-1970	1980-1989	[A301] A318	DE351 People and work	1977-1983	
A312 The nineteenth-century novel and its legacy	1982-1990	[A302]	DE353 Mass communication and society	1974-1980	[DS262] DSE202
A313 Philosophical problems	1981-1985	[A303]	DS261 An introduction to psychology	1981-1989	[DS261] DSE202
A321 The revolutions of 1848	1976-1981		DS262 Introduction to psychology	1973-1978	[D202]
A322 English urban history 1500-1780	1977-1983		DT201 Urban development	1974-1979	
A323 Weimar Germany: the crisis of industrial society 1918-1933	1988-1989		DT352 People and organizations		
A351 Modern art from 1848 to the present: styles and social implications	1976-1982		E200 Contemporary issues in education	1981-1988	E208 [E220] <sup>11</sup> EP228 <sup>11</sup>
A352 Art in Italy 1480-1580	1979-1989		E201 Personality and learning	1976-1984	E206 [E281]
A381 Science and belief: from Darwin to Einstein	1981-1987		E202 Schooling and society	1977-1983	[E205] [E282]
A401 Great Britain 1750-1950: sources and historiography	1974-1982		E203 Curriculum design and development	1976-1982	[E204] [E283] E271
A402 Thought and reality: central themes in Wittgenstein's philosophy	1976-1982		E204 Purpose and planning in the curriculum	1983-1988	[E203] [E283] E271
AD208 Man's religious quest	1978-1985	A228	E205 Conflict and change in education: a sociological introduction	1984-1988	[E202]
AM289 History of mathematics	1976-1985		E220 <sup>11</sup> Contemporary issues in schools	1987 only	[E200] E208 EP228 <sup>11</sup>
AMST283 Science and belief: from Copernicus to Darwin	1974-1981		E221 Decision making in British education systems	1974-1978	[E222]
AST281 Science and the rise of technology since 1800	1973-1980	A281	E222 The control of education in Britain	1979-1985	[E221] E333
D100 Understanding society: a foundation course	1971-1974	[D101] [D102] D103	E262 Language and learning	1973-1978	[E263]
D101 Making sense of society	1975-1981	[D100] [D102] D103	E263 Language in use	1981-1986	[E262]
D102 Social sciences: a foundation course	1982-1990	[D100] [D101] D103	E281 Personality, growth and learning	1972-1975	[E201] E206
D202 Urban change and conflict	1982-1988	[D1201]	E282 School and society	1972-1976	[E202]
D203 Decision making in Britain	1972-1982	[D208]	E283 The curriculum: context, design and development	1972-1975	[E203] [E204] E271
D204 Fundamentals of human geography	1977-1984	[D281]	E321 Management in education	1976-1980	[E323] E325
D207 An introduction to sociology	1981-1990	[D283]	E323 Management and the school	1981-1987	[E321] E325
D208 Decision making in Britain	1983-1990	[D203]	E341 Methods of educational enquiry: an empirical approach	1973-1980	DE304
D222 Microeconomics	1973-1984	D210	E351 Urban education	1974-1977	[E361]
D231 Comparative government and politics	1974-1978	[D232]	E352 Education, economy and politics	1973-1978	[E353]
D232 Comparative politics	1979-1986	[D231]	E353 Society, education and the State	1981-1985	[E352]
D233 World politics	1981-1988	[D332]	E354 Ethnic minorities and community relations	1982-1988	
D281 New trends in geography	1972-1976	[D204]	E361 Education and the urban environment	1978-1982	[E351]
D282 National income and economic policy	1972-1978	D210 [D284]	E364 Curriculum evaluation and assessment in educational institutions	1982-1986	
D283 The sociological perspective	1972-1980	[D207]	ED322 Economics and education policy	1977-1982	
D284 National income and economic policy	1979-1984	D210 [D282]	EH221 Educational computing	1987-1990	EH232
D291 Statistical sources	1975-1984 <sup>a</sup>		M100 Mathematics: a foundation course	1971-1977	M101 MS283 [MST281]
D301 Historical sources and the social scientist	1974-1988		M201 Linear mathematics	1972-1981	[TM281] TM282
D302 Patterns of inequality	1976-1981		M202 <sup>a</sup> Topics in pure mathematics	1973-1978	MST204
D303 Cognitive psychology	1978-1985	D309	M211 An introduction to algebra and geometry	1979 only	M203 [M211] [M212]
D305 Social psychology	1976-1984	D307	M212 Introduction to analysis and topology	1980 only	[M382] [M384] M386
D306 A guided project in human geography	1981-1986		M231 Analysis	1974-1980	[M202] M203 [M231]
D323 Political economy and taxation	1979-1984	D345	M251 An algorithmic approach to computing	1973-1981	[M252] [PM252] [PM951]
D324 Business economics	1980-1987		M252 <sup>a</sup> Computing and computers	1982-1987	M205 <sup>a</sup> [M251] [PM252]
D331 Public administration	1974-1979	[D336]	M321 Partial differential equations of applied mathematics	1974-1982	[PM951]
D332 International politics and foreign policy	1975-1980	[D233]	M331 Integration and normed spaces	1975-1980	
D333 Soviet government and politics	1976-1979	[D334]	M333 Aspects of abstract algebra	1980-1990	
D334 Soviet government and politics	1982-1987	[D333]	M334 Differential geometry	1976-1990	
D335 <sup>a</sup> Issues in crime and society	1982-1987	D310 <sup>a</sup>	M341 Studies in pure mathematics	1981-1985	
D336 Policies, people and administration	1980-1986	[D331]	M351 Fundamentals of statistical inference	1977-1985	see footnotes 1,5
D355 Social policy and social welfare	1984-1989		M352 Numerical computation	1976-1987	M371
D342 Regional analysis and development	1974-1978		M352 Computer-based information systems	1980-1989	M357
D421 <sup>10,11</sup> Social science study course	1982 only		M382 <sup>a</sup> Number theory and metric and topological spaces	1986-1989	[M202] M381 [M383]
D422 <sup>a</sup> Financial institutions and monetary policy	1982-1983	[D434]	M383 <sup>a</sup> Number theory and geometric topology	1986-1989	[M384] M386
D423 <sup>a</sup> Wales: a study of cultural and national identity	1982-1983		M384 <sup>a</sup> Mathematical logic and metric and topological spaces	1986-1989	M381 [M382] [M385] M386
D424 <sup>a</sup> Family, work and community in nineteenth-century England	1982-1983				[M202] M381 [M382]
D425 <sup>a</sup> What reform for Britain's constitution?	1982-1983				[M385] M386



DISCONTINUED COURSES		PRESENTATION	EXCLUDED COMBINATIONS	DISCONTINUED COURSES		PRESENTATION	EXCLUDED COMBINATIONS
M385 <sup>5</sup>	Mathematical logic and geometric topology	1986-1989	M381 [M383] [M384] M386	S336	Crustal and mantle processes	1980-1988	[S333] [S337] S339*
MDT241	Statistics: an interdisciplinary approach	1974-1983		S337	Earth science topics and methods (Part II)	1980-1981	[S335] [S336] S338* S339*
MST281	Elementary mathematics for science and technology	1972-1978	[M100] M101 MS283 [TM281] TM282	S351	The nature of chemistry (Part I)	1976 only	[S304] S343 S344 [S352]
MST282	Mechanics and applied calculus	1972-1982	MST204	S352	The nature of chemistry (Part II)	1977 only	[S304] S343 S344 [S351]
				S364	Evolution	1981-1990	
				S431	Directed studies course in Earth sciences: geology projects in the Lake District	1986-1989	
P232 <sup>11</sup>	Language development	1979 only	E262 [PE232]				
P251	The handicapped person in the community	1977-1988	[P853] [PD251]	S441	Directed studies in chemistry: exploring the chemistry of a neurotransmitter	1986-1990	
P252 <sup>11</sup>	An ageing population	1979-1984		SD286	Biology, brain and behaviour	1981-1990	[SDT286]
P253 <sup>11</sup>	Conflict in the family	1980-1984		SDT286	Biological bases of behaviour	1972-1980	SD286
P853 <sup>11</sup>	The handicapped person in the community	1975-1976	[P251] [PD251]	SM351	Quantum theory and atomic structure	1974-1985	SM355
P881	Industrial relations	1976-1978	[PT281]	SM352	Electromagnetism	1980-1990	SMT356
P891 <sup>11</sup>	Technology for teachers	1975-1976	[PET271] [T100]	ST285	Solids, liquids and gases	1973-1981	S272
PD251	The handicapped person in the community	1977-1978	[P251] [P853]	ST294	Principles of chemical processes	1975-1984	
PE231	Reading development	1977-1985	[PE261]				
PE232	Language development	1980-1986		T100	The man-made world: a foundation course	1971-1979	ET271 <sup>11</sup> [P891] [PET271] [T101] T102
PE261	Reading development	1973-1976	[PE231] [P891] [T100]	T101	Living with technology: a foundation course	1980-1988	ET217 <sup>11</sup> [T100] T102
PET271	Technology for teachers	1976-1981	M205 [M251] [M252] [PM951]	T231	Introduction to engineering mechanics	1975-1978	[T232] T233 T235
PM252	Computing and computers	1982-1983	[M251] [M252] [PM252]	T232	Engineering mechanics: solids	1980-1989	[T231] T235
PM951	Computing and computers	1978-1981		T241	Systems behaviour	1973-1990	T247
PME233	Mathematics across the curriculum	1980-1988		T242	Systems management	1974-1979	[T243] T244
PT272	Environmental control and public health	1976-1982	T234	T243	Systems organization: the management of complexity	1980-1984	[T242] T244
PT281	Industrial relations	1979-1984	[P881]	T252	Engineering materials: an introduction	1982-1989	T201 T253 T254 T255 [TS251]
				T262	Man-made futures: design and technology	1975-1982	T263
S100	Science: a foundation course	1971-1978	[S101] S102	T273	Food production systems	1978-1985	T274
S101	Science: a foundation course	1979-1987	[S100] S102	T283	Introductory electronics	1980-1989	T202 [TS282]
S2-1 <sup>2,3</sup>	Biochemistry	1972-1980	see footnote 3	T291	Instrumentation	1974-1985	T292
S2-2 <sup>2,4</sup>	Geochemistry	1974-1980	see footnote 4	T321	Telecommunications systems	1976-1986	T322
S202	Biology: form and function	1981-1990	[S221] [S223] [S225] S203	T341	Systems modelling	1975-1982	T301
S22-2	Comparative physiology	1972-1980	S202	T351	Materials under stress	1976-1982	T353
S2-3 <sup>2,3</sup>	Environment	1972-1982	see footnote 3	T352	Materials processing	1979-1986	
S23-2	Geology	1972-1982	S236	T361	Control of technology	1978-1985	
S2-4 <sup>2,4</sup>	Geophysics	1974-1980	see footnote 4	T391	Control engineering	1978-1985	T394
S24-2	An introduction to the chemistry of carbon compounds	1974-1980	S246	TAD292	Art and environment	1976-1985	
S2-5 <sup>2,3</sup>	Genes and development	1973-1980	see footnote 3	TD342	Systems performance: human factors and systems failures	1976-1983	T301
S25-2	Structure, bonding and the periodic law	1972-1980	S247	TM221	The digital computer	1975-1982	TM222
S26-2	The Earth's physical resources	1974-1975	[S266] S238	TM281	Modelling with mathematics	1977-1984	[M100] M101 MS283
S266	The Earth's physical resources	1976-1983	[S26-] S238				[MST281] TM282
S299	Genetics	1976-1985	S298	TS251	An introduction to materials	1973-1981	T201 [T252] T253 T254 T255
S304	The nature of chemistry	1978-1987	S343 S344 [S351] [S352]	TS282	Electromagnetics and electronics	1972-1979	T202 [T283]
S321	Physiology of cells and organisms	1974-1982	S324				
S322	Biochemistry and molecular biology	1977-1985	S325				
S323	Ecology	1974-1985	S326				
S333	Earth science topics and methods (Part I)	1976-1979	[S335] [S336] S338* S339*	U201	Risk	1980-1984	
S334	Oceanography	1978-1987	S330	U202	Inquiry	1981-1984	
S335	Surface and sedimentary processes: case studies in Earth science	1980-1985	[S333] [S337] S338*	U203	Popular culture	1982-1987	

## Footnotes:

- M202 was an excluded combination with the third of the four options contained in [M335].
- These courses are part-credit courses and it *cannot* be assumed that one of them will be a suitable prerequisite for a current course. Please read the Science Faculty Overview for advice about prerequisites for science courses.
- A combination of this course and S22- (i.e. S221; S223 and S225) is an excluded combination with S202.
- S2-2 and S2-4 *jointly* (not individually) are an excluded combination with S237.
- Previously offered as separate options within [M335]. Students may not count for credit courses with a common option: those who gained a credit in [M335] will be deemed to have taken the options in which they presented themselves at the examination. (Any students who answered questions in more than two options of [M335] will be deemed to have taken the options in which they presented themselves at the examination.)
- Students who have successfully completed [D335] but have not had it included in the award of a BA degree can register for D310 on condition that if they pass D310 they will have to relinquish the half credit previously awarded for [D335].
- Students who have successfully completed [M252] but have not had it included in the award of a BA degree can register for M205 on condition that if they pass M205 they will have to relinquish the half credit previously awarded for [M252].
- No presentation in 1977.
- A maximum of two social science guided study courses may be taken within a degree profile.
- The options within D421 were given separate codes D422-D428 during 1983.
- Associate student programme only, but counted for credit towards the BA degree.
- Alternate year presentation.



## OVERVIEW

The first half of the arts foundation course (A102) introduces the disciplines of history, literature, music, art history and philosophy. The rest of the course builds on these introductions with an interdisciplinary study of culture and society in Britain 1850–90, which also includes study of religion and the history of science.

Interdisciplinary work is extended and consolidated at second level. It contributes to the breadth of study necessary for richness in a general degree as well as to the development of more specialist skills needed for higher level work. The two main courses are A204 *The Enlightenment and A205 Culture and belief in Europe 1450–1600* (both full-credit courses). These courses draw on a wide range of disciplines and are highly integrated. Interdisciplinary work designed to complement A204 and A205 is also available at second level in two half-credit courses which extend the historical and cultural perspective on the ancient world, A293 *Rome: the Augustan age and A294 Fifth-century Athens: democracy and city state*; in a half-credit course A228 *The religious quest which considers the historical and social context of six religions and their sacred literatures*; and in half-credit courses in the history of science, A281 *Technology and change 1750–1914* and A282 *Science, technology and everyday life 1870–1950*.

Because of the special technical needs of music, there is at second level a half-credit course on the *Elements of music* (A241).

Third-level arts courses offer you an opportunity to study the concerns and methods of individual disciplines in depth and to pursue interdisciplinary studies at a higher level of complexity and sophistication. These courses meet the requirements of students working for an honours degree, foster more independent learning and provide sufficient foundation for postgraduate study. Each of the five main disciplines usually offers two full credits at this level. Literature offers A319 *Literature in the modern world* and two half credits, A361 *Shakespeare* and A362 *Romantic poetry*. History offers A317 *Themes in British and American history: a comparative approach c.1760–1970* and A318 *War, peace and social change: Europe 1900–1950*. Philosophy offers A310 *Life and death* and A311 *Reason and experience*. At present music offers one and a half credits at third level: A314 *From Baroque to Romantic: studies in tonal music* (full credit) and A341 *Beethoven* (half credit). Art history also offers one and a half credits at third level: A315 *Modern art and Modernism: Manet to Pollock* (full credit) and A353 *Art in fifteenth-century Italy* (half credit). Interdisciplinary work at third level is offered in two half-credit courses, A324 *Liberation and reconstruction: politics, culture and society in France and Italy 1943–54* and A331 *Religion in Victorian Britain*.

The Arts Faculty profile is rounded off by the fourth-level project course A403 *Arts and society in Britain since the thirties*, in which you can carry through your project either in a single discipline of your own choice or in a relevant interdisciplinary topic.

In general a structured profile in arts would look like this:

- Foundation

Arts foundation course. Although it is no longer obligatory, a second foundation course remains a desirable prerequisite for third-level study in the arts. Students with no advanced standing awards, in particular, benefit from the support that they receive at foundation level in the first two years of their undergraduate studies. If you do not intend to take two foundation courses you are advised to move on to post-foundation study through A204 or A205.

- Second level

One or other, or both, of A204 *The Enlightenment and A205 Culture and belief in Europe 1450–1600* with, possibly, further credits from A228 *The religious quest* or A293 *Rome: the*

*Augustan age* or A294 *Fifth-century Athens: democracy and city state*; or A281 *Technology and change 1750–1914* or A282 *Science, technology and everyday life 1870–1950*; or a credit could be taken from the 'U' area. A credit from social sciences at this level, for example D209 *State and society*, would also be appropriate.

- Third level

Here you could do two credits in the single arts discipline of your choice; or of course could divide two credits between arts subjects. Two arts full credit equivalents at third level are recommended strongly for entry into A403.

- Fourth level

A403 *Arts and society in Britain since the thirties*. Please read the course description of A403 for details of entry requirements and recommended prerequisites.

We recommend that if you are concentrating on arts subjects you take one social science course, a 'U' area course or a course from any other faculty and a half credit in the history of science.

When reading the following course descriptions do not forget to refer back to Sections 1–3 and Tables I, II and III at the beginning of this publication.

Under 'Notes for Prospective Students' discontinued courses are identified by square brackets; their titles and presentation dates are listed in Table III.

## A102 AN ARTS FOUNDATION COURSE

### Foundation level: full credit

This course offers a systematic introduction to the arts disciplines – history, literature, music, art history and philosophy. Through the study of culture and society in Britain 1850–1890, which takes up the second half of the course, it also encourages you to see how the individual disciplines relate to each other.

The course has four aims:

- To stimulate your interest in and enthusiasm for the study of the arts, and to provide a basis for further more detailed study at post-foundation level.
- To help you develop the basic skills of clear and logical thinking, of selecting relevant material, interpreting it, and expressing yourself in good English prose; and to introduce you to what is meant by education and the learning process at university level.
- To introduce the separate purposes and methods of the different disciplines in the arts.
- To stress the general idea that the arts disciplines should not be kept in separate compartments, but can and should be brought together both in the study of particular problems and in any comprehensive study of the values and standards of society. This idea will be developed in an interdisciplinary study of 'Culture and Society in Britain, 1850–90'.

**Content** You will begin by studying the five main disciplines taught in the Arts Faculty, spending three weeks on each. During this period the separate purposes and methods of each discipline will be introduced. The first part of the course provides a firm foundation for the work in the second part of the course, when you will need to draw upon the practical skills and insights you have begun to develop and apply them to an interdisciplinary study. This is important, for in order to

appreciate the particular problems, values and standards of Victorian Britain, the disciplines must be brought together to do justice to the complexities involved.

### Part I

**Introduction to history** (Units 1–3) These units introduce the nature, importance, and methods of historical study. Most of the examples will be drawn from Britain 1850–90 so that, although the main purpose of the units is to introduce history as an academic discipline, they also serve to introduce the period which is the basis of the interdisciplinary study in the second part of the course.

**Introduction to literature** (Units 4–6) This is divided into six sections, each dealing with some of the principal issues involved in the study of literature. These include the basic question: what do we mean by 'literature'? A variety of texts are studied, including short stories by James Joyce and Kipling, several poems and Dickens' novel *Hard Times*. You will study the formal aspects of these works together with the more general problems of literary interpretation.

**Introduction to music** (Units 7–9) The introduction to music begins somewhat similarly by asking what music is. It then considers how we listen to music, and concentrates on developing aural and analytical skills. You work on very short musical examples to begin with, gradually moving on to longer ones. By the third week you will meet the more complex musical genres of symphony (Berlioz, *Symphony fantastique*) and oratorio (Handel's *Messiah*), and begin to consider how the development of such genres relates to their historical context (work that you will draw upon in the second part of the course).

**Introduction to art history** (Units 10–12) These units begin with the questions: what is art history, and what is art? They then concentrate on the problems associated with the evolution of the genres of art (for example, portraiture and landscape). The units and the set text work in a complementary way to explore the problems of representation and meaning in the visual arts. The units are illustrated with a wide range of examples from all periods of Western art.

**Introduction to philosophy** (Units 13–15) This is in two parts. The first is concerned with the moral theory known as utilitarianism, the second with the question of whether a 'scientific' approach to human beings involves denying that they have free will. You study some of the writings of the Victorian philosopher John Stuart Mill, and, again, this will provide a foundation for some of your later work in the course.

### Part II

**The Great Exhibition: re-reading *Hard Times*** (Unit 16) The first part of Unit 16 examines an important cultural event, the Great Exhibition of 1851; it then briefly re-introduces the study of *Hard Times*. **Interdisciplinary study: an introduction** (Unit 17) recapitulates some of the main points made in the first part of the course and then introduces the ten topics which form the basis of your interdisciplinary study of Victorian Britain 1850–90.

**Religion: conformity and controversy** (Units 18–19) is one of the ten topics of the interdisciplinary study; but these units also bring in the second topic, 'Science'. In order to show the all-pervasive effects of Victorian religion, examples are drawn from music, poetry and painting. **Moral values and the social order** (Units 20–21), while being based mainly on philosophical and historical writings, also brings in imaginative literature.

**Culture: production, consumption and status** (Units 22–26) In the five weeks in which you study these units you will examine various meanings of the term 'culture', and explore a wide range of 'cultural products' and the nature of their relationship to their social context. The cultural products include paintings, music, music-halls, trade union

banners, popular poetry and religion, as well as Dickens' *Hard Times* once more, and the writings of Matthew Arnold. The units also refer to two of our other topics: 'Working class culture and the Labour Movement', and 'The role and status of women'.

**The representation of the people** (Units 27–28) The position of the working class and of women is touched on, though the units draw mainly on philosophical arguments and historical material in studying the contemporary debate over the franchise and its reform. **Town and country** (Units 29–30) examines some of the facts and fictions about 'Town and country'. You will be studying 'facts', such as who lived where, and in what kinds of housing, and 'fictions' such as pastoral images of the countryside as represented in contemporary paintings and poetry.

**Conclusion** (Units 31–32) To help you with revision, these units illustrate the way in which the ten topics are woven together in the second part of the course, bringing out the significance of topics such as 'Economic, social and technological developments' and 'Historicism and the concept of progress'. These units help to highlight and summarize the changes that took place between 1850 and 1890. You are also given practical advice and exercises to help you prepare for the examination.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [A100], [A101].

**Assessment** Eight TMAs (50%) and the examination (50%). TMA 08 takes the form of a mock examination and is not assessed. Substitution is allowed for up to two TMAs from TMAs 01–05 and 07 but not for TMA 06. You will progress from writing single-discipline essays to interdisciplinary essays. The choice of assignments includes some which require reference to the broadcast material.

**Broadcasts** The thirty-two TV and sixteen radio broadcasts are an important part of the course and we have used the special characteristics of radio and television to enhance your appreciation of the issues dealt with in the units. The programmes that accompany the first part of the course have two roles; they exemplify some of the purposes, assumptions and methods of arts study and they present illustrations of the work of eminent practitioners of history, literature, music etc.

**Cassettes** Four 90-minute and one 60-minute audio cassettes are included in the course material.

**Summer school** Course based. The summer school has been planned with the aims of increasing your enjoyment of the arts and your confidence in studying them; of increasing your ability to learn from discussion with others; of consolidating and extending your study in the five main discipline areas of the Arts Faculty (art history, history, literature, music and philosophy); of developing your skills in the interdisciplinary study in the arts which forms Units 16–32 of the course.

**Students with disabilities** If you have a disability which may prevent you from completing assignments in such disciplines as art history or music, or you find you are not able to range as widely in interdisciplinary questions as might be wished, you should consult your tutor, who will ensure that such problems receive sympathetic attention. No substantial difficulties are expected.

**Preparatory reading** In the autumn, before you begin A102, you will receive the preparatory pack *Preparing for the Arts Foundation Course*. Some regions provide additional advice on preparation, although the A102 course team does not regard extra preparation as necessary. However, you should read two of the set books before the course begins: Geoffrey Best, *Mid-Victorian Britain 1851–1875* and Charles Dickens, *Hard Times*. If you have the time to read more widely we recommend the following: E. H. Gombrich (1950) *The Story of Art*, Phaidon; A. O'Hear (1985) *What Philosophy Is*, Phaidon.

**Set books** G. Best *Mid-Victorian Britain*, Fontana. C. Dickens *Hard Times*, The Open University Press. E. H. Gombrich *Art and Illusion*, Phaidon. Course reader: J. M. Golby (ed.) *Culture and Society in Britain, 1850–1890: a source book of contemporary writings*, Oxford University Press, produced specially for A102.



## A204 THE ENLIGHTENMENT

Second level: full credit

This course explores the culture of the 'Age of Reason' at its height (roughly, the middle decades of the eighteenth century) through close study of a number of texts and of certain leading figures. As far as is practical, each text is presented and discussed by several authors and from the points of view of different disciplines. (For example, the units on *Tom Jones* have been written not only by a literary scholar but also by a philosopher and by historians.) Similarly, throughout the course there is emphasis on inter-connections between the 'texts' studied, whether literary, philosophical or belonging to the fine arts. The course also offers guidance on the use of such concepts as 'the Enlightenment', 'Augustan', 'Classic' and 'the Rococo', and there is a general emphasis on the ideas of the time.

**Content** The 'texts' include three novels, *Tom Jones* by Henry Fielding, *Candide* by Voltaire and *Les Liaisons dangereuses* by Choderlos de Laclos, the two latter in English translation; Epistle IV of Pope's *An Essay on Man*; writings by the philosopher David Hume, the economist Adam Smith, and the influential writers of the French Enlightenment; chapters from Gibbon's *Decline and Fall of the Roman Empire*; documents about Frederick the Great and about Enlightenment science and its impact; paintings and engravings by Chardin, Hogarth and Joseph Wright of Derby; representative works of English architecture and landscape; orchestral works by Haydn, and Mozart's opera *The Marriage of Figaro*.

The four-week music block gives a choice, one option for students with some technical grounding in music (such as they would have gained from A241 *Elements of music*, for instance), and the other for those with none; the texts being, in the former option, Haydn's *Sinfonia Concertante* and *Symphony 104* and in the latter Mozart's opera *The Marriage of Figaro*. Records will be provided.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** None, but the course builds upon the arts foundation course and you are encouraged to take A102 before embarking on A204.

**Assessment** Eight TMAs (50%), and the examination (50%). All TMAs will be assessed, and substitution will apply for up to two.

**Broadcasts** Sixteen television broadcasts and thirty-three radio programmes. The broadcasts include programmes on the city of Bath (as an example of eighteenth-century town planning), paintings by Hogarth and Chardin ('Gibbon and the Ruins of Rome', 'Frederick and Voltaire at Sans-Souci'), the D'Holbach circle, and Mozart's *Marriage of Figaro*. Radio programmes include talks on *Tom Jones* as a novel, Hogarth, political prints in the age of Hogarth, architectural pattern-books, scientific method and medical advance, Gibbon as stylist and historian, Voltaire and the Lisbon earthquake, humour in classical music, and Adam Smith and David Hume.

**Students with disabilities** You will be encouraged to visit certain buildings and gardens, but inability to do so should not prevent you from studying the related parts of the course. Alternative assignments are available for those with visual or aural handicaps.

**Preparatory reading** Four of the first five weeks of the course are devoted to the study of Fielding's *Tom Jones* and it would be to your advantage (though in no way obligatory) to read the novel before the beginning of the course.

**Set books** H. Fielding *The History of Tom Jones*, Penguin. Voltaire (trans. J. Butt) *Candide*, Penguin. A. Smith *The Wealth of Nations*, Penguin. Choderlos de Laclos (ed. A. Skinner trans. R. Aldington) *Les Liaisons dangereuses*, Routledge. S. Eliot and B. Stern (eds) *The Age of Enlightenment: an Anthology of Eighteenth-century Texts*, 2 volumes, Ward Lock Educational. D. Hume *Enquiries Concerning Human Understanding and Concerning the Principles of Morals*, ed. L. A. Selby-Bigge, Oxford University Press.

**Special feature** Specially prepared long-playing records are provided to accompany the units and you must have easy access to a record player.

## A205 CULTURE AND BELIEF IN EUROPE 1450-1600

Second level: full credit

The course examines the nature of culture in the period 1450-1600, making reference to its religious and secular characteristics and pursuing particular debates. Its aims are:

- To enable you to build upon interdisciplinary study skills developed from studying the arts foundation course and to complement other second-level interdisciplinary courses.
- To develop further skills appropriate to the various disciplines within the Faculty of Arts.
- To enable you to understand and elucidate problems through the study of primary and secondary sources including artefacts and texts.

There are four recurring themes, which are introduced in the first block.

**Religion and secularization** What hold did Christianity have upon the men and women of sixteenth-century Europe? How was it affected by the Protestant and Catholic Reformations? Did European culture and society become more secular in the sixteenth century?

**Authority, political and cultural** Who had legitimate power over whom: who or what set the standards of acceptability and excellence in sixteenth-century European culture?

**Cultural and social change** How did European culture and society change in response to new developments in knowledge, learning and location of all forms of authority - religious, political and cultural?

**Regionalism and widening perspectives** What was the effect of contact between communities on either side of Europe's external and internal frontiers? What was the relationship between centre and periphery in the regions of Europe?

### Content

**Block 1 Popular culture: humanism and belief 1450-1530** forms the conceptual framework for the course. Introducing discipline and interdisciplinary study skills and using contemporary texts and artefacts it looks at a mystery play, a shrine, an altarpiece, philosophy, poetry, culture and painting.

**Block 2 Venice and Antwerp** examines pre-Reformation society and culture through a comparative study of Venice and Antwerp, looking at politics, economics, patronage, humanism, printing, minorities.

**Block 3 The Protestant and Catholic Reformations** examines and explains the basic developments of the Reformation movements as parallel phenomena, studying, for example, Luther, Calvin and Melancthon, predestination and free will, Dürer and religious art in Germany. Case studies investigate the influence of the Reformation on a selection of cities in Europe.

**Block 4 Reform and culture** considers the connections between the Reformation, culture and society. One case study, on English culture, includes the music of Tallis and Marlowe's *Dr Faustus*. The other, on Spanish culture, includes El Greco, St Theresa and some Jesuit political philosophers.

**Block 5 Europe and the wider world** investigates Europe's response to the New World of Asia and Africa through writings about the New World, relations with the Muslim world, the Ottoman Empire, exchanges of medicine, art.

**Block 6 Communication and culture** considers élite and popular culture and the influence of printing on cultural changes. It studies both traditional non-print culture (festivals, sermons) and the use of books (*Morte d'Arthur*, *Don Quixote*).

**Block 7 France (1547-1610)** considers the nature of authority (secular and religious) from the reign of François I to Henri IV, seen in the context of the political tensions and wars of religion of that time, and the emergence of the nation state.

**Block 8 The British Isles** investigates the comparatively late effect of the Reformation in Britain, concentrating on the theme of authority through study of Shakespeare's *Richard II*, music, the Sidney Circle, Spenser's *Faerie Queene* and Scottish court poetry.

**Block 9** *Revising the course* presents a general view of the course.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisite** A102.

**Complementary and related courses** [A201], [A202], [A203], A204.

**Assessment** Eight TMAs (50%) and the examination (50%). Substitution will apply to up to two TMAs but not to TMA 08.

**Broadcasts and cassettes** Twenty-four TV and sixteen radio programmes; five half-hour and five one-hour audio cassettes.

**Students with disabilities** Students with a visual handicap may have difficulty with the visual content of some of the blocks.

**Set books** *Culture and Belief in Europe 1450-1600: an Anthology of Primary Sources* has been produced for the course by D. Englander, D. Norman, R. O'Day and R. Owens (eds.), Basil Blackwell. Another text used throughout is H. Koenigsberger, G. Mosse and G. Bowler *Europe in the Sixteenth Century* (2nd edn.), Longman. Other set books are: D. Lindsay *The Thrie Estaitis* (ed. R. Lyall), Canongate. C. Marlowe *Dr Faustus: A Text* (eds. D. Ormerod and C. Wortham), University of Western Australia Press. Michel de Montaigne *Essays* (trans. J. M. Cohen), Penguin. W. Shakespeare *King Richard II* (ed. A. Gurr), Cambridge University Press. E. Spenser *The Faerie Queen Book 1* (ed. Bayley), Oxford University Press.

## A228 THE RELIGIOUS QUEST

Second level: half credit

This course has the following aims:

- To explore aspects of 'the religious quest' in six of the religions of the world.
- To familiarize you with the scholarly methods needed for the objective study of religions.
- To explore the meaning of concepts and modes of expression used in different religions.
- To provide an historical framework for the religions studied.
- To give an account of the character, content and riches of the sacred literature of the religions studied.
- To encourage you to enter into the thought-world of others, and to study objectively, but with sympathetic interest, the meaning of their religious beliefs and practices.
- To help you to assess the influence of religious thought and practice on human life, both social and individual.

**Content** There are fifteen units in two blocks. The first block deals with religions of the Indian tradition: *Hinduism* (Units 1-4), *Buddhism* (Units 5, 6 and 7), *Sikhism* (Units 8-9). The second block contains the study of religions of Middle Eastern origin: *Judaism* (Units 10-11), *Christianity* (Units 12-13), *Islam* (Units 14-15).

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [AD208].

**Recommended prerequisites** None, though it would be useful to have taken [A101] or A102.

**Complementary and related courses** As well as A102, related courses in the Faculties of Arts and Social Sciences and in the School of Education would be: [A313], [A381], [D207] and [E354].

**Tuition** There is no summer school but there will be local tuition, evening tutorials or day schools, depending on local conditions. Since many of the ideas and concepts encountered in this course are likely to be new and perhaps difficult to understand, attendance at local tutorials will be quite important.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one

TMA. The TMAs cover the whole course but you will be able to choose which religions you will concentrate on in the two blocks.

**Broadcasts and cassettes** The six TV programmes and two audio cassettes are an integral part of the study of the six religions. The television programmes show ways of worship and religious observance in different parts of the world. Much of the material is completely original. If you cannot receive these broadcasts you will be at some disadvantage, although no part of the assessment will be based exclusively on broadcast material. Religious ritual can be very colourful and a colour television set is an advantage in viewing some of these programmes, though not indispensable. The audio cassettes include personal views of each religion by a practitioner of that religion, and a programme on the Hindu temple.

**Students with disabilities** Students with visual handicaps have successfully studied this material.

**Preparatory reading** It will be useful to have read the relevant sections of *The Hutchinson Encyclopedia of Living Faiths*, one of the set books, before the course begins.

**Set books** W. Foy (ed.) *The Religious Quest: A Reader*, Croom-Helm (course reader). R.C. Zaehner (ed.) *The Hutchinson Encyclopedia of Living Faiths*, Hutchinson (4th edn.) You will be supplied with Bowker, *Worlds of Faith*, Ariel.

## A241 ELEMENTS OF MUSIC

Second level: half credit

A241 is not a musical appreciation course; it is a technical course in music theory, including harmony and analysis, designed to complement higher-level specialist music courses, especially A314 *From Baroque to Romantic: studies in tonal music* and A341 *Beethoven*. A241 gives you a grasp of harmony, style, form and orchestration which is essential for the detailed study of music at higher levels. The course is intended both for students with some musical background (playing an instrument or music studied for O level, for example) and also for those without knowledge of the technical aspects of music, but with a love of music and a desire to study it in some depth. For these there will obviously be more work to start with. There is a preparatory supplement on rudiments, and a cassette which can be studied before the first course units by those with no previous experience. However, if you are seriously interested in taking A241 but are an absolute beginner and anxious about your suitability for the course, seek advice from your tutor-counsellor.

The general aim of the course is to familiarize you thoroughly with the elements of music, develop aural perception, teach score-reading, and give you the technical knowledge to practise harmonic and stylistic analysis of the period between about 1730 and 1900.

**Content** The course is in three main blocks, together with aural training, score-reading and stylistic analysis, all reinforced by practical experience of playing a recorder.

The first three-unit block deals with rudiments (elements, notation and terminology) and has exercises in 'score-reading' and aural training. If you have no previous knowledge you will find this block rather dense and full of facts to be learnt (though the specially prepared cassette and supplement should help those who need it). If you have half-forgotten experience you will have to make an effort to refresh your memory in these areas. The core of the course follows: nine units concentrating on harmony and style. You will work exercises of an elementary nature - phrases in major and minor keys, modulation, simple harmonizations and so on - and will learn to do harmonic and stylistic analysis by discussion of more advanced harmony, texture, and style. You may find that the course reaches a peak of demand by Unit 8, where you are required to do harmonization. We feel that not until you have worked exercises yourself in detail will you appreciate fully and be able to analyse thoroughly the workings of the 'masters'. After Unit 8 the course makes different demands of a more analytical and less practical nature.



Units 13-15 deal with form in a refreshing and unpedantic way. The last unit is devoted to a quick study of orchestration – mainly orchestral sonorities, examples of which have been specially written and recorded.

#### NOTES FOR PROSPECTIVE STUDENTS

**Assessment** TMAs 02-08 (50%) and the examination (50%). Substitution will apply for up to two TMAs. There is also one formative TMA (01) which will not be used for assessment.

Listening to the cassettes is essential for the completion of the first five assignments, since aspects of aural work are part of these assignments. Easy access to a cassette player is therefore necessary. Half of the examination is devoted to a harmony question and the rest to questions on stylistic and harmonic analysis, form and orchestration.

**Records and musical instruments** Specially prepared long-playing records are provided to accompany the units, and you must have easy access to a record player. You can also, if you wish, be provided with a small electric reed organ to enable you to hear what you write. (This instrument may not be taken or sent outside the United Kingdom.) Correspondence tuition on playing a recorder runs for the first twelve units of the course, and a recorder of one size or another is needed. These are available at modest cost but do not buy one until you have read the advice in the Course Guide.

**Broadcasts and cassettes** Eight TV programmes and sixteen former radio programmes on audio cassettes. On the whole these reinforce the written material. Certain cassettes contain aural exercises as part of assignments (see 'Assessment'). There are three other cassettes: *Practice in aural training: Understanding what you hear*, and a revision cassette.

**Students with disabilities** The course is not suitable for students who are aurally disabled. Visually disabled students will need the help of an amanuensis or cassette recorder and must have a good ear.

**Set books and cassettes** E. Blom (ed.) (revised by David Cummings, 6th edn.) *The New Everyman Dictionary of Music*, J. Dent. J. Hosier *Instruments of the Orchestra*, Oxford University Press (boxed set containing book and cassette).

## A281 TECHNOLOGY AND CHANGE 1750-1914

Second level: half credit

Last presentation 1991

This course builds upon the themes opened up in the study of industrialization begun in the arts foundation course (A102), but concentrates on the technological changes of the period. It will be of interest to students from scientific and technological backgrounds as well as to those whose studies are arts-based. The course explores the technological details of industrial developments and the social and economic context in which they occurred; it helps you to develop the techniques of historical study through the use of primary and secondary sources. It looks mainly at Great Britain, but developments in Europe and the USA are also briefly considered, thus encouraging a comparative approach. One important theme is the rise of British technology at the beginning of the period and its relative decline at the end in the face of European and American competition. Other themes are the complex relationships between the development of technology and economic change and the effects of the growth of industry on social conditions.

**Content** The study-line of this course is established by a case study of Manchester which, by discussing the experience of industrialization in a particular place, introduces some of the main issues and problems. This is followed by three period-based Study Guides (1750-1815, 1815-1870 and 1870-1914) dealing with the economic and social context of the technological developments discussed in the course. The Study Guides draw upon materials in fourteen essays on technological topics, each of which traces the development

of a particular technology throughout the whole period covered by the course. These essays deal with the textile industries, iron and steel manufacture, the steam engine, the chemical industry, the coal industry, agriculture, public health, canals, roads and railways, shipping, the electrical industry, electrical communications and production engineering. There are also seven audio cassettes with accompanying printed illustrations which deal with many of the technical details discussed in the essays and some other topics. The Study Guides also draw upon a collection of primary and secondary documents. Thus a coherent study is made both of the technological advances in particular industries and of the wider social and economic context in which technology has developed.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [AST281].

**Recommended prerequisites** None. However, familiarity with the 'Introduction to History' and treatment of industrialization in the former arts foundation course [A101] may be useful, as would some general knowledge of the Industrial Revolution in Britain.

**Complementary and related courses** A102, A282, [A309], A317, MA290, S102, T102.

**Assessment** Four essay-type TMAs (50%), and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts and cassettes** Eleven television programmes are part of the teaching, showing and explaining the workings of moving machinery and technological processes which cannot be represented as still pictures. Colour television is important but not essential. The course also includes seven audio cassettes.

**Home experiment kit** There is a non-returnable home experiment kit, the Textiles Package. This contains a number of samples of raw materials, yarns and fabrics, accompanied by experiment sheets.

**Students with disabilities** If you have a visual handicap you may have difficulty with the television programmes.

**Preparatory reading** It would be valuable, though not necessary, to have read David S. Landes (1969) *The Unbound Prometheus*, Cambridge University Press.

## A282 SCIENCE, TECHNOLOGY AND EVERYDAY LIFE 1870-1950

Second level: half credit

The main aim of this course is to enable you to associate changes in people's lives at home, at work and at leisure with scientific and technological developments at the heart of what has been called the 'second industrial revolution'. How and why such developments came about is explored by considering, for instance, the roles played by government policy, consumer demand, capitalist expansion and ideological debate. The processes of discovery, invention, innovation and diffusion are examined within their social context, involving you in debates about the extent to which science and technology can be said to have determined historical change. You are encouraged to examine critically the belief in scientific and technological 'progress' which was widespread in the chosen period. The focus is mainly on Great Britain, the USA and, to an extent, Western Europe. The course will equip you with the basic skills necessary for the study of the social history of science and technology, such as the ability to evaluate both historical evidence and theories about the development and interaction of science, technology and society.

**Content** The main text of the course is an anthology of thematic essays written by the course team. The areas dealt with in the

essays are: electrification, materials (e.g. plastics, bulk steel), new modes of transport (e.g. electric traction and the internal combustion engine), new modes of communication (e.g. radio, cinema), food production and consumption, health and medicine and finally, applications of 'scientific method' to human problems.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** None, but familiarity with the Introduction to History in A102 may be useful.

**Complementary and related courses** A102, S102, T102, A281, A317, [D102], MA290.

**Assessment** Four essay-type TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts** There are eight TV programmes which are part of the teaching. The first programme raises some of the main concerns of the course and in particular examines the technological optimism of the period and how this was affected by, for example, two world wars and large-scale economic depression. The following seven programmes each deal with a particular innovation or system of innovations such as aluminium, the electric home, the automobile and radio. Each programme is closely related to an anthology essay, and exercises are included in the Study Guide. There is one audio cassette.

**Students with disabilities** The course should present no special problems, although if you are visually handicapped you will have some difficulties with the broadcasts which are an important part of the course.

**Special features** You are advised to record the TV programmes, as they contain valuable sources of archive film, newsreels, advertisements etc. which will be useful for study in depth and future reference. Nevertheless, access to a video recorder is not essential.

**Set books** There are two volumes of primary and secondary source material, produced specially for the course. The primary sources reader will be supplied with the course material but you will have to buy the secondary reader, C. Chant (ed.) *Sources for the Study of Science, Technology and Everyday Life 1870-1950 Vol. 2 A Secondary Reader*, Hodder and Stoughton.

## A293 ROME: THE AUGUSTAN AGE

Second level: half credit

A293 is an interdisciplinary course which introduces the main cultural, political and social features of the Roman Empire in the late first century BC and the early first century AD. No previous knowledge of the period is required.

The age of Augustus saw the establishment, out of a period of military anarchy and political chaos, of a form of government which was to preserve the Roman Empire for almost a further five hundred years. The aim of the course is to enable you to study, appreciate and evaluate a wide selection of ancient source-material (in translation) – literary, historical, philosophical, epigraphic, archaeological, architectural and artistic – which is presented in a course anthology, illustrated booklets and broadcasts.

**Content** The course is divided into four sections. In the first (Units 1-3) the main features of the Roman world are introduced, with emphasis on the political and social ethos of the ruling aristocracy of the late Roman republic, and its breakdown. Study of works by the statesman and thinker Cicero and by the Epicurean philosopher Lucretius help to set the moral and intellectual background of the subsequent age.

The second and central section (Units 4-9) deals with the principate of Augustus (27BC-AD14) and his successors. The main features of Augustus' rule are highlighted by a critical study of the emperor's own account of his achievements, the *Res gestae*. Particular attention will be given to Augustan poetry

(selections from Virgil, Horace and Ovid). Unit 9 looks at Augustus' successors, the emperors Tiberius, Gaius and Claudius (d. AD54), and considers to what extent they maintained or departed from an established pattern of rule.

The third section (Units 10-12) considers Rome in the wider context of its relations with Italy and the provinces. Social life, architecture and town planning are closely related in the study of such questions as occupations, social class, the relationship of town to countryside and the cultural influence of Greece on Roman life.

The course concludes with three provincial case studies. The purpose of these is to balance the main focus of the course, Rome, with some detailed insights into the relations between Roman civilization and indigenous culture in various parts of the Roman Empire. Study of Britain and Germany (associated with Northern Gaul) in the West is balanced in the East by Judaea, with its old-fashioned Jewish and Hellenic culture. Among questions considered in this last section are the attitude of Rome to Judaic religion and the historical origins of Christianity.

The course units are:

- 1 From Republic to Principate (historical introduction)
- 2 Cicero, *De officiis*
- 3 Lucretius, *De rerum natura*
- 4 Augustus, *Res gestae*
- 5 Roman painting and sculpture
- 6-8 Augustan poetry
- 9 Tiberius, Gaius and Claudius
- 10-12 Social history: architecture and town planning
- 13-14 Provincial case studies I: Gaul, Germany and Britain
- 15-16 Provincial case studies II: Judaea.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [A291].

**Recommended prerequisites** None. However, A102 is a good introduction, particularly the units on historical sources and methods, which you are strongly advised to read if you have not taken A102.

**Complementary and related courses** [A292], A294.

**Assessment** TMAs 01-04 (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts and cassettes** The purpose of the audio cassettes is to enable distinguished scholars to supplement, or sometimes differ from, points of view expressed in the main body of the course. The eight TV programmes introduce the wealth of surviving visual material.

You will also receive an audio cassette which gives instruction on the use of historical sources and help with the study of texts (especially poetry) in translation. The material in this cassette is closely related to the unit texts.

**Students with disabilities** If you are visually handicapped you will find Unit 5 'Roman Painting and Sculpture' and the architecture section of Units 10-12, both of which depend upon use of illustrated booklets, very difficult. However, where visual evidence is demanded, an alternative TMA question will be provided. The ability to visit libraries is an advantage but is not essential, so if your mobility is restricted you should not have particular difficulty with the course.

**Preparatory reading** If you wish to do some preparatory reading we recommend: D.R. Dudley (1975) *Roman Society*, Penguin; E. T. Salmon (1977) *History of the Roman World 30BC-AD138*, Methuen; C. M. Wells (1982) *The Roman Empire*, Fontana. If you wish to investigate museums or archaeological sites look at: R. J. A. Wilson (1975) *A Guide to the Roman Remains in Britain*, Constable, and the AA *Guide to Stately Homes, Museums, Castles and Gardens*, which includes important archaeological sites.

**Set books** Most of the set reading and other material for study is in a course anthology, K. Chisholm and J. Ferguson (eds.) *Rome: the Augustan Age*, Oxford University Press, and illustrated booklets. (The illustrated booklets are mailed as part of the course material.) You will also need a history text, H. H. Scullard *From the Gracchi to Nero: a History of Rome*, Routledge, which serves as a reference book for chronology and events. Both the anthology and *From the Gracchi to Nero* are referred to throughout the course.



## A294 FIFTH-CENTURY ATHENS: DEMOCRACY AND CITY STATE

### Second level: half credit

This course explores the diverse cultural and social implications for the Athenians of the fifth century BC of their historically unique experience of direct democratic rule within a city state. The Athenians regarded their political activity as the chief inspiration for their social and cultural achievement and as the basis of their wide-reaching and profitable empire. For us, it is the central point in a study of the most significant and well documented period of the ancient world.

The aims of this interdisciplinary course are to introduce this aspect of classical Greece and to enable you to study, appreciate and evaluate a wide selection of ancient source material including texts (in translation), buildings and other works of art and artefacts. A variety of different sources embody the central themes of the course; in particular we consider how the nature of our source material for classical Athens affects the way in which we study the period. We also ask questions about how our contemporary experience affects our study of the past. No previous knowledge of the subject is required.

**Content** The course is divided into five main blocks: in each, a particular text or visual source is used to introduce an important theme.

#### Block 1 Introduction

**Block 2 The Greek theatre in its dramatic and social context** There is detailed study of two important tragic dramas (Aeschylus, *Prometheus Bound* and Sophocles, *Antigone*); the material is also used to relate the Athenian dramatic festivals to their wider social and political context.

**Block 3 Thucydides and Athenian democracy** Thucydides was the chief historian of later fifth-century Athens, and his *History of the Peloponnesian War* is used as a basis for a study of the dynamics of political change and for a case study of historical aims and methods.

**Block 4 Tensions and change in fifth-century Athens** This examines the tension and change in society and its values brought about by war and empire; a wide range of evidence is drawn upon, including Athens' most famous monument, the Acropolis, as well as an 'anti-war tragedy', the *Trojan Women* of Euripides.

**Block 5 Philosophy and religious experience in late fifth-century Athens** This block explores the development of Greek rationalism as seen in medical, scientific writers, the Sophists, and a play of Aristophanes, the Athenian comic dramatist, leading to a study of a Socratic dialogue of the philosopher Plato. The *Bacchae*, the last tragic drama of Euripides, is also read in order to examine the relationship of values based upon rational modes of thought and conventional piety to Greek mystery religion. This block draws together themes from earlier parts of the course.

**Block 6 Course revision and examination preparation**

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [A292].

**Recommended prerequisite** A102.

**Complementary and related courses** This course complements A293. Also related are [A203], A204, A205 and A228.

**Assessment** Four TMA5 (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts** There are eight TV programmes closely integrated with the content and teaching strategy of the course.

**Cassettes** Audio and audio-vision cassettes integrate teaching material with the blocks. An audio cassette player is essential.

**Students with disabilities** If you have a visual handicap you will find some difficulty with the

study of visual evidence, but this should not make it impossible for you to tackle the course successfully.

**Preparatory reading** It would be useful, though it is in no way obligatory, to have read through some of the set books (these are the primary texts of the course). The Greek dramas to be studied in Block 2 (see above) would be an obvious choice.

**Set books** A secondary text book *The World of Athens*, Joint Association of Classical Teachers, CUP, will be sent to you as part of the course material. Primary texts (all Penguin Classics) to be purchased are: Thucydides *The Peloponnesian War*, Sophocles *The Three Theban Plays*, Aeschylus *Prometheus Bound and Other Plays*, Euripides *The Bacchae and Other Plays*, Aristophanes *Lysistrata and Other Plays*, Plato *The Last Days of Socrates*.

**Note** Penguin has two editions of Sophocles; you should buy the edition translated by Robert Fagles, ISBN 0-14 044 425-4.

## A310 LIFE AND DEATH

### Third level: full credit

The chief aim of the course is to show how various problems of life and death, such as suicide, euthanasia and abortion, can be brought under moral theories, that is, systematic philosophical accounts of the difference between right and wrong, good and evil, justice and injustice. A complementary aim is to suggest some ways of deciding between moral theories when they conflict in their treatment of problems of life and death. By the end of the course you should be able to construct arguments for and against your own beliefs with the aid of theories. You should also be able to appreciate underlying questions about the value and meaning of life, and to evaluate theories about 'self-realization' propounded by various philosophers.

The philosophical theories and arguments considered in the course are entirely secular; explicitly religious views are not discussed.

The course will help you to:

- Extract unstated moral principles from moral rhetoric.
- Test moral principles against difficult cases taken from real life.

As well as its obvious appeal to students with an interest in philosophy, those with a background in education, sociology, politics, religion and psychology should find this course of interest. It should also be of value to people whose work in such areas as health care, policing and social work involves them in the consideration of life and death problems.

**Content** The course material consists of four books, each of which can be read independently of the others, and all of which are written for an audience with little or no background in philosophy. Teaching devices, such as exercises and material linking text with audio cassettes, are confined to study guides accompanying each of the four course books.

**Book 1** This starts by considering the difference between moral rhetoric about life and death, such as might be produced by organized lobbies or interest groups, and moral philosophy about life and death. There is a discussion of the ways in which moral theory can improve on ordinary moral rhetoric about, for example, abortion or euthanasia. Then a number of theories from moral philosophy, notably utilitarian and Kantian ones, are expounded. These theories are then applied in a detailed discussion of one particular life and death issue – the permissibility of capital punishment. Book 1 is entitled *Moral Theory and Capital Punishment*.

**Book 2** This widens the range of life and death issues under discussion to include questions about the permissibility of euthanasia and the moral status of suicide. Difficulties are revealed in the utilitarian treatment of these issues, suicide in particular. The book considers the possibility that special questions are raised by suicide, questions to do with the value or meaning of the life to be cut short, perhaps better accommo-

dated by a non-utilitarian philosophy like existentialism. Utilitarianism is again shown to be under strain when applied to questions about the morality of euthanasia. The discussion draws on a number of real medical cases. This volume is entitled *Ending Lives*.

**Book 3** The morality of abortion is the central topic of this book. Balanced consideration is given to liberal and conservative positions in the debate about abortion, and influential arguments supporting these positions in the philosophical literature are carefully reviewed. A novel argument is constructed broadly in keeping with a conservative position but not based on the usual premises. Book 3 also touches on issues connected with foetal research and surrogacy. It is entitled *Beginning Lives*.

**Book 4** Questions about the value and the meaning of life that have arisen intermittently in the other three books are now taken up in earnest. Two themes predominate: the interpretation of facts about life that may seem to make it meaningless, such as death, the lack of a purpose of life, etc; and the ideal of self-realization. Theories of self-realization from Aristotle to Bradley and Sartre are considered. This book is entitled *The Quest for Meaning*.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisite** A102.

**Complementary and related courses** This course complements A228, [A292] and [A309], and is relevant to [D207], D211, D310, D321, [D355], [D435], U235 and U205.

**Assessment** TMA5 02-08 (50%) and the examination (50%). Substitution will apply for up to one TMA. TMA 01 is formative and not used for assessment.

**Cassettes** Five 90-minute audio cassettes. There are no broadcasts.

**Summer school** Course based.

**Preparatory reading** The Glover set book is a good introduction to the topics dealt with in the course.

**Set books** There are three set books and a course reader: T. L. Beauchamp and J. F. Childress *Principles of Biomedical Ethics*, Oxford University Press (3rd edn.); J. Glover *Causing Death and Saving Lives*, Penguin; P. Singer (ed.) *Applied Ethics*, Oxford University Press; O. Hanfling (ed.) *Life and Meaning*, Basil Blackwell (course reader).

## A311 REASON AND EXPERIENCE

### Third level: full credit

*Last presentation 1991*

This course deals with six of the founders of modern philosophy: Descartes (1596-1650), Spinoza (1632-1677), Locke (1632-1704), Berkeley (1685-1753), Leibniz (1646-1716), and Hume (1711-1776); and equips you to evaluate their work and see its relevance to present-day philosophical concerns.

**Content** The six philosophers both responded and contributed to 'the revolution in scientific thinking that marked the end of the middle ages. An introductory unit sets the stage, contrasting the old Aristotelian science, which relied on the notion that things belong to one of a large number of natural kinds of things, each with its own 'essence', usually defined in terms of ends towards which the things were thought to develop, with the new mechanical science which sought to explain everything by reference to corpuses of matter in motion, the motions being describable in purely mathematical terms.

In the five units on Descartes, the new science is presented as a way of avoiding scepticism. Mechanics was to be put on a secure foundation by abandoning Aristotle's innumerable essences of natural kinds in favour of matter having just one essence, extension. Descartes held that there are two substances, under God: matter and mind.

This 'dualism' was a source of considerable perplexity. If mind and matter are distinct, how can they interact?

There are four units on Spinoza, who sought to avoid this problem by saying that mind and matter are two attributes of one substance: what is material from one aspect is mental from another; and the one substance, he says, is God. Spinoza's philosophy has profound implications for our understanding of ourselves as moral agents.

Locke, like Descartes, was concerned about the foundation of science. Though classed as empiricist, Locke's approach had much in common with that of Descartes, usually called rationalist. One point of contact was the view that the immediate objects of knowledge are 'ideas', produced in our minds by external objects, but whereas Descartes held that some ideas are 'innate', this was strenuously denied by Locke.

Berkeley was opposed to the corpuscular philosophy of Descartes and Locke on the ground that it amounted to an atheistic 'materialism'. He held that the existence of sensible things was nothing other than their being perceived, and that the conception of a material substance causing the perceptions was a contradiction. He allied this 'idealism' with the doctrine that our ideas are caused by God.

Leibniz deplored competition between schools in philosophy and claimed to combine what was best in each of them. Like Berkeley he rejected material substances as conceived by Descartes and Locke, but tried, nevertheless, to uphold the reality of matter. Like Descartes, he tried to reconcile a mechanistic physics with belief in a spiritual world. Like Spinoza, he thought of the universe as wholly determined, but he tried to find room in his system for free will.

Hume was less concerned with the natural science of his time than with developing a new science of human nature inspired by Newton's mechanics. Although accepting some of Locke's assumptions, he believed that the way of ideas led ultimately to a sceptical position from which rationalist strategies provided no escape. In studying the fundamental beliefs used in interpreting our experience – about causation, the external world, and our own identity – Hume developed a distinctive view of human understanding in which non-rational aspects predominate.

There are four 'review' units, designed to help you to absorb and make connections between the main blocks you have been studying.

#### NOTES FOR PROSPECTIVE STUDENTS

**Assessment** TMA5 02-08 (50%) and the examination (50%). Substitution will apply for up to two TMAs. TMA 01 is formative and not used for assessment.

**Cassettes** Four 90-minute audio cassettes. There are no broadcasts.

**Summer school** Course based. The aim is to help you understand and evaluate the arguments of the philosophers, and to enable you to try out your understanding on tutors and fellow students.

**Preparatory reading** You must read chapters 2, 3 and 4 of the *Aristotle* set book (see below) before starting work on Unit 1 of the course; it is recommended that you also read chapter 1 but this is not essential. It will probably be helpful to read chapters 2, 3 and 4 once through quickly to get a general view, and then more slowly, attempting to identify the main points of each chapter. This second reading should be completed just before the course begins in February. Allow at least two hours or so for each chapter.

If you wish to undertake some additional preparatory reading you may find the articles on Descartes, Spinoza, Locke, Berkeley, Leibniz and Hume in D. J. O'Connor (ed.) (1964) *A Critical History of Western Philosophy*, Collier-Macmillan useful.

**Set books** A. E. Taylor *Aristotle*, Dover. George Berkeley *Philosophical Works including the works on vision*, Everyman. R. Descartes *The Essential Descartes* (ed. M. Wilson), Mentor (Sphere). David Hume *A Treatise on Human Nature* Book 1 (ed. D. G. Macnabb), Fontana. G. W. von Leibniz *Philosophical Writings* (trans. M. Morris and G. Parkinson), Everyman. John Locke *An Essay Concerning Human Understanding* (ed. J. W. Yolton), Everyman. B. de Spinoza *On the Improvement of the Understanding and The Ethics* (trans. R. H. M. Elwes), Dover.



## A314 FROM BAROQUE TO ROMANTIC: STUDIES IN TONAL MUSIC

### Third level: full credit

The aims of the course are:

- To introduce a wide range of music from the most familiar period of European musical history, including acknowledged masterpieces of the concert repertoire.
- To place this music in its context by means of biographical, social and historical investigation and by studying a wealth of less familiar but valuable music.
- To encourage informed and critical listening to music, and to give insight into the process of composition during the period of major-minor tonality.

**Content** There are thirty-two units, with accompanying scores, divided into three main blocks: Baroque, Classical and Romantic. In the first two blocks, introductory 'mapping' units prepare the way for detailed discussion and analysis of works by Bach, Handel, Haydn, Mozart, Beethoven and Schubert. The music of the Romantic era is approached through topics or genres rather than individual composers: Romantic piano music; merging the arts (song, symphonic poem, music drama); the symphony; nationalism. The units are as follows:

#### Baroque

An introduction to Baroque music

- 1 Some underlying principles of Baroque music
- 2 Baroque music in Italy
- 3 Baroque music in France and England
- 4 Baroque music in Germany

#### Handel

5 An introduction to Handel's life and works

- 6 Cannons (1717-18); *Acis and Galatea*
- 7 London (c. 1740): two case studies (Grand Concerto Op. 6 No. 11 in A major, Organ Concerto Op. 4 No. 4 in F major)

#### Bach

- 8 An introduction to Bach's life and works
- 9 Köthen (1717-23): two case studies (Brandenburg Concerto No. 4, Cello Suite No. 1 in G)
- 10 Leipzig (c. 1740): three case studies (Prelude and Fugue in E, 'Kyrie' from the Mass in B minor, 'Canonic Variations on Vom Himmel hoch')

#### Classical

- The background to the Classical era
- 11 The Classical era: an introduction
  - 12 Mainly opera
  - 13 Keyboard, chamber music and song
  - 14 Symphony and concerto

#### Haydn and Mozart

- 15-16 Haydn (String Quartets Op. 1 No. 1 and Op. 76 No. 4)
- 17-18 Mozart (Piano Concerto No. 22, Symphony No. 40)

#### Beethoven and Schubert

- 19-20 Beethoven (Symphony No. 3 *Eroica*)
- 21-22 Schubert (Symphony No. 8 'The Unfinished', a selection of *Lieder*)

#### Romantic

##### Romantic music I

- 23-24 The Romantic era: an introduction
- 25-26 Romantic piano music (Brahms, Chopin, Liszt, Mendelssohn, Schumann)

##### Romantic music II

- 27-29 Merging the arts: song and opera (songs by Berlioz, Brahms, Fauré, Gounod, Schumann, Wolf; Donizetti *Lucia di Lammermoor*, Verdi *Aida*, Weber *Der Freischütz*, Wagner *Götterdämmerung*)

##### Romantic music III

- 30-31 The symphony and symphonic poem (Brahms, Symphony No. 4; Mendelssohn, Symphony No. 4 'Italian'; Tchaikovsky, Symphony No. 6; Berlioz, *Romeo and Juliet*; Liszt, *Orpheus*)

- 32a Russian nationalism (Glinka, *Kamenskaya*; Tchaikovsky, String Quartet, Op. 22; Borodin, *In the Steppes of Central Asia*)
- 32b Tonality dissolving? (Wagner: *Tristan*

(prelude); Satie, *Gymnopédie I*; Mussorgsky, 'With Nanny'; Liszt, *La Lugubre Gondola I*)

### NOTES FOR PROSPECTIVE STUDENTS

Recommended prerequisite A241.

**Assessment** TMAs 01-08 (50%) and the examination (50%). Substitution will apply for up to two TMAs. The questions will be designed to cover three basic skills: 'information gathering', musical analysis, and writing an 'argument' essay.

**Cassettes and discs** Fourteen audio cassettes and thirteen discs containing the major case studies. A revision cassette to help you prepare for the examination is also included.

**Summer school** Course based, including viewing and studying opera, seminars, lectures and the opportunity of music-making for singers and instrumentalists alike. The summer school provides the first-class facilities of a large university music department.

**Students with disabilities** This course is probably impossible if you have severely impaired hearing and will present substantial difficulties for those with visual handicaps. Course and supplementary materials are not available on tape.

**Special features** Access to a good quality cassette player with a counter and to a record player is essential.

**Preparatory work** The best way to prepare for A314 is to listen to as much music as possible from the period covered by the course; any of the case studies mentioned above, other works by the same composers or similar works by other composers. You will find BBC Radio 3 an invaluable source of material: *Radio Times*, available weekly from newsagents, contains details of all its programmes. A good plan would be to select a few hours of familiar and unfamiliar music each week. A programme in which you will hear informed discussion of a variety of musical topics is *Music Weekly* (see *Radio Times* for transmission times).

If it is several years since you did A241 *Elements of music* you will probably benefit from reminding yourself of the ground it covers: from very early on, A314 assumes reasonable fluency in following harmonic analysis and reading vocal and simple orchestral scores.

Listening and getting back into the way of looking at music are more important preparation than reading about music: A314 itself will give you a thorough historical framework as well as much detailed information. However, if you do want to do some reading you could try browsing in *The New Grove Dictionary of Music and Musicians* (1980) which is available in many libraries: (just sample, say, the entries on a few of the major composers.) Alternatively, Jack Westrup *An Introduction to Musical History* (Hutchinson) outlines briefly some of the problems of music history while D. J. Groot *A History of Western Music* (Dent) is a fairly substantial and well-illustrated account into which you might like to dip selectively. (Chapters IX to XVIII cover approximately the same period as the course.)

**Set materials** Listed below are the works that you should buy. Versions and stockists will be suggested in the first mailing.

#### Scores

- Beethoven Symphony No. 3 *Eroica*  
Brahms Symphony No. 4  
Mozart Symphony No. 40

#### Discs

- Beethoven Symphony No. 3 *Eroica*  
Brahms Symphony No. 4

## A315 MODERN ART AND MODERNISM: MANET TO POLLOCK

### Third level: full credit

The course introduces aspects of the history of modern art, both of a range of works of art and of the prevailing theories and means of interpretation. By 'Modernism' we refer to a particular set of ideas and beliefs about modern art which has become dominant in this century. The course should enable you to demonstrate your understanding of 'Modernism' and to consider alternative explanations and interpretations of modern art using historical and critical analyses current in the history of art of other periods. The works of art discussed in detail in the course range from Manet's paintings of the 1860s to

Jackson Pollock's of the 1940s and early 1950s. The earliest critical or art historical texts considered are from the 1840s, while the latest are selections from the early 1980s.

Our aims are:

- To encourage an informed approach to the analysis of works of art; to demonstrate and review the various methods and concerns of historians and critics of modern art; and to provide a basis for the identification and discussion of the problems raised by the study of modern art.
- To show that 'Modernism' may be seen as a particular set of ideas by means of which the history of art is represented and its production explained.
- To encourage an understanding of the origins and history of Modernist ideas in art through a study of selected historical and critical issues.
- To examine the relations between interpretations of works of art and the social, historical and technical contexts of their production.
- To test Modernist ideas against other possible ways of explaining and interpreting art, with reference to information about the actual circumstances in which works of art have been produced.

**Content** Weeks 1 and 2 are devoted to study of the Course Introduction. The basic correspondence materials for weeks 3-28 consist of a series of thirteen blocks arranged chronologically. During the remaining four weeks of the course you work on an extended essay.

The Course Introduction offers a general characterization of the subject of study and of its typical subjects of debate. It sets out some general concerns in modern art and art criticism, and offers some discussion of the characteristics of Modernist ideas and means of approach. The Introduction is intended to provide a point of reference throughout the course.

Most of the blocks which follow have a tripartite structure:

**Section 1** Discussion of themes and issues appropriate to the central case study.

**Section 2** Case study of a particular body of works of art in their historical context.

**Section 3** Critical section surveying changes and controversies in the interpretation of the works, artists and issues which form the basis of the case study.

The block titles are:

- I Manet and Modernism
- II Impressionism and Degas
- III Gauguin and 'Post Impressionism'
- IV Two Exhibitions: The Fauves, 1905, and die Brücke, 1906
- V Cubism: Picasso and Braque (3 units)
- VI Italian Futurism (1 unit)
- VII Abstraction and Kandinsky
- VIII Russian Art and the Revolution
- IX George Grosz and Weimar Germany
- X Léger
- XI Surrealism
- XII English Art and Modernism
- XIII Abstract Expressionism and Jackson Pollock

Each block is accompanied by reproductions in colour and in black and white, with a wide range of examples for comparative study and independent investigation. They are bound and drilled in loose-leaf format, so that you can select and extract material for use as required. The course reader has been specially prepared to provide an anthology of art criticism and theory covering the period of this course and there are frequent references to it in the teaching texts. As you work through the course you will become familiar with a growing range of works of art and have to engage with a developing body of ideas about them. Through this we intend you to gain an understanding of the history of art as a history of themes, ideas and problems.

In the extended essay, the last and double length TMA of the course, you are required to make your own study of a work, commission or group of works, testing the explanatory power of different types of information and interpretation, and demonstrating your ability to place your chosen subject in terms of a relevant discussion and critique. The

broadcasts and the reader furnish examples of forms of approach which might be relevant.

### NOTES FOR PROSPECTIVE STUDENTS

**Complementary and related courses** Experience of other third-level art history courses ([A305], [A351], [A352], [A353]) and of interdisciplinary courses with art history components ([A101], [A102], [A201], [A202], [A203], [A204], [A291], [A292], [A293], [U203]) would be useful.

**Assessment** Three assessment components: (i) TMAs 01-03 and 05-07 (35%); (ii) an extended essay (08) 15%; and (iii) the examination (50%). Substitution will apply for up to one TMA from the TMA component, but will not apply to the extended essay. There is a threshold of 38% on the extended essay. TMA 04 is an outline proposal for the extended essay and is not used for assessment.

**Broadcasts** Thirty-two TV and thirty-two radio-visual programmes, generally with two of each related to each block. Presenters have special interests and expertise to offer and care has been taken to provide accurate and interesting film material from original works of art in a wide range of places. Access to colour viewing will plainly be of importance.

The broadcasts are integral to the teaching aims of the course. The television programmes, for instance, will mostly provide examples of particular concerns, methods and interpretations which you will be able to review in the light of block discussion and exercises in broadcast notes.

**Summer school** Course based, in London. It is structured around four themes which recur throughout the course: Realism, Expression and Expressionism, Abstraction, The Artist and Society.

Special emphasis is placed on visits to galleries and exhibitions which contain important works studied in the course, not easily accessible to most students. These visits form a substantial part of the programme. Two of their aims are that you should gain experience in making critical distinctions between characteristics of original works of art and reproductions; and should develop skills in assessing interpretations in the light of evidence gained from first-hand experience of painting. Seminars provide opportunities for group discussion of issues raised in the course, and for detailed discussion of individual works. Evening sessions include optional lectures and seminars.

**Students with disabilities** Since one of the principal aims of the course is to enable you to make critical comparisons between works of art (seen in the original at summer school, or in printed reproductions or television) and texts related to them, A315 is not suitable for you if you have a serious visual handicap.

If you have impaired manual dexterity you may find some difficulty in handling the printed material, since there are frequent references in the units to the set books, the Supplementary Documents Booklet and the loose-leaf reproductions.

Preparing the extended essay will normally require trips to museums, art galleries and libraries. However, if you cannot do this you will be able to write an essay based on works of art reproduced in the course material. The summer school also includes a number of visits to art galleries.

Course and supplementary materials are not available on tape.

**Preparatory work and reading** The most useful preparation is to get to know local galleries and museums which contain nineteenth and twentieth-century works of art and, when the opportunity arises, to visit national collections. It will also be worth while to look for books in your local library which contain reproductions of works of art from the period. Be sceptical of these however: you will find that the quality of reproduction varies a great deal.

There is a considerable number of general histories of modern art available in print and in libraries, though there is none that we would unreservedly recommend. If you do wish to read any of these we hope that you will do so critically and in a spirit of scepticism where it seems appropriate.

If you have time, reading some history of the period would be very useful. Two books we recommend are *Age of Capital 1848-1875* by E. J. Hobsbawm, Abacus Books, 1977, and *Europe since 1870* by James Joll, Penguin, 1976. For one block of the course - Block VIII *Russian Art and the Revolution* - an acquaintance with the historical context would be especially useful. We recommend E. H. Carr's *The Russian Revolution from Lenin to Stalin 1917-1929*, Papermac, 1980.

An important concern of this course is how works of art in general are to be interpreted and explained, particularly how they are to be interpreted and explained as representations, and how interpretations and explanations can be tested in relation to what artists actually do or have done. In



this area the classic work is Ernst Gombrich's *Art and Illusion*, Phaidon, 1960 (paperback edition 1977). This is not a book about modern art, but it has much that is both sensible and interesting to say about art in general.

Another important concern of this course is the examination of modern art criticism. You will find a selection of relevant texts in the reader, *Modern Art and Modernism: A Critical Anthology*. Two important critics whose names recur throughout the course are Roger Fry and Clement Greenberg. Fry's collection of essays *Vision and Design* was originally published in 1920; a new edition was published in 1982 by Oxford University Press. Greenberg's influential collection *Art and Culture*, originally published in 1961, has been issued in this country by Thames and Hudson. Another name you will become familiar with is Clive Bell; his *Art*, Chatto and Windus, is out of print but may be available in your library.

You will also find useful examples of articles in art history and art criticism in the back numbers of certain specialized journals, in particular in the English journal *Studio International* from 1965-1974, and the American journal *Artforum* from 1965 onwards. If you have access to a good art library, journals worth watching for the occasional article include *Art in America*, *Art News* and the *Art Journal*, all American magazines concerned with modern art. You will also find occasional articles on the period under review in the English journals *Art History* and the *Burlington Magazine*. For a useful general subject index of magazine articles on art, consult the *Art Index*, which should be available in a good reference library.

We also recommend T. J. Clark's study of Courbet, *The Image of the People*, Thames and Hudson, revised edition, paperback 1982, and his *The Painter of Modern Life: Paris in the Art of Manet and his Followers* Thames and Hudson, 1985. Clark, who has contributed to the broadcasts, has been an influential figure in the reconsideration of what we are attempting to characterize as the Modernist approach to art history. You might also like to read some of Charles Baudelaire's art criticism, *Art in Paris 1845-1862* and *The Painter of Modern Life and other Essays*, both edited and translated by J. Mayne and published by Phaidon. Many of the terms used in studying the history of modern art are complex and not clearly defined; there is not, for instance, a single, correct meaning which you can get from a dictionary for the word *realism*. Raymond Williams' *Keywords: a Vocabulary of Culture and Society*, Fontana/Croom Helm, paperback, 1976 (revised and expanded edn. Flamingo/Fontana, 1983) includes a hundred or so connected essays each of which examines a 'keyword' in the study of society and culture. Many of these terms—*aesthetic*, *culture*, *formalist*, *realism*, etc.—are central to the concerns of this course, and we strongly recommend this book for the information it will give you about how their various meanings have been formed, influenced, modified and confused in different historical circumstances.

All or most of these books should be available through your local library. Naturally we do not expect you to read all of them, but we hope that this list will be helpful in planning your preliminary reading.

**Set books** Three set books will be used throughout the course: H. B. Chipp (1972) *Theories of Modern Art*, University of California Press; G. H. Hamilton (revised edn. 1970) *Painting and Sculpture in Europe 1880-1940* (Pelican History of Art) Viking/Penguin; F. Frascina and C. Harrison *Modern Art and Modernism: a Critical Anthology* Paul Chapman Publishing (course reader).

## A317 THEMES IN BRITISH AND AMERICAN HISTORY: A COMPARATIVE APPROACH, c1760-1970

### Third level: full credit

This course provides a thematic, comparative analysis of the historical development of the two great English-speaking democracies and industrial powers. It should be of interest to both arts and social science students, as well as to those who want to specialize in history.

It teaches four basic skills:

- Organizing and presenting evidence and constructing coherent arguments.
- Making sense of documentary source material.
- Making historical comparisons.
- Understanding the debates between historians, through an intensive thematic

study of economic, political and social developments in Britain and America, concentrating on three basic organizing themes: what did industrialization mean for Britain and America? What did democracy and constitutionalism mean for Britain and America? How have social differences, based on class, race and sex, developed in Britain and America?

**Content** These themes will be studied by means of eight 'Focus Points', which concentrate on particular issues relating to the themes. The Focus Points are:

- 1 'Democracy' in Britain and America (1750-1870)
- 2 Conditions of industrialization (1750-1860)
- 3 Expansion (1763-1914)
- 4 Economic development in Britain and America (1860-1970)
- 5 Citizenship, equality and industrialization (1830-1890)
- 6 Cities and the social order (1850-1970)
- 7 Class and class conflict
- 8 The state and social reform (1890-1970)

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** A102 and either [A203] or A204.

**Complementary and related courses** This course will provide an effective preparation for A403. A student taking A317 and A403 together with [A309] and [A323] and one or both of the Arts Faculty multidisciplinary second-level courses (e.g. A204) will have a most impressive 'major' in history.

**Assessment** Eight TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA, but not for TMA 06.

**Broadcasts and cassettes** There are teaching and lecture cassettes, immediately relevant to the written course material, and eight television broadcasts. The first lecture gives a survey of the entire course. The first TV programme is an introduction to the historian's use of visual sources.

**Students with disabilities** The cassettes are closely integrated with the teaching material, so if you have an aural disability you would need to obtain transcripts from the Office for Students with Disabilities. You should be aware of the importance of maps, graphs and tables.

**Preparatory reading** You are advised to read a general history of Britain, and a general history of the United States. The following would be suitable: Eric J. Evans (1983) *The Forging of the Modern State: Early Industrial Britain 1783-1870*, Longman. Keith Robbins (1983) *The Eclipse of a Great Power: Modern Britain 1870-1975*, Longman. Carl N. Degler *Out of Our Past: The Forces that Shaped Modern America*, Harper and Row (3rd edn).

**Set books** There is one set book, the course reader, C. Emsley (ed.) (1984) *Essays in Comparative History: Economy, Politics and Society in Britain and America, 1850-1920*, Open University Press. Background reading will be recommended at various points in the course.

## A318 WAR, PEACE AND SOCIAL CHANGE: EUROPE 1900-1955

### Third level: full credit

The aims of the course are to enable you to:

- Argue in an informed way over the nature, extent and causes of social change in the main European countries.
- Discuss the causes of the two world wars, evaluating 'structural' (i.e. economic and industrial) forces against those of geopolitics, ideology, nationalism and contingency.
- Understand the nature of total war, the differences between wars and the relationship between war and revolution.
- Argue in an informed way about the causes of social change; in particular, to evaluate the significance of the total wars with respect to this change, and to discuss the relationship of the wars to the main geopolitical changes.
- Develop further the skills of critical analysis and interpretation of primary source materials (documents, literary and artistic

materials, film and manifestations of popular culture).

- Understand some of the different approaches to historical study, such as Marxist, sociological, linguistic, 'liberal humanist', quantitative and qualitative.
- Develop the skills of dealing with problems such as periodization and historical semantics, and writing essays of honours standard.
- Further your understanding of the nature of historiographical controversy and arrive at informed judgements on debates presented in the course.

### Content

**Block 1 *Europe on the eve of war*** Introduction to the issues of the course; European armies, governments and societies in 1914; industrialized and *ancien régime* societies; social structure and high and popular culture; the processes of change; the origins of World War I.

**Block 2 *World War I and its consequences*** The nature of the war; the debate over the effects and consequences of World War I; the Russian and German revolutions and the collapse of the Hapsburg Empire: a comparative study.

**Block 3 *Between two wars*** Social developments in the western democracies; three totalitarian regimes: a comparative study; mass society; the origins of World War II.

**Block 4 *World War II and its consequences*** The nature of the war; the debate over the effects and consequences of World War II; Europe divided; social developments c.1948-1955.

**Block 5 *War and change in twentieth-century Europe*** The nature and causes of war; the processes of change; the results of total war.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [A301], [A309].

**Recommended prerequisites** None, but we strongly advise you not to attempt this course without any credits at foundation or second level in arts or social sciences.

**Complementary and related courses** A317, A324. A318 will provide an appropriate preparation for fourth-level project-based courses or for guided study courses where students engage in specialized and independent study.

**Assessment** TMAs 01-05 and 08 (38%); TMAs 06/07 (extended essay) (12%); examination (50%). Substitution can apply to one TMA from TMAs 01-04 but not to TMAs 05-08.

**Cassettes** Two returnable video cassettes of archive film compilations and four audio cassettes.

**Summer school** Course based. The summer school is an essential element in giving you an introduction to history at third level. Development of effective skills in discussion and analysis, handling of primary sources and writing history benefit from summer school experience, as does the appreciation of special types of source material such as film.

**Students with disabilities** If you have a visual or aural handicap you should note that the video and audio cassettes contain material which is integrated with the text and will be used for assessment. Film material will also be part of the summer school programme.

**Preparatory reading** You may find it useful to read through Roberts *Europe 1880-1945* (see below), but this is not necessary.

**Set books** J. M. Roberts *Europe 1880-1945* (second edition) Longman. Course reader: C. Emsley, A. Marwick and W. Simpson, (eds.) *War, Peace and Social Change in Twentieth-century Europe*, Open University Press.

## A319 LITERATURE IN THE MODERN WORLD

### Third level: full credit

The main aims of the course are:

- To provide you with a range of challenging and substantial primary texts (novels, poems, plays) from writing between c.1920 and c.1980.
- To enable you to reach an understanding appropriate to a third-level single-discipline

course of the main concepts and procedures required by the study of literature.

- To examine in relation to appropriate texts aspects of the literary-cultural change through which the subject of 'English literature' has become 'literatures in English'.
- To develop awareness of the relation of literary texts to their cultural context.
- To examine, both generally and in relation to individual texts, the relevance of literary study in the modern world.

**Content** The course is divided into eight main blocks and three anthologies.

**Block 1 *Introductory*** illustrates the main themes of the course with reference to shortish texts (stories, poems, plays) and excerpts from critical writing on the theoretical and subject themes and gives you initial practice in the formal analysis of such texts.

**Block 2 *The impact of Modernism*** surveys and illustrates the main features of Modernist writing in English, and related theoretical questions about literary language and narrative structure.

**Block 3 *'Englishness'*** shows how inherited definitions of 'Englishness' were challenged from about 1930 by cultural influences (Modernism) and political events, domestic and European.

**Block 4 *Literature and ideology*** surveys definitions of 'ideology', and illustrates the working of 'ideology' in literary and dramatic texts and the view that 'literature' as a concept is 'ideological'.

**Block 5 *End of empire*** considers the effects of end of empire on some British writers, and discusses related theoretical problems (cultural contexts, the influence of 'history' on 'literature').

**Block 6 *New writing in English*** illustrates the range of writing in English from countries formerly in the British Empire, and discusses their role in redefining 'English literature'.

**Block 7 *Language and gender*** considers gender stereotyping in literary texts, the influence of 'patriarchal ideology' on women writers, and the claims for a feminist *écriture*.

**Block 8 *'Literature' and 'history'*** considers the relationship between literary or dramatic texts and historical events, and how far such texts offer special insights into such events.

**Anthologies** The three anthologies cover drama; prose and poetry

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** You are strongly advised to take A102, A204 and A205 before A319, and to take A319 before A361.

**Complementary and related courses** Chronologically this course follows on from A312 (A319 and [A312] are not an excluded combination) which it is replacing. Students of [A306] will also find much of interest in A319.

**Assessment** Eight TMAs (50%) and the examination (50%).

**Broadcasts and cassettes** Sixteen TV and sixteen radio programmes: two of the TV programmes will be double-length drama performances. Four 60-minute audio cassettes.

**Summer school** Course based.

**Students with disabilities** If you have reduced manual dexterity or a visual handicap you may have difficulty with the large amount of printed material you will need to study. Course and supplementary materials are not available on tape.

**Preparatory reading** It would be helpful to start reading the set texts before the course begins.

**Set books** There will be a course reader and the following texts: Virginia Woolf *Mrs Dalloway* (Grafton), T. S. Eliot *The Waste Land* (Faber), Graham Greene *England Made Me* (Penguin), Evelyn Waugh *Officers and Gentlemen* (Penguin), Albert Camus *L'Étranger* (Penguin), Muriel Spark *The Prime of Miss Jean Brodie* (Penguin), E. M. Forster *A Passage to India* (Penguin), Chinua Achebe *Things Fall Apart* (Heinemann), V. S. Soyinka *Madmen and Specialists* (Methuen), V. S. Naipaul *In a Free State* (Penguin), R. K. Narayan *The Painter of Signs* (Penguin), D. H. Lawrence *The Virgin and the Gypsy* (Penguin), Toni Morrison *Song of Solomon* (Pan), J. C. Ballard *Empire of the Sun* (Granada), Bertholt Brecht *Mother Courage* (Methuen), John Arden *Sergeant Musgrave's Dance* (Methuen).



## A324 LIBERATION AND RECONSTRUCTION: POLITICS, CULTURE AND SOCIETY IN FRANCE AND ITALY, 1943-1954

Third level: half credit

Liberation from Nazi occupation and Fascism at the end of World War II was not simply a military phenomenon. In France and Italy, as well as in other European countries, it also represented a profound desire for significant political, social and economic transformation. The purpose of this course is to examine the objectives of those involved in the resistance against Nazism and Fascism and to see how far they were realized in the post-war decade.

This will be done through a study not only of the politics and economics of the period, but also of its culture. Writers, artists and (in Italy) film-makers were deeply involved in the struggle for a new society, and the course will place their work in its full context. The course is, therefore, firmly interdisciplinary in nature.

By the end of the course you should have an understanding of the forces shaping the development of post-war France and Italy, and a deeper appreciation of the relationship between art and politics.

**Content** The course is divided into sixteen units. Unit 1 introduces the contents and approach of the course through the study of one of the early works of the Italian novelist and short story writer Italo Calvino. Unit 2 looks at economic and political reconstruction in France and Italy between 1943 and 1948. Unit 3 concentrates in more detail upon the role of the Left in both countries during the same period, while Units 4 and 12 examine the effect of the Cold War upon intellectuals, looking particularly at two Frenchmen – Jean-Paul Sartre and Albert Camus – whose work took increasingly divergent lines and who will be studied through texts by both authors.

Units 5 and 6 look at two powerful influences which, while not totally opposed to change, were anxious that it should not be revolutionary: the Roman Catholic Church and the United States of America. Unit 7 examines the relationship between the visual arts and politics in France. Units 8 and 9 deal with Italian neo-realist cinema, which achieved widespread international critical acclaim in the post-war period. At the centre of this part of the course will be a close study of Vittorio de Sica's 1951 classic *Umberto D.*, which will be taught through video cassette.

Unit 10 explores social and economic development in France and Italy between 1949 and 1954, while Unit 11 looks at the development of the Left in the same period.

In Unit 13 the course looks at the status of women in post-war France and Italy, assessing how far this group in society participated in and benefited from the process of liberation. Through a study of Cesare Pavese's novel *The Moon and the Bonfire*, Unit 14 ties together many of the themes of the course (anti-fascism, resistance, the Church, the influence of the United States) while at the same time leaving you with the question facing both Italy and France in the early 1950s: how to find the real source of social and political regeneration after the disappointing results of the immediate post-war period. Unit 15 examines the extent to which French and Italian culture were 'Americanised' in this period.

Unit 16 is a recapitulation and revision unit.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** [A203], A204, A293 or A294. As an interdisciplinary third-level course, A324 would be particularly appropriately studied after second-level interdisciplinary courses in the arts or the social sciences.

**Complementary and related courses** The course will complement and extend [A309]. It will provide additional contextualization and depth of understanding for U235 and A310 and also form a

valuable basis for the interdisciplinary project work of A403.

**Assessment** Five TMAs (50%) and the examination. Substitution may be applied to one TMA.

**Cassettes** Video and audio cassettes are a substantial part of the course. The video material includes one complete film, extracts from several others and a collection of documentary sources. The audio cassettes include recordings of extracts from set play texts and commentaries by outside experts on various aspects of the course.

**Students with disabilities** If you have a visual handicap you are likely to have considerable difficulty, particularly with those units concerned with film and art history but also, because of the importance of the other video cassettes, throughout the rest of the course. The audio cassettes will also present problems if you have hearing difficulties.

**Preparatory reading** No special preparatory work is specified for this course, although you may wish to read one or more of the set books in advance.

**Set books** Jean-Paul Sartre *Crime passionnel*, Methuen. Italo Calvino *Adam, One Afternoon*, Pan Books. Cesare Pavese *The Moon and the Bonfire*, Sceptre.

## A331 RELIGION IN VICTORIAN BRITAIN

Third level: half credit

This course introduces central issues in the history of religion in Victorian Britain and enables you to assess the historical evidence as it relates to contemporary scholarly debates. The course shows the complexity of the religious life of the period and the shallowness of many conventional generalizations on the subject concerning, for example, 'an age of faith' or 'a crisis of faith'. It also shows how much the varieties of religious life changed during the Victorian period.

**Content** The content and teaching strategy of the course are based on a series of questions. In the first half of the course these are:

- What were the principal religious and anti-religious groups in Victorian Britain?
  - How were these groups organized, and in what ways did their organization change during the Victorian period?
  - What were their characteristic beliefs, and how did these beliefs develop and change in scope and content during the Victorian period?
  - What were their internal differences and varieties of opinion and attitude?
- In discussing these questions, however, more complex issues are identified. These will become the core questions of the second half of the course:
- To what extent were relationships between religious traditions in Victorian Britain dominated by the conflict between establishment and dissent?
  - How far were Victorian religious conflicts matters of institutional rivalry and how far were they matters of theology, belief and morality?
  - What was the relative importance of science, historical criticism, moral doubts about Christian orthodoxy, and class, in challenging traditional Christian belief in Victorian Britain?
  - To what extent were intellectual, administrative and ecclesiastical developments within and between Victorian religious traditions implicitly or explicitly a response to growing secularization?
  - How far were Victorian religious traditions prepared to accommodate secular influences and how far were they opposed to them?

The course material consists of four books: two volumes of essays written by the course team, one reader of primary sources and one reader of secondary sources. There are also four Study Guides, providing guidance through the course material, identifying core questions and setting exercises. A detailed Glossary and Fact Sheet gives essential background information such as brief definitions of terms, and an indication of the rela-

tionships between different developments and events.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites, complementary and related courses** There are no prerequisites but it is likely that most students will have studied [A101] or A102 and/or [D102] or D103, and although not necessary, it is desirable that you should have studied [A203] or A204. This course should appeal to students with a particular interest in historical studies or nineteenth-century studies, as well as in religious studies.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Cassettes** You will receive four one-hour audio cassettes to supplement the teaching in the Study Guides.

**Set books** J. Moore (ed.) *Religion in Victorian Britain*, Vol. III: *Sources*, Manchester University Press. G. Parsons (ed.) *Religion in Victorian Britain* Vol IV: *Interpretation*, Manchester University Press (course readers).

## A341 BEETHOVEN

Third level: half credit

This course should be of interest to those who have enough technical musical knowledge to be able to study music courses at third level. In contrast to the broad survey undertaken in A314, A341 concentrates almost exclusively on the music and life of one composer, Beethoven, and so provides an opportunity to consider in depth some aspects of Beethoven's magnificent contribution to our musical heritage.

The main aim of the course is therefore to introduce several of the central issues, aesthetic, historical, political and social, that are involved when discussing Beethoven's music and the musical life of his time, so that on completing the course you will be able to:

- Evaluate the historical significance of Beethoven's music, including its legacy in the nineteenth and twentieth centuries.
- Assess how far Beethoven's music reflects his times and how far he himself shaped contemporary musical thought.
- Identify the changing social role of the musician as brought about by Beethoven.
- Discuss intelligently the characteristics of the different musical periods of Beethoven's career.
- Demonstrate through analysis how Beethoven's music is constructed.

**Content** The course is divided into five main sections. The first, Unit 1, is a short biography of Beethoven which can be read as an introduction to the course and can also be used for reference as the course progresses. This is followed by four blocks.

**Block 1 Beethoven the performer** After Unit 2, which gives an outline of musical life in Vienna during the 1790s, Units 3-4 deal with Beethoven's earlier piano works. Beethoven first made his reputation as a performer rather than as a composer: during the late 1790s he was considered one of the greatest pianists of his time. Many of his early compositions feature the piano, and his treatment of this medium is illustrated through a detailed discussion of his Piano Sonata Op. 13, the *Pathétique*.

**Block 2 Beethoven: Classic and Romantic** Although Beethoven began as a composer in the Classical tradition of Haydn and Mozart, he subsequently introduced many Romantic features into his music. These Classical and Romantic traits are considered in Units 5 and 6 respectively, in preparation for a more detailed examination in Units 7-8 of the mixture of Classical and Romantic elements in the case study for this block, the Sixth Symphony, the *Pastoral*.

**Block 3 Beethoven: the brotherhood of man** Beethoven was influenced by the ideas of the French Revolution of 1789 and by the events of the Napoleonic Wars. His enthusiasm for the ideal of the brotherhood of man is made explicit in the Ninth Symphony, the *Choral*, and his only opera *Fidelio* is about the rescue of its hero from wrongful imprisonment for a

political crime. Both these works are treated in detail: *Fidelio* (Act II) in Unit 9-10 and the *Choral Symphony* in Units 11-12.

**Block 4 Beethoven: genius and visionary** Unit 13 is a discussion of the changing role of the composer and the part Beethoven played in this development, followed by an examination in Units 14-15 of one of Beethoven's late works, the String Quartet Op. 131, which is the major case study for this block. Finally, in Unit 16 Beethoven's legacy is traced primarily through his influence on Wagner, Brahms, Bartók and Tippett.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** A241. You are strongly advised to take A314 before studying A341. The central block of A314 deals with the Classical period in music and so forms a useful context for the more detailed discussion of Beethoven's music in A341. Units 19-20 of A314 are a commentary on Beethoven's Third Symphony, the *Eroica*.

**Complementary and related courses** A341 has been designed to complement A314 and therefore makes similar demands on the student. Other related courses are A102, A204 and A241.

**Assessment** TMAs 01-04 (50%) and the examination (50%). Substitution will apply for up to one TMA. TMA 01 is in two parts, a mini-analysis followed by a short essay. TMAs 02-04 are full-length essays which, although of the argument type, will draw on your analytical skills.

**Cassettes** Three of the seven audio cassettes contain the main works by Beethoven studied in the course. Four are teaching cassettes, of which one gives help with analysis and one provides additional musical illustrations. You will need an audio-cassette player.

**Students with disabilities** This course is not suitable if you are severely aurally disabled. Visually handicapped students will have, as well as their usual problems, difficulty in obtaining some of the scores in Braille.

**Preparatory work** Rather than read about Beethoven, the best way to prepare for A341 is to listen as much as possible to his music. You could begin by making yourself familiar with the five major case studies mentioned above. Then, if time permits, you could go on to the minor case studies, which are treated in less detail in the units. These include Beethoven's Second Piano Concerto, the Septet, the overture to *Egmont*, the Choral Fantasia, the String Quartet Op. 59 No. 1 and the Piano Sonata Op. 111. Many, if not all, of these works are broadcast regularly on Radio 3 – you can find details of performances from the *Radio Times* – and appear fairly frequently in concert performances. Rather than tackle too much unfamiliar music at the outset, however, it is better to listen a few times to selected works until you are familiar with them before trying further new works. Otherwise musical indigestion may set in.

If you are really intent on reading something about Beethoven before you start the course, a good introduction can be found in the article on Beethoven in the *New Grove Dictionary of Music and Musicians* (1980) which has been revised, updated and published separately as *The New Grove Beethoven* by Joseph Kerman and Alan Tyson (Macmillan, 1983). This provides both biographical material and a concise commentary on the music. For a more extended biography, Maynard Solomon's *Beethoven* (Granada, 1978) is worth while. However, much of the information in both these sources has been taken into the course material, so if you prepare yourself by listening rather than reading nothing will have been lost.

### Set materials

Scores  
Beethoven Symphony No. 9, the *Choral*.  
Beethoven Symphony No. 6, the *Pastoral*.  
Recordings  
Beethoven Symphony No. 9, the *Choral*.

## A353 ART IN FIFTEENTH- CENTURY ITALY

Third level: half credit

The course selects objects and themes for study which will introduce the salient characteristics of the art of the period and allow you to practise and test the methods and debates of art history.

You will gain an insight into the circumstances of production of works of art (artists'



training, varieties of patronage), and learn how to evaluate their content and function as well as how to analyse their formal properties. By the end of the course you will also have become familiar with the language of art history, and have the conceptual tools with which to investigate and assess the historical significance of a given work of art and its status as a primary source.

#### Content

**Block I** Introduction and case studies  
Introduction to important issues of art historical study, with particular reference to Renaissance art.

- Sculpture case study: Verrocchio's Colleoni Monument.
- Painting case study: Leonardo's *Last Supper*.
- Architecture case study: the Pazzi Chapel.

**Block II** The New Style in Tuscan and Florentine art, its theoretical codification in Alberti's *On Painting*, and its reception and propagation by Florentines. There is a discussion of artistic patronage and of works by Masaccio, Brunelleschi, Donatello and Ghiberti.

**Block III** moves out of Florence and discusses three peripatetic artists: it assesses the role in their *oeuvre* of artistic autonomy versus local expectations, and the competing attractions of the International Gothic Style and the Tuscan New Style. There is also a study of architecture in Northern Italy.

**Block IV** Looks at a significant art form of the Renaissance, the altarpiece. There is also a case study of two fresco cycles with mythological themes, one in Ferrara, one in Rimini. These reflect the regional theme of the course.

**Block V** A revision block, looking at issues raised throughout the course but through new case studies on Venice, Rome and late Medicean Florence.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** None. However, the course would link naturally to a programme of study which might include A102, [A203], A204, [A292] and A293. The course would be of interest to students of history and its visual aspects. It should not be seen as a course in art appreciation.

**Assessment** Four TMAs (50%), and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts and cassettes** There are twelve television programmes which are essential viewing. They consider and reflect the three main visual arts in the course and look at artists' techniques and at important sites, as important in their diversity as in their similarity. Courtly and religious patronage and town planning are also important TV themes. There is an audio cassette to teach the reading of architectural plans and Alberti's theories of perspective (in conjunction with a small kit, see 'Special features' below).

**Students with disabilities** The course is unsuitable if you have a visual handicap as it requires careful study of a large number of plates and critical viewing of television programmes.

**Special features** Any chance you have to visit local art galleries will be valuable though not essential. There is a non-returnable perspective kit, which you will assemble at home. It consists of a small cardboard box through which experiments demonstrating Alberti's perspective theories can be performed.

**Set books** M. Baxandall *Painting and Experience in Fifteenth-Century Italy*, Oxford University Press (2nd edn.); C. Avery *Florentine Renaissance Sculpture*, John Murray; P. Murray *The Architecture of the Italian Renaissance*, Thames and Hudson; E. Vasari (trans. G. Bull) *The Lives of the Artists Vol. 1*, Penguin; L. B. Alberti (trans. J. R. Spencer) *On Painting*, Yale University Press. You will be expected to read Baxandall at the very beginning of the course. There will be two reading weeks for you to work through a study guide of Baxandall. There is also a document collection of primary and secondary source material.

### A361 SHAKESPEARE

Third level: half credit

You will be expected to learn to recognize and discuss competently the characteristic quali-

ties of Shakespearian drama, and to be able to evaluate the effects of Shakespeare's language. The plays are studied not simply as 'poetry' or 'literature' but as 'dramatic literature' which needs some kind of staging if its qualities are to be fully realized, and so television is a very important part of the course. Although we do not expect you to study other plays of the period, or much contemporary history in detail, the course material is written with appropriate attention to the artistic and social circumstances which influenced Shakespeare's thinking and stagecraft.

Although the level is appropriate to students concentrating on literature, the course is designed so that (after some recommended preliminary study) it can be taken by those concentrating on other areas – even outside arts.

**Content** The eight plays to be studied are: *Henry IV Parts 1 and 2*; *Antony and Cleopatra*; *Twelfth Night*; *Hamlet*; *Measure for Measure*; *King Lear*; *The Tempest*.

Of these, *Antony and Cleopatra* and *King Lear* are the texts studied in most detail – three weeks each. A summary after *Antony and Cleopatra* consolidates work done on the first three plays and prepares for more advanced work on the plays that follow.

Shakespeare's language is his glory and – for modern students – his chief problem. This course has accordingly been designed to give continual guidance in this area. The plays are studied not simply as poetry but as texts intended for staging, and the television and radio programmes continually explore the process by which a text achieves life on the stage or in some comparable modern medium. Workshops and rehearsals, discussion with directors, designers and actors explore such problems as how a producer makes critical choices about how to emphasize themes, how actors make 'difficult' language accessible to a modern audience, how to identify the signals in the text which influence the staging. One of the aims of the course is to make its students into an informed audience who, for any future production, will have a special understanding of what happens before a play begins its public performance.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** A102 and [A203] or A204. Alternatively, you should have some preliminary experience in the study of literature (not necessarily of drama). The wholly inexperienced student could profitably read Units 7–8 of [A101], 'Reading poetry', and/or any second-level arts course(s).

**Complementary and related courses** The course is designed so that students who wish to take the equivalent of one full credit in literature during a single year can study A361 and A362 together.

**Assessment** TMAs 01–04 (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts and cassettes** Twelve TV and eight radio programmes. A colour TV will be desirable. There are also six one-hour audio cassettes.

**Students with disabilities** If you have a visual or aural handicap you will find some broadcasting elements of the course difficult, but not impossible.

**Set books** *Henry IV Part 1* ed. P. H. Davison, New Penguin Shakespeare; *Henry IV Part 2* ed. P. H. Davison, New Penguin Shakespeare; *Antony and Cleopatra* ed. B. Everett, Signet (Sphere); *Twelfth Night* ed. M. M. Mahood, New Penguin Shakespeare; *Hamlet* ed. T. J. B. Spencer, New Penguin Shakespeare; *Measure for Measure* ed. J. M. Norworthy, New Penguin Shakespeare; *King Lear* ed. G. K. Hunter, New Penguin Shakespeare; *The Tempest* ed. F. Kermod, Arden Paperback.

### A362 ROMANTIC POETRY

Third level: half credit

Last presentation 1991

This course is designed to be taken either on its own or in conjunction with the third-level half-credit course A361 *Shakespeare*. Students

taking both courses together will thus study in one year the equivalent of a full credit in literature. However, if you wish to study both courses you should be aware of the considerable workload this will impose.

The aim of this course is to provide a short and concentrated study of the six major English Romantic poets.

**Content** The course falls roughly into two halves. The first starts with the state of British poetry at the beginning of the Romantic movement, and continues with study of the 'first generation' of Romantic poets: Blake, Wordsworth and Coleridge. The second half starts with a bridging section towards the 'second generation' – Byron, Keats and Shelley – which develops consideration of the essayists, other poets and relevant political and social matters, together with the relationships among the poets; and continues with detailed study of Byron, Keats and Shelley. The units are:

**Unit 1** Poetry in Britain from 1780 to 1798.

**Units 2–3** Blake. Study of his poetry, centring on *Songs of Innocence and Experience* and *The Marriage of Heaven and Hell*, and touching on the Prophetic Books. Blake's artistic achievements are considered at all relevant points.

**Units 4–8** An integrated study of the poetry of Wordsworth and Coleridge, with discussion of their ideas about poetry. *The Prelude* (extracts), *The Immortality Ode*, *Tintern Abbey*, *Resolution and Independence* and selected narrative poems, lyrics and sonnets are studied in detail. *The Preface to Lyrical Ballads* is discussed. A number of Coleridge's important poems are studied, including *The Ancient Mariner*, *Kubla Khan*, *Christabel*, *Dejection: An Ode*, *Frost at Midnight*.

**Units 9–10** A consideration of the state of affairs in literature and society.

**Units 11–12** The poetry of Byron, in which *Don Juan* is the main work extracted for study. Some lyrics, selected prose and at least one of the shorter narrative poems are studied.

**Units 13–14** The poetry of Keats. The Odes are the main works studied, but both *Hyperion*, the *Eve of St Agnes*, other narrative poems, sonnets and some of the Letters are included.

**Units 15–16** The poetry of Shelley. Of the longer poems, *Julian and Maddalo*, *The Mask of Anarchy*, *Prometheus Unbound* (selection), *Adonais* and *The Triumph of Life* are studied. A few sonnets, lyrics and other short poems are also studied. A *Defence of Poetry* and selected letters and other prose and translations are included.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** None. However, it is highly desirable for you to have taken A102 and one of the Arts Faculty's second-level interdisciplinary courses, [A203] or A204. Alternatively, you should have some preliminary experience in the study of literature.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts and cassettes** There are four TV programmes and twelve radio programmes to enrich the printed material, in the form of discussion of matters of special interest and relevance to the work of the set poets. They are contributed largely by outside experts.

There are five one-hour audio cassettes. These include poetry by each of the set poets; cassette-tape programmes on Blake and on Shelley, Keats and the classical world; and a revision cassette.

**Students with disabilities** If your hearing is severely impaired you will be at a disadvantage since poetry cassettes are part of the course.

**Set books** Blake, *Selected Poems*, ed. P. H. Butter, Everyman; Wordsworth, *Selected Poems*, ed. W. Davies, Everyman; Wordsworth, *The Prelude*, 1805, ed. S. Gill, Oxford University Press; Coleridge, *Selected Poems*, ed. J. Reeves, Heinemann; Byron, *Selected Poems*, ed. R. Skelton, Heinemann; Keats, *Selected Poems*, ed. R. Gittings, Heinemann; Shelley, *Selected Poems*, ed. T. Webb, Everyman; Abrams, M. H. (ed.) *English Romantic Poets: Modern Essays in Criticism*, Oxford University Press (2nd edn.).

### A403 ARTS AND SOCIETY IN BRITAIN SINCE THE THIRTIES

Fourth level: full credit

Only 100 students can be accepted for A403 in 1991 and you are asked to pay particular attention to the Notes for Prospective Students below.

This course is a culmination of studies in the Faculty of Arts and, building on previous single-discipline and multidisciplinary work, offers you the opportunity to conduct a research project related to the main issues of the course. The project may be confined to one discipline, or can cover several disciplines. The issues discussed in Essays at the beginning of the course are:

#### Block I Society

- 1 (a) The Thirties  
(b) World War II  
(c) Post-war era  
(d) The cultural revolution of the late Fifties and Sixties  
(e) The Seventies
- 2 Technology and society
- 3 Decline of empire
- 4 The political system
- 5 American influences on popular culture: I, II and III
- 6 The welfare state
- 7 Social groups
- 8 Standards of living

#### Block II Arts

- 1 The state and the arts
- 2 English art since 1930
- 3 The artist and society: the role of the composer
- 4 The artist and society: the role of the writer
- 5 Englishness and foreign influences 1930–80
- 6 The construction of taste
- 7 War, politics and the arts
- 8 The thirties legacy and post-war reconstruction in architecture

#### Block III Ideas

- 1 Philosophy, metaphysics and meaning
- 2 Science and belief
- 3 Mind, body and machine
- 4 Language and literature
- 5 Thinking about the arts
- 6 Morality and ethics
- 7 Political thought and ideological debate
- 8 Philosophy of religion
- 9 Developments in religion

During the first nine weeks of the course you work through the Essays, provisionally decide upon a project related to one or more of the main issues raised, and write two TMAs covering some of these. You will then embark on your research project and submit two progress reports before finally writing a 10,000-word dissertation. There is an examination designed to show that the detail of the project can be related to the context of the course.

A list of possible projects will be provided but, in consultation with your tutor, you are expected to establish a suitable topic for yourself, bearing in mind (a) that it should relate to one or more of the 'major issues' and (b) the availability of suitable source material.

#### NOTES FOR PROSPECTIVE STUDENTS

Before conditionally registering for A403 you must either already have obtained credits entitling you to the award of the BA degree, or be studying a course or courses success in which would entitle you to the award of the BA degree. If you do not then pass the course(s) required for a BA degree you will not be offered a place on A403. You must not have exceeded the honours credit maximum or be put in a position to do so by studying A403 in 1991.

Students will be accepted according to date of final registration: e.g. those who finally registered in 1988 will be accepted before those who did so in 1981.

**Recommended prerequisites** You are strongly advised to have gained as part of your degree either two full-credit equivalents in arts third- or fourth-level courses or [D301] plus one full-credit equivalent in arts at third or fourth level. You must remember that you will be expected not only to work initially in a wide range of arts disciplines but



also to undertake independent research on an arts project of your choice. If you have not got these recommended prerequisites you are strongly advised to consult the staff tutor responsible for A403 in your region before registering for the course.

**Assessment** TMA 01 (10%) with a threshold of 20%; TMA 02 (10%) with a threshold of 20%; Assessed Project Report TMA 03 (5%); Project Report TMA 04 (ungraded); Project TMA 05 (35%) with a threshold of 40%; examination (40%) with a threshold of 40%.

If you fail to meet a threshold your record will be given individual consideration at the award meeting but a credit will not normally be awarded without further investigation into your mastery of the course by the Examinations and Assessment Board. There will be no substitution on any assessment component.

**Tuition** For the first eleven weeks of the course, you will work with a generalist tutor. Then, on the basis of the project topic, you will be reallocated to a project tutor and will no longer work with your generalist tutor. You will continue to work under

the guidance of your project tutor for the rest of the course. Throughout the course, you will be in touch with your tutor mainly by telephone and letter.

**Students with disabilities** If you are either visually handicapped or you have severe restrictions of mobility you will have difficulty with this course because all students will be required to undertake a considerable amount of independent research using material unlikely to be taped or in Braille form and requiring access to libraries, museums,

art galleries, record offices. Course and supplementary materials are not available on tape.

**Preparatory reading** For a general historical survey of the period we recommend J. Stevenson (1983) *Britain 1914-45*, Penguin, and A. Marwick (1982) *British Society since 1945*, Penguin.

A more detailed preliminary reading list covering individual disciplines is given in the Course Guide which will be mailed in November before the course begins.



# SOCIAL SCIENCES

## OVERVIEW

The Social Sciences Faculty offers courses which are of interest to people who want to understand how their own society works, and courses which make up more specialized programmes of study in the social sciences. You may choose to base your studies upon a core of one or two social science disciplines (economics, geography, government and politics, psychology, social policy, sociology) or to select courses to help you pursue or enter a career; or you may simply put together courses in areas which interest you. Many of the courses are directly relevant to professional demands not only as the cores of appropriate degree profiles but also for keeping up to date and developing your skills.

It is easy to be overwhelmed by the number and variety of courses and to find it difficult to chart a path through them. Clearly you need to look carefully at the individual course descriptions and to consider how they complement each other and related to your own requirements and interests. But some general guidance is possible. There is a straightforward educational logic underlying the whole range of courses: you should be able to develop your skills and experience as you work from foundation level through to third (and fourth) levels. Just as the foundation course prepares you for the second level, so the completion of two or three second-level courses is preparation for work at third level.

The foundation course D103 *Society and social science* provides a grounding in the principal debates and approaches of the social sciences, and is a helpful introduction to the ways of learning within the Open University and the social sciences in particular. It is an important first step for those embarking on distance education, even if they have experience of other forms of learning. But it is not a dry introductory course. It starts from questions which concern us all, bringing together insights from different disciplines to help you better understand our very diverse society. As well as examining the United Kingdom in the 1990s, it also looks at the historical and international contexts of this society and considers how these affect our everyday lives.

The Faculty's second-level courses build on the methods and approaches of the foundation course. Two of them, D211 *Social problems and social welfare* and DSE202 *Introduction to psychology*, have been specially devised in terms of teaching style and tutorial support as bridges from foundation course to second level. D211 may seem more familiar to D103 students because of its interdisciplinary issue-based form, but it also serves as a broadly based introduction to social policy. DSE202 is an introduction to a single discipline, but like D211 it has been designed so as to make the transition from foundation to second level as painless as possible.

These courses are of interest in their own right, but you should consider them particularly carefully if you are not yet fully confident of your grasp of material in the foundation course. They are particularly recommended if you do not intend to take a second foundation course in another faculty, but of course there is no obligation to take them and you may feel more attracted to others in areas of more direct personal interest and relevance. All the second-level courses should be manageable for anyone who has completed the foundation course. Four other full credits and one half credit are available at second level, DT200 *An introduction to information technology*, D205 *Changing Britain, changing world*, D209 *State and society*, D210 *Introduction to economics* and D251 *Issues in deafness*. All of them deal with important contemporary issues and develop themes of the social sciences in tackling them. DT200 looks at the social and technological questions raised by the introduction and spread of information technology, as well as teaching basic computer skills. D205 considers the relationships between recent social and

economic changes in the United Kingdom and the rest of the world, and explores some of the conflicts between the pressures for such change and the needs of the physical environment. D209 looks at the development and operation of modern states and the sources of power within them. D210 is an introduction to the main concerns and approaches of the study of economics. D251 allows a closer concentration on one area of social concern; it is part of a set of broader social policy courses, as well being of particular value to those who have a special interest in problems of deafness. MDST 242 *Statistics in society* is described in the Mathematics Faculty, but it is also an important part of our profile. It provides social scientists with a grounding in quantitative methods, which are useful not only for some third-level courses, such as DE304, but also for other higher level study.

The range of courses at third level is similar to that at second, but here you can work on specialist interests and use and develop skills acquired in second-level courses. At third level you will probably be expected to move away from the usual unit format towards more independent work, using original articles, being expected to assess different theoretical approaches more critically, or writing more extended projects, dissertations or essays. You will have been prepared for this by your study of previous courses.

There are six full credit courses at third level, DE304 *Research methods in education and the social sciences*, D307 *Social psychology*, D308 *Democratic government and politics*, D309 *Cognitive psychology*, D310 *Crime, justice and society*, D312 *Global politics* and D314 *Restructuring Britain*. DE304 is an introduction to research methods relevant to most areas of the social sciences and education. In particular, it develops skills in the preparation of surveys and ethnographic research, helping you both to evaluate research reports and to prepare manageable research proposals of your own. D307 and D309 are more specialist psychology courses which build on DSE202. D307 is also a good choice if you have a special interest in social policy or sociology. D308 and D312 are courses in government and politics. D308, raising questions about different forms of democratic organization, is suitable for anyone concerned with the operations and practice of public administration and the welfare state. D312 is of wider interest, for those seeking to develop an international aspect to their studies and starting from a base in geography or politics.

D310 is one of the Faculty's social policy courses, but is also related to sociology (as a more applied area of study) as well as being the first part of an Advanced Diploma in Criminology (Prison Studies) available in the associate programme from 1992. While D314 builds on the arguments of D205, it also draws on a wide variety of disciplines outside geography to examine the extent and direction of changes in the structure of economy, society and politics of the United Kingdom over the last twenty-five years. This is a valuable course for students who wish to put together a set of courses concentrating on contemporary developments within the United Kingdom.

There are four half credits at third level, D321 *Professional judgment*, D345 *Economics and government policy*, DE325 *Work and society* and DE354 *Beliefs and ideologies*. D321 is a critical consideration of the ways in which decisions are made within professions, using examples from the medical profession and trying to develop practical guides to decision-making. Apart from its intrinsic interest, its analysis of decision-making makes it relevant to wider social policy, politics and economics courses. D345 is an economics course, but also of value to those who want a degree profile which concentrates on the study of British government and politics or who would like to understand the context within which social policy is developed. DE325 and

### Core disciplinary courses

	Second level	Third level
Economics	D210 <i>Introduction to economics</i>	D345 <i>Economics and government policy</i>
Geography	D205 <i>Changing Britain, changing world</i>	D314 <i>Restructuring Britain</i>
Government and politics		D308 <i>Democratic government and politics</i> D312 <i>Global politics</i>
Psychology	DSE202 <i>Introduction to psychology</i>	D307 <i>Social psychology</i> D309 <i>Cognitive psychology</i>
Social policy	D211 <i>Social problems and social welfare</i> D251 <i>Issues in deafness</i>	D310 <i>Crime, justice and society</i>
Sociology	D213 <i>Understanding modern societies (from 1992)</i>	DE325 <i>Work in society</i> DE 354 <i>Beliefs and ideologies</i>
Interdisciplinary courses	D212 <i>Running the country (from 1992)</i> D209 <i>State and society</i> DT200 <i>An introduction to information technology: social and technological issues</i> D211, D310 and D314 are also interdisciplinary courses	D321 <i>Professional judgment</i> DE304 <i>Research methods in education and the social sciences</i>

DE354 come within the sociology discipline. DE325 will be of interest to those who want to explore the changing nature of work in modern societies; it relates not only to other sociology courses but also, for example, to DT200. DE354's examination of how we come to hold particular beliefs and how ideas and values help to maintain or change the power structures of society makes it centrally important to sociology, but the issues raised in it are also relevant to other debates particularly within politics and social policy.

At fourth level you have an opportunity to investigate chosen topics more flexibly through a small number of guided study courses. These courses allow you to undertake more specialized and intensive study than is otherwise possible in the Faculty's courses. In 1991 there will be only one fourth-level course, D437 *Conflict and change in the countryside*.

It is possible to identify core disciplinary courses on which to build if you want to specialize (see table above). But the discipline-based courses are not cut off from one another and can be used in a variety of ways. The social policy courses, in particular, should be seen as interdisciplinary, since their attention to applied policy means that they draw on a variety of disciplinary insights. D314, too, has an interdisciplinary structure. The key interdisciplinary courses at second level are D209 *State and society* and DT200 *Introduction to information technology*. Both can make a valuable contribution to several different discipline-based course profiles. MDST242 *Statistics in society* is a useful foundation in quantitative methods.

At third level D321 *Professional judgment* could also be an important part of the concluding section of a degree based on several disciplinary specialisms, and DE304 *Research methods in education and the social sciences* gives guidance on research methods across the disciplines.

Two courses which are to be presented for the first time in 1992 have not yet been discussed: D212 *Running the country* and D213 *Understanding modern societies*. It may be helpful to give some advance notice of these. D212, like D211 and DSE202, is planned as a bridge from foundation course to second level. It will be an interdisciplinary course, looking at the institutions (including markets, bureaucratic managerial hierarchies and voluntary co-operation) through which large-scale collective action and social control are co-ordinated and put into practice. D213 will also be interdisciplinary, but more

squarely based in the sociology area, beginning with an analysis of the formation of modern societies, moving on to the dynamics of contemporary industrial societies and concluding with a consideration of their transformation and change in the late twentieth century.

Of course, there is no need to use our disciplinary structure as the basis of your degree. Our intention is to provide as wide a choice as possible. That is one reason for our support for interdisciplinary courses at second level, even if they often have some disciplinary emphasis of one sort or another. It would be possible to concentrate mainly on interdisciplinary courses (for example around a core of D211, D209, DT200, D310, D321 and D314), or you can put together your own selection, perhaps drawing on relevant courses from outside the Faculty, particularly from the 'U' area (U221 *The changing experience of women*, U204 *Third World studies*, U205 *Health and disease* U206 *The environment*, U235 *Nuclear weapons: inquiry, analysis and debate*), but from other areas too. As you do so, however, it is important to remember that the pattern of courses offered in the Faculty does have some coherence, not only in terms of subjects covered and the approaches of the social sciences but, perhaps more importantly from your point of view as a student, in terms of educational progression.

When reading the following course descriptions do not forget to refer back to Sections 1-3 and Tables I, II and III at the beginning of this publication.

Under 'Notes for Prospective Students' discontinued courses are identified by square brackets; their titles and presentation dates are listed in Table III.

## D103 SOCIETY AND SOCIAL SCIENCE: A FOUNDATION COURSE

### Foundation level: full credit

What does an everyday task like shopping for food have to do with social science? What determines the food we eat - personal preference, the advertisers, the producers, the international market? How can changing patterns of health be explained? How are we as individuals shaped by the societies around us? How is our society shaped by its place in



the world? These are just some of the questions <sup>7</sup> 03 will be asking. The main aim is to help you broaden and deepen your understanding of the diverse society in which we live. With this in mind we investigate how historical and international processes affect our lives in terms of culture, economy, social structure, politics and ourselves as individuals.

Since social scientists disagree about what the 'right' answers are to a whole range of important social questions, you will be able to engage in stimulating debates and try to sort out for yourself the merits of different explanations. D103 offers guidance as to how you might construct your own answers. As well as studying particular theories of sociologists, economists, political scientists, psychologists and geographers, you will be invited to examine the broad traditions of thought most influential in Western thinking over the last two hundred years – traditions such as Liberalism, Marxism, Conservatism – and to assess the implications of these for social science and social practice.

**Content** There are seven blocks of course material, each four or five weeks' work. The first sets out the main concerns of the course through an investigation of the food we eat, why we consume these foods and why people in some parts of the world cannot get enough to eat. The second block begins to examine social structures and divisions such as race, gender and class. What difference does it make to your experience of living in the UK if you are from a particular social class or particular region, if you are a woman, or black? In Block III you will study the contemporary economy, looking at the nature of work (paid and unpaid), the extent to which economies are sensitive to market forces, and the role of the state in relation to the market. This links directly to Block IV's primary concern with important elements of the modern British state. The block discusses how these have been shaped historically and makes clear the international context in which the modern state functions. It not only raises questions about the nature of our political institutions and how they work but also looks at the role of ideas in society. Block V follows by asking how individuals use these ideas to make sense of society and the consequences this has for social practice, individual behaviour and identities. Questions to be raised here include: how do people become 'socialized'? How much of this is determined by biology, how much by the culture in which we live? Regional cultures and identities are taken up in Block VI, which examines regional and urban inequality, how this has changed over time and how it is linked with the workings of the international and political order. The concluding Block VII concentrates on the influences of social science on society and on the traditions of thought you have been studying throughout the course. These different traditions are applied in short essays analysing the main problems of contemporary UK society, written by practising social scientists who, broadly, represent each tradition. We reflect on how you might decide which of the traditions, or some combination of them, makes most sense to you. The block includes a revision of the main themes of the course and advice on revision techniques and how to approach the examination.

To help you gain the maximum benefit from the course you will be given expert guidance on, for instance, taking notes, interpreting numerical tables, writing essays and many other study skills.

We want to encourage students from as wide a range of different backgrounds as possible (for instance, students with disabilities or from different ethnic groups) to study with us on the course.

## NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [D100], [D101], [D102].

**Assessment** Seven TMAs (50%) and the examination (50%). There is also a formative assignment at the beginning of the course, not used for assessment. Substitution will apply for up to two TMAs.

**Broadcasts and cassettes** The television broadcasts are integral to this course and expand and develop ideas raised in the written material. Time will be set aside in your study schedule to watch and work on the sixteen programmes, each of which is 50 minutes long. A media booklet guides you through this important part of the course and some TMAs may have, as one choice, a question based mainly on a TV programme. The programmes are not only linked to the material in each block, but twelve of them are also linked as a series about modern British society. You will be taught how to study and 'decode' television material.

There are also regular radio broadcasts giving you up-to-date information about the course and about the TMA question you are working on. Audio cassettes reinforce the other course components and help you with your study skills.

**Summer school** Course based. The summer school will engage you in activities which can only be done in a residential setting. They will be directly relevant to the course – particularly to Blocks V, VI and VII.

**Preparatory work** A specially designed package of materials will be sent to you in the October before you begin your studies to help you prepare yourself for the course.

**Special feature** A D103 newspaper will be issued from time to time, containing letters from students, comments on current affairs, book reviews, cartoons and much besides.

**Set books** A. Northedge *The Good Study Guide*. Course reader: *Society and Social Science: a Reader*. (Both to be published in autumn 1990.)

## D205 CHANGING BRITAIN, CHANGING WORLD: GEOGRAPHICAL PERSPECTIVES

**Second level: full credit**

This course is about the geography of social and environmental change. It raises questions that are central to understanding the processes which are re-shaping the social and economic face of society. How has the class map of Britain changed in recent years? How and why has Britain's position in the world economy been changing? What social and ecological effects is industrialization having on Third World countries? Are the world's resources running out? Are we facing the prospect of ecodoom?

You will find that these issues are analysed in a way which is interesting and suitable for two types of students: those who want a clearer understanding of the geography of world change and those who want an introduction to questions, topics and explanations dealt with by geographers.

**Content** There are three themes running through the course. The first explores the relationship between society and nature, the attempt to exert social control over the environment and how this affects the world we live in. The second theme examines the relationship between society and its spatial organization. It shows how distance and place affect the organization of production, the distribution of goods and the provision of services. The third theme examines the changing forms of interdependence between nations and between regions, and the effects these have on local societies and their prospects for development.

**Block 1 Introduction: issues and themes** sets the scene with examples drawn from north-east England and the wider world.

**Block 2 Industry and resources** analyses some of the building-blocks of the geography of society. Individual units are concerned with basic principles of the siting of industry, multinationals and how to analyse them, the making of the world economy, and natural resources and social change.

**Block 3 Land use and services** examines the internal organization of cities and the geography of social services. Units look at urban land use, the geography of housing and

patterns of inequality of access to health care.

**Block 4 Culture and conflict: views of space, place and nature** challenges some of our accepted notions of nature and of our relationship to land, the environment and the politics of territory. Units deal with questions of land-ownership, with 'place and perception', with environment and politics in capitalist societies and in centrally-planned societies, and finally with 'geopolitics'.

**Block 5 The changing face of the British Isles** is concerned with the different kinds of change experienced in different parts of the British Isles in response to wider global change. Units look at the influence of multinational investment upon a traditional rural community in the West of Ireland, the inner city problem in Britain and Britain's north-south divide.

**Block 6 Uneven development and the world order** looks at the changing social and economic fortunes of nations in a world bound together by an international economy. Units investigate the rise of newly industrializing countries, the effect of rapid industrial growth upon the Brazilian way of life, the consequences of Islamic resurgence, and the politics and economics of famine.

**Block 7 Geography and society** draws together the central arguments of the course to show how geography matters to the way in which society develops. The units take the examples of regional nationalism, regional policy, EEC development and international pollution to show how geographical differences and nature can have a significant influence on social change.

**Block 8** A review of the themes and content of the course.

## NOTES FOR PROSPECTIVE STUDENTS

**Complementary and related courses** D205 is a suitable sequel to [D102] and has strong connections with such courses as [D202], [D208], [D209], [D210] and [D314]. It is also suitable for students who are not concentrating on social science courses, as it has links with T102, T234 and T274. There are also strong links with U204 and U205.

**Assessment** TMAs 02-07 (50%) and the examination (50%). Substitution will apply for up to one TMA. TMA 01 is formative and will not be used for assessment.

**Broadcasts** The fourteen TV programmes play an important part, particularly to add to treatment of problems and case studies dealt with in the units. There is special emphasis on material from Brazil and Spain, and other programmes deal with Ireland and Bangladesh as well as places in the UK.

**Students with disabilities** If you have a visual handicap you may have substantial difficulties in dealing with numerous maps and diagrams, but not greater than most other social science courses. Students with an aural handicap may have some difficulties as TV is important to assessment.

**Set books** There is a course reader: D. Massey and J. Allen (eds) *Geography Matters!*, Cambridge University Press/Open University. You will be sent the *Third World Atlas* as part of the course material.

## D209 STATE AND SOCIETY

**Second level: full credit**

*Last presentation in 1991*

This course tackles some of the central questions concerning the modern state and its relationship with society, individuals and groups. Does this modern state control our lives? How and why has the state become so all-pervasive? Whose interests does it represent? What are the consequences of the expanded interventions of the state in economic, political and social life? How do modern states legitimate their power? Does the international framework limit the freedom of particular states to develop? Can the state be 'rolled back'? Who then will represent the common good? D209 explores these issues within an interdisciplinary framework, drawing on politics, sociology,

economics and, to a lesser extent, history and geography.

The aims of the course are:

- To examine a central element in modern societies: the state.
- To introduce the concepts and theories used in the social sciences to analyse the role of the state.
- To relate those theories and concepts to the historical development of states and to current issues and concrete problems.
- To examine the state from an international point of view, using material from advanced capitalist, socialist and Third World countries.
- To develop your conceptual framework and study skills from a foundation course level to that appropriate to third-level courses.

## Content

**Block 1 Introduction** A discussion of George Orwell's 1984 introduces some important themes such as the relationship of the state and the individual and the nature of totalitarianism. The second unit sets out the main theoretical approaches and questions to be dealt with, and the structure of the course itself.

**Block 2 The formation of modern states** discusses the significance of democracy, industrialization and nationalism in the formation of both capitalist and communist states.

**Block 3 The state and civil society** introduces representation with a discussion of parties, classes and interest groups and an analysis of state intervention in family life, health care, and the media.

**Block 4 The state and economic intervention** examines economic intervention by the national state in different types of society, and constraints upon the state that arise from economic processes. Case studies of post-war Britain, Hungary and Japan illustrate the contrast between the market and state planning.

**Block 5 Power and legitimation** The central role of the state in constructing and enforcing social cohesion involves legitimation, consensus and the coercive use of power. The units examine Britain, Poland, Zambia and the state in Nazi Germany.

**Block 6 States and the international system** examines the relationship of the national state to the international system of states and supranational state agencies. Competing theories about the international framework are related to NATO, the EEC and the IMF.

**Block 7 Future directions for the state** Beginning with a summary of the main theoretical positions examined in the course, this block goes on to discuss contemporary views of the future of the modern state and new challenges to state organization and the structure of civil society.

## NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** None. Although a pass in [D102]/D103 would be helpful, D209 is a broadly based multidisciplinary course designed to be accessible to all second-level students.

**Complementary and related courses** [A309], [D207], [D208], [D232], [D233], [D308], [D312], [D334], DE354, U204, U221, U235.

**Assessment** TMAs 01-06 (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts and cassettes** Twelve TV and eight radio programmes. Topics include state propaganda, the crisis in Poland, the role of the media in Northern Ireland, and the influence of multinational companies in the Third World (a case study of Namibia).

Four teaching audio cassettes introduce the blocks, discuss the reader articles, and help you to revise the course.

**Set books** G. Orwell *Nineteen Eighty-Four*, Penguin (which you are advised to read before the course begins). D. Held et al. (eds.) *States and Societies*, Basil Blackwell (course reader).



## D210 INTRODUCTION TO ECONOMICS

Second level: full credit

This course introduces economics by examining issues to do with the UK economy. If you want to understand the economic problems of the day, this course will help you to do just that. Booms and slumps, inflation, the balance of payments, the EMS, unemployment, the apparent decline of British industry, technological developments, inequalities of wealth and income and the changing role of the state are all included. The course sets out and clarifies various ways of understanding these issues, recognizing that economists often differ in their explanations.

In teaching the economic theory care is taken to build up concepts systematically and to provide regular breathing spaces so that you can consolidate your own work. There are four audio cassettes and one video cassette (and accompanying booklets) to help you work through the theory at your own pace. In this way D210 has been designed both for students who want a single course in economics, and for those who wish to look ahead to further, more specialized courses in economics.

**Content** Block 1 examines booms and slumps in an historical context by looking at fluctuations in economic activity. It also introduces the important debate between Keynesians and monetarists.

Block 2 looks at British manufacturing and examines its rise and relative decline within the world economy. It continues the historical outlook of the previous block and also looks at the place of the UK economy as part of the world economy.

Block 3 takes up this international perspective by analysing changing patterns of world trade and exchange; demand and supply analysis is introduced and illustrated using international commodity markets. This block also examines post-war balance of payments policies and the role of money and international currencies.

Block 4 considers the structure of production and how firms operate. It examines costs, efficiency, mergers and the changing concentration of production. It also analyses different market structures such as competition and monopoly, and the effects these may have on prices, costs and profits.

Block 5 is about income and wealth. It looks at inequalities in the distribution of income and wealth, and how earnings are determined for different occupational groups. State involvement in the distribution of income and wealth is considered, both in the UK and in the USSR.

Block 6 examines unemployment. Different explanations are considered, including free market analyses which stress the effects of high wages, Keynesian explanations which stress the need for state involvement, and technological explanations.

Block 7 builds on all the previous blocks by developing a model of the economy as a whole. Here the debate between Keynesians and monetarists over the role of the government is examined in detail. Discussion of policy includes demand management, inflation, exchange rate policy, the EMS, and supply side policies. The last unit is a double unit revising the course and helping you to prepare for the examination.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [D222], [D282] and [D284].

**Related courses** If you have taken D205, [D208], D209, D314, U204 and some interdisciplinary courses you will have encountered ideas and issues that relate directly to D210. D210 is a recommended prerequisite for D345.

**Assessment** Seven TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Cassettes** There are four audio cassettes and one video cassette.

## D211 SOCIAL PROBLEMS AND SOCIAL WELFARE

Second level: full credit

This course provides a link between the social sciences foundation course, [D102]/D103, and other second and third-level courses in the social sciences. It retains [D102]/D103's interdisciplinary basis, together with the concern to explore competing approaches to social issues. It looks at how social problems are defined, and at some of the types of social intervention that are intended to resolve social problems and promote social welfare. In particular, the course examines some of the contemporary debates between advocates of free market solutions, state intervention, and decentralized or community based programmes.

**Content** The course has five blocks:

**Block 1** examines how social processes shape our life experiences: birth, childhood, adolescence and old age. Through these topics the block provides an introduction to social problems and the causes and consequences of social intervention.

**Block 2** looks at the condition of the family in contemporary Britain and explores debates about the role of the family in both creating social problems and promoting social welfare. The block provides a critical analysis of conventional definitions of the family, and contrasts images of family life with the diversity of living patterns which are to be found in Britain today. This block also examines the influence of social policies on the family and the influence of ideas about the family on social policy.

**Block 3** deals with the growth of social work as one distinctive form of social intervention. It traces some of the continuities and changes in social work from its nineteenth-century origins to present day arguments about its effectiveness. The block looks at a number of aspects of contemporary social work: the role of family centres, concern about child abuse and different methods of providing care. From these studies the block examines some of the wider issues to do with the problems of social intervention, and uses them as a basis for considering competing views about the future of social work in Britain.

**Block 4** looks at the connections between social welfare and Britain's economic decline. The block examines both the process of that decline and some of the remedies which have been put forward for economic recovery. Special attention is given to the renewed interest in the role of market forces in reviving the national economy. The resurgence of interest in the role of local or municipal socialism in tackling social inequality and regional decline is also an important topic.

**Block 5** concludes the course by considering two important questions. The first is what contribution social science can make to the solution of social problems and the promotion of social welfare. The second takes up a different view of the 'crisis' of British society. To what extent is Britain undergoing a moral crisis, in which traditional values have collapsed and lawlessness is increasing? The block uses these two questions to present a substantial review of the course as a whole.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisite** [D102]/D103.

**Complementary and related courses** D211 is intended to provide a good basis for further study within the social sciences. At second level, it is a useful complement to [D207], [D208] and D209, and is of particular relevance if you are considering studying D310.

**Assessment** Seven TMAs (50%) and the examination (50%). Substitution will apply for up to two TMAs.

**Broadcasts and cassettes** There are sixteen TV programmes and a number of audio cassettes.

**Set books** M. Loney, R. Bocock, J. Clarke, A. Cochrane, P. Graham and M. Wilson (eds.) *The State or the Market: Politics and Welfare in Contemporary Britain*, Sage (course reader).

## D251 ISSUES IN DEAFNESS

Second level: half credit

D251 introduces the study of deaf people, their community and language. It examines issues in the areas of social policy and psychology from the point of view of deaf people and the social agencies with which they interact. It will be of interest to deaf people and their families, professionals who deal with deafness, those interested in linguistics and members of disability, equal opportunities and minority groups.

This course is Part One of the Professional Diploma in Social Work with Deaf People (D601) to be presented in 1992 in the associate programme.

### Content

**Block 1** *Deaf worlds* The course starts with an introduction to the deaf community and its culture using a video study of a deaf family in which deafness can be traced back through many generations. We then examine the concepts of community and culture within an international and historical perspective. The next section, supported by a video, considers communication and deafness in terms of British Sign Language (BSL), the language of deaf people, and explores general questions of linguistics in relation to BSL. The next section analyses social divisions within the deaf community by looking at the experiences of members of particular groups such as black people, elderly deaf people, gay and lesbian deaf people.

**Block 2** *Deaf communities in a hearing world* examines the consequences of a system of education which until recently refused to recognize BSL, and discusses the current emphasis on normalization and integration in schools. We move on to examine deafness in terms of mental illness as a commodity to be treated by professionals, and assess the 'discourses' which have given rise to the notion that deaf people have particular personality traits. We then look at the development of welfare and social work in relation to deaf people and consider current debates about it.

**Block 3** *The social construction of deafness* examines the concept of social construction in relation to deafness within medical, educational and social work, and how deafness is portrayed in literature, film, theatre and the arts. The course then analyses the minority group status of deaf people and compares the model of disability with that of a linguistic minority, leading to a general consideration of the relationship between minority groups and the dominant culture. A concluding video-based unit reviews the course and looks at the future of the deaf community in relation to art, technology and politics.

### NOTES FOR PROSPECTIVE STUDENTS

**Complementary and related courses** D211, D307, D309, [D5262], D5E202, [E354], ED356 (new in 1992), U221.

**Assessment** Four TMAs (50%) and an examination (50%). Substitution can apply for one TMA.

**Students with disabilities** The visual nature of much of the course material could present difficulties for those with visual impairment. Since this course may be of particular interest to some students within this group, you are invited to seek advice from the course team before applying; write to the D251 course manager, The Open University, Milton Keynes MK7 6AA. Course and supplementary materials are not available on tape.

**Cassettes** Four 30-minute video cassettes are an essential part of the course.

**Set books** You must buy H. Lane *When the Mind Hears*, Penguin; D. Miles, *British Sign Language*, BBC; and J. Kyle and B. Woll *Sign Language - the Study of Deaf People and Their Language*, Cambridge University Press.

You will receive as part of your course material: J. Bishop and G. Taylor (eds.) *Being Deaf: the Experiences of Deaf People*; S. Gregory and G. Hartley (eds.) *Constructing Deafness*.

**Special features** Access to a video-cassette player is essential.

## D307 SOCIAL PSYCHOLOGY: DEVELOPMENT, EXPERIENCE AND BEHAVIOUR IN A SOCIAL WORLD

Third level: full credit

D307 is a central part of the set of courses which contribute to an honours degree recognized by the British Psychological Society (see Section 1 of this publication). The course is designed not only for those who intend to specialize in psychology but also for students with a wider interest in social science and those whose primary interests are in arts subjects and who wish to increase their understanding of the development, experience and social behaviour of people in the context of the societies and cultures in which they live.

**Content** The course is structured loosely around the chronological development of individuals. It consists of seven blocks which vary in length from two to six weeks' work. Alongside these blocks you also study an integrative block which discusses the philosophical underpinnings of theories and methods, makes cross-references between the substance of blocks, highlights problems and controversial issues and serves a review function. Where appropriate the course makes reference to or deals more fully with applied social psychological research and its relevance to everyday life. This concern with the relevance of research is also reflected in the course reader and in the use of project work.

The course begins by describing the process by which an infant is integrated into her or his social world. The second block continues with social development by emphasizing the role of language and cognitive development in action and interaction with others. Block 3 takes up the theme 'Relating to Others', and deals with communication and interaction. Block 4 is an exploration of the dimensions of personal consciousness and the process of understanding oneself. In Block 5 the individualistic point of view shifts towards collective representations of the world with a discussion of classical attitude theory. This is then broadened to consider how attitudes and beliefs relate to decisions about how to vote. The experience and effects of group membership and the psychology of social movements are explored in Blocks 6 and 7. Thus the course begins and ends by setting the subject matter into a wider social and cultural context.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [D305].

**Recommended prerequisites** [D102]/D103, [D5262], D5E202.

**Complementary and related courses** D309, E206 and E362 are suitable complementary courses and would contribute toward the British Psychological Society recognized set.

**Assessment** Three assessment components: (i) TMAs 01, 02, 03 and 06 (28.5%); (ii) TMA 04 (project, double weighted) and TMA 07 (integrative) (21.5%); and (iii) the examination (50%). Substitution will apply for one TMA in component (i), but not to any of the other components.

One project (to be chosen from five options) as well as essay TMAs make up the continuous assessment. It will be possible to choose suitable practical work if you are housebound. One option requires either access to a computer terminal or use of the Academic Computing Service postal service; and two projects require use of a VHS video machine.

**Cassettes** You will receive an audio and a returnable video cassette associated with work on practical projects.

**Set books** J. Murphy, M. John and H. Brown (eds.) *Dialogues and Debates in Social Psychology*, Lawrence Erlbaum Associates (course reader). H. Himmelweit, T. Hilde, P. Humphreys and M. Jaeger *How Voters Decide*, Open University Press (2nd edn.). R. Stevens *Freud and Psychoanalysis*, Open University Press.



## D308 DEMOCRATIC GOVERNMENT AND POLITICS

### Third level: full credit

D308 is about a series of issues fundamental to the kind of society we live in. What is democracy? How has it arisen? How can it be maintained and developed? The course tackles these issues by tracing the themes of 'democracy', 'autonomy', 'freedom' and 'conflict' across a selection of political systems, movements and groups, both contemporary and historical. Within this strategy it offers a good comparative understanding of the political and governmental systems of two western states and also examines the growing importance of political phenomena which manifest themselves at the supranational level.

At the individual level significant changes have been occurring in modes of political activity and in many people's attitudes to what (if anything) constitutes worthwhile involvement in politics and public affairs. D308 attempts to analyse these changes by examining developments in political parties, the growth of international movements such as the women's movement or the 'greens', and experiments in industrial democracy. By the end of the course you should be able to formulate your own reasoned view of what constitutes 'democracy' and understand why this complex yet popular idea is today as controversial and alive as at any time in its long history.

**Content** The course is organized in seven blocks.

**Block 1** examines how and why democratic ideas and institutions have arisen.

**Block 2** looks at how 'democracy' may be defined and at the development of competing ideas about the kinds of democracy that are possible and desirable.

**Block 3** starts with an examination of US political culture, the institutions of US government, and how public policy is made. Then a parallel and comparative study is made of France. Finally there is a discussion of some general questions concerning the comparison of different political and governmental systems.

**Block 4** looks at challenges to existing democratic forms and examines issues such as democratic politics in Eastern Europe, the effects of nationalism and the influence of supranational institutions and global networks.

**Block 5** The emphasis is on innovations in contemporary democratic theory and practice. The block looks at new forms of democracy such as industrial democracy and the women's movement and examines the possible extension of democracy into sectors such as foreign policy where 'reasons of state' have often been used to limit democracy.

**Block 6** The goal is to encourage you to relate course work to contemporary political phenomena. A choice of one from at least three options will be available. The options will be guided reading of a prescribed text or deeper study of an area covered earlier in the course, such as industrial democracy.

**Block 7** A review of the main course themes with revision in mind.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** [D208] and/or D209. D308 has been designed with the contents of [D102], [D103], [D208] and D209 very much in mind.

**Complementary and related courses** D308 is complementary to [D208] and D209, both in its focus on democratic processes and institutions and in its choice of cases.

**Assessment** Seven TMAs (50%), seven non-assessed CMAs and the examination (50%). Substitution can apply to one TMA but not to the project TMA related to Block 6.

**Broadcasts and cassettes** Eight TV programmes are concentrated on just two parts of the course. The first set is connected to Block 3, looking at

aspects of the US political system. The second set is linked to Block 5, examining some of the new forms of democracy with which that part of the course is concerned. There are also eight one-hour audio cassettes spread throughout the course.

**Set books** D. Held *Models of Democracy*, Polity Press. V. Wright (1988) *The Government and Politics of France*, Unwin Hyman (3rd edn.).

Two course readers, *The American Political Process* and *New Forms of Democracy*, will be sent to you as part of the course material. The Block 6 options may require the guided reading of an extra text which you will be asked to obtain.

## D309 COGNITIVE PSYCHOLOGY

### Third level: full credit

D309 is an essential course for students who want recognition of their degree by the British Psychological Society (see Section 1).

The course will acquaint you with the most important theories and methods of cognitive psychology. It is concerned with higher mental processes and the ways in which knowledge is acquired, stored and used, and it emphasizes the relevance of the theories and findings of cognitive psychology to mental activities in everyday life. Three methods are introduced: experiments, the use of computer models and introspection. Full instruction will be given in writing simple computer programs, in experimental design and in statistical analysis, which requires only basic arithmetical skills.

**Content** There are four main areas:

**Memory** Everyday memory; working memory; encoding and retrieval.

**Language understanding** Language and knowledge; models of language understanding.

**Problem solving** Models of problem solving; production systems and cognitive skills.

**Perception and representation** Conceptual categories; seeing objects; the computational approach to vision.

These four topics are in the form of books, with the same titles, in the Open Guides to Psychology series, published by Open University Press. You will not need to buy them; they will be sent to you.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [D303].

**Recommended prerequisites** D5E202 or [D5262] since they cover the introductory material that forms the basis for more detailed treatment in D309.

**Assessment** TMAs 01-08 (50%) and the examination (50%). Substitution will apply for up to two TMAs.

**Computing** Computing is introduced at day and summer schools for writing artificial intelligence programs and for controlling experiments.

**Summer school** Course based, providing experience and training in experimental methods and in writing simple computer programs.

**Students with disabilities** No special problems are expected, although if you have a visual handicap you may have substantial difficulties with home experiments.

**Set books** A. M. Aitkenhead and J. M. Slack (eds.) *Issues in Cognitive Modelling*, Lawrence Erlbaum Associates (course reader). A. W. Ellis *Reading, Writing and Dyslexia: a Cognitive Analysis*, Lawrence Erlbaum Associates. J. Greene and M. D'Oliveira (1985) *Learning to Use Statistical Tests in Psychology: a Student's Guide*, Open University Press (in the series Open Guides to Psychology).

## D310 CRIME, JUSTICE AND SOCIETY

### Third level: full credit

How much crime is there? Is there a criminal personality? Is the law the last defence of the

social order? Why is there a crisis in the prisons? To whom are Chief Constables and the police accountable? Why is there a separate juvenile system? Where do our ideas about crime and the criminal come from? What should we do with long-term prisoners? Are poverty or the weakening of family discipline sufficient explanations for the rising rates of crime? Are women less criminal than men? Is there really a rise in crime – and, if so, are we right to interpret it as a symptom of growing social conflict or the break-up of society? Is crime the same in every society? Do we need more or less law and order?

These are some of the questions considered in *Crime, justice and society*. In recent years such questions have risen to the forefront of public attention. They are matters for urgent debate in government; they are widely discussed in the media and everyday conversation. D310 has been designed as a broadly based interdisciplinary social science course. It examines both historical and current issues concerning the nature of crime, the functioning of the law and the criminal justice system. It is not a specialist course in criminology. Rather, it uses questions of crime, the law and the machinery of justice to explore the nature of social order; to examine how conflicts and disputes in society are regulated; and why individuals do or do not conform to the norms and standards of behaviour prescribed by the social order. We examine crime and the law as vantage points from which wider descriptions and explanations of how society works can be surveyed.

A degree of independent study is encouraged through use of a course reader, study guides, set books and supplementary readings, which culminates in an opportunity to explore in detail an aspect of crime, the criminal justice system (including prisons) or criminology which is of particular interest to you.

**Content** The course has five blocks. There is a choice of two routes through the last block of the course.

**Block 1** An introduction to the course raising such issues as the quality of media representations of crime; the extent of crime; the causes of crime and how it can most effectively be controlled.

**Block 2** traces developments in changing patterns of crime and transformations in the law and machinery of justice in Britain from the eighteenth to the mid-twentieth century. It provides the necessary historical basis for understanding the present character and problems of crime and the law in the light of their past development.

**Block 3** deals with contemporary institutions of justice such as the police, courts and the penal system as they affect both adults and juveniles. As well as providing a guide to the criminal justice system, it also identifies a number of controversial questions in it such as police accountability, the impartiality of the judiciary and the effects of imprisonment, and assesses the relative merits of the separate system of justice that has developed in Scotland.

**Block 4** draws on the two disciplines of sociology and psychology to examine how crime and the law have been analysed and explained within the social sciences. It surveys some of the most recent significant developments in the theory and explanation of crime and law.

You choose one of the following two options for the next block:

either

**Block 5**, which offers a critical analysis of research methods within criminology, through the analysis of a set text on 'hooliganism'. This is used as an example of how criminological texts can be subject to critical inquiry and how different research agendas may suggest alternative approaches. In the final double TMA you are required to reflect on these issues with a view to presenting your own ideas for further research in a subject area of your own choice.

or

**Block 5A**, which looks at issues and

methods in research on institutions. You will be required to read and appraise research papers in a variety of styles, relate them to theoretical material studied earlier in the course and produce an outline for further research. Prison research is the main theme of the block, but the issues and methods discussed are equally applicable to other institutions and to other aspects of the criminal justice system.

**\*Block 5 options** An Advanced Diploma in Criminology (Prison Studies) is planned, to begin in 1992. If you complete the Block 5A option you will be able to count D310 as the first of two full credits for this diploma. The second, postgraduate part of the diploma will be available only in the associate programme.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [D335], which it replaced; [D431].

Usually students who have passed a course from an excluded combination may not register for another course from the same excluded combination. However, in this instance, if you have successfully completed [D335] but have not had it included in the award of a BA degree, you may if you wish register for D310 on condition that if you pass D310 you relinquish the half credit you obtained for [D335]. You will not be allowed to base your decision on the grade of pass obtained on D310. If a pass is awarded for D310, then regardless of the grade, the half credit for [D335] must be relinquished. Virtually all the teaching material from [D335] has been incorporated in D310. If you wish to take up this option in 1991 you should consult your tutor-counsellor first.

**Recommended prerequisites** [D102]/[D103 and [D207] or D211 or [DE206] or [D5262]. D310 provides an applied area for students who have already studied courses within the psychology or sociology disciplines.

**Complementary and related courses** A310, [D208], D209, D321, [D355], [E205].

**Assessment** TMAs 01-06 (50%) and the examination (50%). Substitution will apply for up to one of TMAs 01-05. TMA 06 is a compulsory double weighted assignment and therefore cannot be used for substitution; it will have a threshold of 30%.

**Cassettes** Important issues raised in the course are given further analysis on five audio cassettes.

**Set books** G. Pearson Hooligan: *A History of Respectable Fears*, Macmillan. P. Marsh, E. Rosser and R. Harre, *The Rules of Disorder* (set book for Block 5 only), Routledge. F. Heidensohn *Women and Crime*, Macmillan. M. Fitzgerald, G. McLennan, J. Pawson *Crime and Society*, Routledge (course reader).

## D312 GLOBAL POLITICS

### Third level: full credit

This course explores the main characteristics of the contemporary global political and economic orders, and in doing so examines the limits of state autonomy in an increasingly interdependent world. For example, we are all aware just how far events abroad, like the burning of the rainforest in Brazil or political protests in South Africa, have global political consequences. D312 gives particular attention to the powerful forces which determine what governments around the world can and cannot do.

### Content

**Block 1** Introduction to the course

**Block 2** Superpower rivalry and global political competition (6 weeks' work) One of the main features of the modern international political world has been the onset of the Cold War and the resurgence of a Second Cold War that has shaped international relations in the 1980s. This block examines the origins of the Second Cold War and some of its implications for contemporary global politics and the politics of three regions: Central America, the Middle East, and South Asia. It explores the claim that Cold War politics have determined global relations since the Second World War



and acted as the most powerful force in relations between nations.

**Block 3 Technology, change and the global political order** (5 weeks' work) Nuclear technology has been an important new element in great-power competition and the nuclear arms race a central feature of world politics. This block explores how far the arms race is driven by technology and then widens its scope to discuss the degree to which technology, as a force in itself, is transforming the nature of world politics. By examining the influence of nuclear power, communications, space and information technology upon the nature of world politics the block evaluates the role of technological progress as a powerful force for creating new global issues and intensifying an interdependence between states which can only be managed by establishing structures of international co-operation.

**Block 4 A global economy?** (7 weeks' work) Technological developments, while obviously important, have taken place within an economic framework and cannot really be divorced from systems of economic production and exchange. How far have stronger international links been made through the formation of a world economic system? What is the nature of any such global economy and how far does it determine the nature and direction of international political development? Are the capitalist and communist worlds both part of a broader economic system? This block examines the notion of a global economy and explores its implications for international and domestic politics.

**Block 5 Politics in a global society?** (7 weeks' work) Economic structures and technological forces have clearly played a large part in the formation of a more tightly-knit international system. Is the power of the state, therefore, being eroded or extended by growing interdependence? This block evaluates competing outlooks upon the emergence of a world society and the contemporary significance of the nation state in world politics.

**Block 6 Research project** (7 weeks' work) The research project is designed to enable you to choose a current issue or topic which interests you and write an extended (double) TMA, based upon your own research undertaken at summer school. The first five blocks supply the background and range of concepts you need in order to tackle individual topics for yourself. The summer school will provide facilities for personal library work and opportunities for tutorial and group activities on the subject of your choice, both with other students and with tutorial staff, as well as for reviewing the course material.

**Block 7 Conclusion** (1 week's work) A final review of the main concepts involved in the idea of global politics.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** [D102]/D103, D205, D208 and D209. The course is complementary to D308 and is designed to further the themes introduced by [D208] and D209. You are advised to take one or both of these second-level courses before beginning D312.

**Assessment** Six TMAs, including a project which counts as a double-weighted TMA, and the examination. Substitution will apply to up to one TMA but not to the project.

**Cassettes** There are seven audio cassettes linked directly to the blocks and project.

**Summer school** Course based. See also above.

**Set book** F. Halliday (1986) *The Making of the Second Cold War*, Verso (2nd edn.).

## D314 RESTRUCTURING BRITAIN

Third level: full credit

This interdisciplinary course examines some of the important changes which have

reshaped the structure of contemporary Britain and its place in the international system during the last twenty-five years. It asks whether a significant restructuring is under way and attempts to explain the changes which have occurred. The course should enable you to make a critical examination of different theories and relate them to the available evidence. It has three sections, on economy, society, politics and the state, and instead of traditional units there are three main course books and three readers, permitting you to read and assess some of the important articles and debates for yourself. The uneven geographical dimension of change is a point of attention throughout the course.

**Content** Britain has experienced a number of large economic, social and political changes during the last twenty-five years. Manufacturing industry and employment have suffered a sharp decline and Britain's share of world manufacturing exports has fallen sharply as manufactured imports have risen. At the same time, the number of jobs in the service sector has grown rapidly. This has led some commentators to suggest that Britain has been de-industrialized and that we are now a 'post-industrial' society. There have also been changes in the structure of employment. Many skilled male jobs in manufacturing have disappeared, particularly in the inner cities and the older industrial regions, and there has been a rapid growth of part-time low-skilled jobs, many of which are held by women, as well as a massive increase in the level of unemployment. There has also been an increase in the number of 'white collar' office jobs and a decline in the number of manual workers, which has led some observers to suggest that the traditional working class is disappearing and that Britain is becoming a middle-class society.

These views are open to question, but what is clear is that there have been significant changes in the economy, work, consumption and social structure of Britain. These economic and social changes, and their very uneven geographical incidence, raise a number of questions about the changing form and geography of culture and politics in contemporary Britain. It has been suggested that there is a growing gulf between the affluent south-east and the rest of the country, between the poor inner cities and the wealthy suburbs, and that these 'two nations' of income and wealth, employment and unemployment, owner-occupiers and council tenants, are reflected in a growing geographical division in party political alignment and voting. It has also been suggested that the post-war political consensus on housing, employment and the welfare state is dead and that we have entered a new era of market-oriented policies. At the wider international level, there are questions about the UK's changing relationships with Europe, with the USA and with the Commonwealth.

Taken collectively, these issues and changes raise the question of whether Britain has undergone a radical transformation in its economy, social structure, culture and politics over the last twenty-five years, and it is this question that the course considers.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisite** [D102]/D103. It would be to your advantage to have taken at least one of the courses listed below.

**Complementary and related courses** [D202], [D204], D205, D209, D211.

**Assessment** TMAs 02-07 (50%) and the examination (50%). Substitution will apply to up to one TMA. TMA 01 is formative and will not be used for assessment.

**Cassettes** There are two audio cassettes.

**Preparatory reading** You might find it useful to read some of the following: A. Gamble (1981) *Britain in Decline*, Macmillan; S. Lash and J. Urry (1987) *The End of Organised Capitalism*, Polity Press; R. Hudson and A. Williams (1986) *The United Kingdom*, Harper and Row.

**Set books** Three readers will be provided as part of the course material.

## D321 PROFESSIONAL JUDGMENT

Third level: half credit

A course about how and how well professionals deal with individual cases and about how they could and (perhaps) should deal with them. Our aim is to provide you with the background you need to understand and take part in debates about the quality of professional judgment and decision making. These processes have become the subject of an increasing number of legal cases and public inquiries and are generating growing political and public interest.

**Content** Using medicine as its case study and presenting the debate in the form of a dialogue, the course examines competing views as to whether professional judgments about individual cases are seriously defective or deficient. Errors in reasoning, inefficiencies in use of resources and insufficient consideration of patients' values are the main 'diagnoses' considered. The 'treatments' offered by those who make a positive diagnosis include the adoption of formal, and typically computer-based, judgment and decision aids (e.g. expert systems, decision analysis programs), greater peer review and the reform of the education of professionals so as to equip them with improved judgment and decision-making skills.

These questions are considered first at the level of the individual interaction between professional and 'client' (Units 1-7), and then in their politico-economic, ethical and legal contexts (Units 8-10). Unit 11 looks at the education and wider socialization of professionals (and their clients) and discusses current and possible future changes in these. The debate is conducted within the contrasting but related cultures of Britain and North America.

Most of the case material is medical but the course is intended for all those who deal with individual cases and all those involved in or affected by their judgments and decisions. There is some supplementary material on a number of other professions and you can select an area of personal interest for part of your work.

The course introduces the types of analysis which must be understood as a preliminary to informed participation in discussions about the quality of professional judgment and the merits of various decision support systems. If you have little numerical background you are likely to find the course demanding, though the presentation has been designed with you in mind (competence in manipulating statistics is not required).

The course is television-based and you must be able to watch the programmes. The *Introductory texts* summarize the main points of each programme and provide a lengthier dialogue on its main themes as well as supporting material and examples. They also introduce the extended treatments provided in the set reading, which comes in the form of a reader and supplementary offprints.

A particular feature of the course is the relationship between its content and its assessment. You will be exposed to, as well as studying, professional judgment and we have taken the opportunity to make the assessment of the course part of its subject matter. By course assessment we mean both our assessment of your work and your assessment of ours: we will be asking you to make (brief) judgments of the course and its teaching as part of your assignments. Since this may create some worries we have developed special ethical codes: if you are contemplating taking the course, you should write immediately for a copy of the Course Codes to Jack Dowie, Social Sciences (Gardiner), The Open University, Milton Keynes MK7 6AA. It will be assumed that if you finally register for D321 you have given your informed consent to the ethical code and read the matching code agreed to by your tutor and the course team.

#### NOTES FOR PROSPECTIVE STUDENTS

**Assessment** TMAs 01-04 (50%), of which one out

of TMAs 01-03 will be substitutable, and the examination (50%).

**Tuition** We hope to provide at least one face-to-face tutorial and a limited number of inter-regional day schools.

**Broadcasts** Eleven TV programmes.

**Set books** A specially prepared reader: J. A. Dowie and A. Elstein (eds.) *Professional Judgment: a Reader in Clinical Decision Making*, Cambridge University Press.

## D345 ECONOMICS AND GOVERNMENT POLICY

Third level: half credit

This course is designed to increase your understanding of current issues in economic policy and to strengthen your ability to use economic theory. In D345, basic economic analysis is applied to a wide range of important practical problems: from the abolition of domestic rates to the privatization of nationalized industries, from the queues in the National Health Service to the food mountains of the Common Agricultural Policy, from the reform of the tax and social security systems to the importance of the public sector borrowing requirement. Obviously, not only economic analysis is involved. D345 will show you how the application of basic economic analysis can clarify the problems and help to assess the different policies advocated by politicians, and others, to deal with them. But there is also an important political ingredient in these, and in the other matters considered in the course, and this too is taken into account.

**Content** There are four blocks in the course. The first, which you will be studying while the Chancellor prepares the annual budget statement, concentrates on the budget. We explain the procedures by which conflicting interests and economic pressures are combined in the budget presented to Parliament. You will see, for example, the significance of economic arguments over the PSBR, and why, particularly since 1979, the idea that the budget could be manipulated to reduce unemployment has been rejected by the government. Theories and arguments which lie behind opposing views of what the government should do to make the economy more efficient, and the outcome more fair, are discussed and drawn upon throughout the course. More than a quarter of government expenditure is undertaken by local government and so we also examine the role of local government in the UK.

The second block is about taxation. Fundamental tax reforms are advocated by politicians in all parties. The characteristics of the present tax system, and some of the main criticisms of it, are outlined; and then various reforms such as changing personal income tax and introducing a poll tax to replace domestic rates, are examined.

Block 3 examines government policy towards industry and agriculture. What is the real reason for the recent programme of privatization? What should the government's policy be (and what is it) towards monopolies and nationalized industries? Can it successfully influence private sector investment decisions to improve the performance of the economy? You will also find a clear account of the Common Agricultural Policy, and see what alternatives are being considered in the EEC for its reform.

The last block concentrates on economic aspects of the welfare state. We examine the social security system and proposals for its reform, we look at the government's influence on the distribution of income and we explain the problems which have to be faced in deciding policies for the NHS. The last unit will help you to review and revise the course.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [D323].

**Recommended prerequisites** D345 was written with the assumption that you have already studied



D210 or a similar course ([D222] and/or [D284]). If you are in any doubt about whether you are adequately prepared, please consult your tutor-counsellor, or the D345 Course Manager, Faculty of Social Sciences, Walton Hall.

**Related courses** This course complements other University courses concerned with government or policy, for example (from the Social Sciences Faculty) D205, [D208], D211, [D324], [D355].

**Students with disabilities** Course and supplementary materials are not available on tape.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Cassettes** Two audio cassettes and accompanying booklets help you revise certain basic economic concepts and guide you through worked examples of some of the techniques used in the course.

**Set books** A. Gilie, R. Levacic and G. Thompson (eds.) *Politics and Economic Policy*, Hodder and Stoughton (course reader). J. A. Kay and M. A. King (1989) *The British Tax System*, Oxford University Press (5th edn.). The current issue of *Public Domain* is available to D345 students at a reduced rate; details of how to buy it will be sent in the first course mailing.

## D437 SOCIAL SCIENCES GUIDED STUDY COURSE

### Fourth level: half credit

This course is designed to enable you, at the end of your degree programme, to investigate certain topics within a more flexible guided study programme, thereby widening the range of topics which can be studied at the undergraduate level and allowing for an amount of specialization appropriate to an honours degree. The course is built around prescribed reading, and you are expected to study more independently than at third level; you are also expected to show greater initiative in obtaining essential reading materials. All guided study courses are mounted from year to year and what is offered in a particular year will be decided in the previous year. No more than two of these courses may be studied.

At present we plan to present the following in 1991:

#### D437 *Conflict and change in the countryside*

If you intend to register you should write for the leaflet 'Guided Study Courses', which gives details of the 1991 course including objectives, course outline and guidance on books. It is available from the Central Enquiry Service, PO Box 71, The Open University, Walton Hall, Milton Keynes MK7 6AG, tel. 0908 653231.

### NOTES FOR PROSPECTIVE STUDENTS

**Course material** The material for the course comprises a course description, course guide, booklists and tutor-marked assignments; there are no printed units. There are no broadcasts and no summer school.

**Conditional registration** Because of the form of this course and the method by which it will be taught, the number of students will be restricted to 25. The prerequisites are three post-foundation credits in the social sciences, or closely related credits, including one course at third level. Applications will be considered during the period of conditional registration; those whose combination of credits for a chosen course appears not to provide a suitable preparation will be advised by letter to reconsider their registration before the final date for conditional registration.

**Note** Students are not selected for this course: the 25 places are allocated according to usual OU procedures.

**Tuition** The course is taught by a member of full-time staff, and tuition is provided through correspondence based on the TMAs.

**Assessment** There are six TMAs (the substitution rule applies for one TMA) and the examination. Full details of the assessment strategy is given in the leaflet mentioned above. There are more TMAs than in other half-credit courses so that there can be more communication between tutors and students.

**Students with disabilities** If you have a visual handicap you may have some difficulty. Course and supplementary materials are not available on tape.

**Set books** There will be set books, and you may need to make extensive use of specified books and publications in your local library. Further details about set books can be obtained from the Central Enquiry Service (see above).

## DE304 RESEARCH METHODS IN EDUCATION AND THE SOCIAL SCIENCES

### Third level: full credit

Last presentation 1991

This course is offered jointly by the Social Sciences Faculty and the School of Education and pertains to any course in these areas which draws on research findings as a source of evidence. However, it is of most relevance to research based in the disciplines of sociology, psychology and education.

This is one of the courses which may be taken by students who wish to obtain recognition of their degree by the British Psychological Society (see Section 1 of this publication).

The course has two main aims. First, it equips you with the information and skills you need to evaluate research in the social sciences in both academic and non-academic contexts. By giving you a fuller understanding of the methods, processes and problems of social research, it enables you to judge reports of research findings and to assess the practical implications of research. Secondly, the course provides a good grounding for those who wish to undertake their own research in the social sciences.

**Content** The course concentrates on the design, collection and analysis of research data in three broad research styles: ethnography, survey and experiment. Experimental methods are not taught in as much detail as the other two styles, the emphasis being on the logic of experimentation. Detailed procedures for data collection in laboratory experiments are not considered.

The written course texts are organized into the following eight blocks:

**Block 1 *Variety in social science research*** Case studies are used to give an introductory survey of the theory and practice of social research. The block identifies the main characteristics of three research styles and gives examples of each style in practice.

**Block 2 *Beginning research*** This block concentrates on the origins of research ideas, the use of existing data sources, and descriptive statistical analysis.

**Block 3 *Research design*** This block considers research design including surveys and sampling techniques, experiments and designs involving ethnographic methods.

**Block 4 *Data collection procedures*** and

**Block 5 *Classification and measurement*** In these two blocks problems and methods of data collection are discussed, including techniques of participant observation, interviews and the design and administration of questionnaires. 'Measurement' in the social sciences and the construction of educational tests and attitude scales are covered in Block 5.

**Block 6 *Making sense of data*** and

**Block 7 *Modelling relationships in data*** These are about data analysis, including ethnographic data, and statistical inference.

**Block 8 *Evaluation of research*** This block concentrates on the evaluation of research in both its technical and ethical aspects. It also revises material taught earlier in the course.

Parts of certain blocks are optional, i.e. non-examinable. They are Block 2 Part 3, Block 5 Part 4 and Block 7 Parts 2 and 3. The order of study of the blocks has been revised in order to allow you to work on the projects throughout the year.

The eight blocks are complemented by three set books, two of which are readers specially prepared for the course.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [E341], which it replaces.

**Recommended prerequisites** It would be an advantage to have studied [D102] and at least one other social science or educational studies course. The organization and analysis of statistics is kept to the minimum and it is assumed that you have only an elementary knowledge of mathematics and no experience of statistics.

**Complementary courses** The course will contribute to the critical appreciation of any social sciences or educational studies course that uses evidence from empirical research in developing its arguments. It is also very useful for any student who intends to undertake postgraduate work requiring the collection of empirical data. The course is complemented by MDST242 (which is a first course in statistical analysis with some emphasis on social science). DE304 is also one of three components in the MSc in Advanced Educational and Social Research Methods (further information on this is obtainable from the Central Enquiry Service).

**Assessment** Five assessment components: (i) STMA 03 (5%); (ii) ethnography project STMA 09 (15%); (iii) survey project STMA 11 (15%); (iv) evaluation project STMA 13 (15%); and (v) the examination (50%). Substitution will apply for single-weighted TMA component (i) but not to the double-weighted project components (ii), (iii) and (iv). Thresholds of 30% will apply to each of the project components (ii), (iii) and (iv) and to the final examination.

The assessment is an important part of the course, not only as a measure of performance but also as a means of giving you practical experience in the application of skills taught. Continuous assessment is by a mixture of 'formative' and 'summative' TMAs. One formative TMA is an optional exercise. The other two formative TMAs are submissions, in draft form, of the survey and ethnography project reports. These allow you to receive comment and advice on the reports from your tutor before submitting the assignments for assessment. The formative TMAs, each equivalent to 0.5 TMAs, do not count towards the award of a credit. There is one short summative TMA early in the course. The remaining summative TMAs consist of three projects, each two TMAs in length. The first two projects require the collection and analysis of survey and ethnographic interview data. The final project is concerned with the evaluation of research reports. You can expect to devote about a third of your study time to the project work.

**Cassettes** The teaching components of the course are completed by four audio cassettes. These present a series of programmes on a wide variety of topics including project work, statistical analysis and the ethics and politics of social research. There are no broadcast TV programmes, but video cassettes of programmes made for the course may be shown at tutorials and day schools. These programmes demonstrate interviewing techniques relevant to project work, and teach some statistical techniques.

**Students with disabilities** This is an active course, involving some interviewing. It may not be suitable therefore for students with certain disabilities. If you are in any doubt you should seek advice from your tutor-counsellor, or from the Adviser on the Education of Students with Disabilities.

**Set books** J. Bynner and K. M. Stribley (eds.) (1979) *Social Research: Principles and Procedures*, Longman (course reader); this consists of a collection of 'classic' methodological articles. M. J. Wilson (ed.) (1979) *Social and Educational Research in Action: a Book of Readings*, Longman (course reader); this is a book of readings demonstrating the application of research methods in specific research projects. H. W. Smith (1975) *Strategies of Social Research: The Methodological Imagination*, Prentice-Hall.

## DE325 WORK AND SOCIETY

### Third level: half credit

Why is work designed as it is? How and why do jobs differ in security, conditions and status? Why and how does professional work differ from factory work? Why should we trust the professional person but not the car dealer? Work is one of the most significant things we do and it tells us not only a great deal about ourselves as individuals but also a great deal, collectively, about the society in which we live and toil.

What is work? Can and should non-paid work such as housework and voluntary work be regarded as work? Is criminal activity work? How, too, are we to regard the 'black economy' or the paid 'official' work of the monarchy? The course reflects contemporary debates which challenge everyday assumptions about work and reveals how our 'common-sense' view of the concept of work proves to be riddled with inconsistencies.

The course will appeal to anyone who is interested in exploring these questions further and in understanding how and why work is socially organized, and the consequences of this for our lives as well as for social stability and change.

**Content** The course is divided into four blocks. The first considers various types of work and the principles which these types reveal, e.g. the nature of some work in non-European societies; the control of factory work; the cultural and gender construction of housework; the historical development of agricultural work; and the professional's claim to trustworthiness. To a considerable extent it thus establishes the agenda for the rest of the course.

The second block takes a wider view of what determines work design. Is it, ultimately, culture or modern technology which is responsible for work design? This question is explored through two detailed observations of work, in France and in modern China.

The third block is directly concerned with current trends within places of work: it considers the design of factory employment; the nature and determinants of the demand and supply of labour, and differences in the ways in which employees are rewarded; the sources and consequences of conflict at work; and the factors that shape organizational structure.

The last block takes a broader look at the relationship between work and society by considering those aspects of society (education, the family, ideology) which serve to support and sustain current forms of work with all their inequalities and potential for conflict.

The course also contains three review units to allow you to catch up with your work if you have fallen behind; to reflect, in an organized manner, on some general questions which have been raised in earlier units but which might not have been directly treated, and to revise for the examination.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [DE351].

**Recommended prerequisites** We recommend that you should have studied one or more of the following courses: [D102] D103 [D207], [DE353], DT200, [E205], E333, U221. If you have not studied any of these prerequisites you are encouraged to read the unit material in advance, or a general preparatory text such as P. Worsley (1988) *The New Introducing Sociology*, Penguin.

**Assessment** TMAs 01-04 (50%) and the examination (50%). Substitution will apply for one TMA.

**Broadcasts and cassettes** The television programme presents a survey of course themes and ideas. Audio cassettes provide further analysis of some important issues.

**Set books** Two specially prepared anthologies containing articles and excerpts to accompany the course units: Craig R. Littler (ed.) *The Experience of Work*, published by Gower; and K. Thompson (ed.) (1984) *Work, Employment and Unemployment*, Open University Press.

## DE354 BELIEFS AND IDEOLOGIES

### Third level: half credit

The course looks at some of the ways in which knowledge, beliefs and ideologies are bound up with social systems.

This involves some consideration of different theories of ideology, and of power within society, but we concentrate mainly on case



studies drawn from both historical and contemporary examples. We examine how ideas about, for example, religion and nationalism have been formed, and how they sustain or challenge existing social relations.

**Content** Most of the material is in three readers, with an introduction, conclusion and study guides to back them up.

The introduction outlines the questions to be covered in the study of beliefs and ideologies, and sketches in some of the main definitions of the concept of ideology.

The first reader examines the character of religious ideology, language and institutions, contrasting different forms of religion from the formal to the popular. It looks in particular at the dominant religious formations in nineteenth-century Britain, at the Rastafarian movement and its relationship to black consciousness, and at the place of religion in British society since 1945.

The second reader considers the relationship between ideology and political processes – the definition of 'the political' in terms of liberal democracy in Britain; the formation of the complex of imperialist and nationalist ideologies that fed into modern British Conservatism; and, as a contrasting case, the role of ideology in the making of Fascist Italy in the 1920s and '30s.

The third reader attempts to explain the role of particular institutions and agents in organizing social relations. It deals with the formation of specialized forms of knowledge about the family, sexuality, and schooling, and the use of such knowledge to categorize and regulate the population.

The conclusion provides a summary of the main themes and concepts developed in the course.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisite** [D207]. It is strongly recommended that you should first study one of the social science second-level introductory discipline courses, preferably (but not necessarily) [D207].

**Complementary and related courses** The course is one of three sponsored by the sociology discipline, the others being [D207], DE325 and, from 1992, D213. Other related courses are [A203], [A309], A315, D209, D308, [U203], U221.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Cassettes** Three 90-minute audio cassettes extend the tutorial facilities of the course, enhance the teaching of theories of ideology and give guidance in the study of the more difficult course readings.

**Set books** Three readers have been prepared for the course which contain most of the set reading. They are: R. Bocock and K. Thompson (eds.) *Religion and Ideology*, Manchester University Press; J. Donald and S. Hall (eds.) *Politics and Ideology*, Open University Press; and V. Beechey and J. Donald (eds.) *Subjectivity and Social Relations*, Open University Press. You need purchase only *Religion and Ideology*, as the other two readers will be supplied as part of the course material.

### DSE202 INTRODUCTION TO PSYCHOLOGY

#### Second level: full credit

This course provides an introduction to psychology which is suitable for all students with an interest in this area. It is a recommended prerequisite for those who plan to take a course such as D307 or D309. It is also an

essential part of the set of psychology courses which is recognized by the British Psychological Society (see Section 1 of this publication).

The course introduces a wide range of approaches and methods in psychology. You will learn to evaluate the models, theories and techniques which are described and will acquire basic skills necessary for psychological research. A theme of the course material is the different ways in which psychology is applied in everyday life.

**Content** The course is presented in two volumes and is divided into eight parts, each dealing with a different set of approaches. Each part is accompanied by a television programme and has an associated assignment. There are also audio cassettes to expand some parts of the course.

**Part 1** introduces some questions about the theory, methods and uses of psychology, which are outlined with the aid of television and audio cassette material.

**Part 2** includes chapters on the development of self, child development and psychodynamics.

**Part 3** is about the foundations of behaviour, and includes chapters on the biological bases of behaviour, learning and conditioning.

**Part 4** looks at similarities and differences between people and includes chapters on intelligence, personality and the humanistic approach. There is also a project unit on personality.

**Part 5** deals with the psychological processes involved in acquiring and making sense of information from the environment. It includes chapters on perception, attention and human memory. There is also a project on attention.

**Part 6** contrasts the individual and social dimensions, with special reference to language, communication and aggression.

**Part 7** examines the applications of psychology, and includes chapters on clinical psychology and autism.

**Part 8** includes a review of the whole course.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [DS261]; [DS262], which this course replaces.

**Recommended prerequisite** [D102]/D103.

**Complementary and related courses** D102; D309; D307; DE304; E206; E362. Please read the Recognition Information Leaflet about the British Psychological Society (see Section 1).

**Assessment** Eight TMAs (50%) of which three will be practical projects, and the examination (50%). Substitution will apply for up to two TMAs but not to TMA 08.

**Broadcasts and cassettes** There are eight TV programmes dealing with the theme of 'Psychology in action' and including material about the work of psychologists, ranging from laboratory scientists to clinical therapists. Two audio cassettes will include discussions by well known psychologists of the controversial issues in psychology.

**Summer school** Course based, giving you an opportunity to complete two projects of your own design in different areas of psychology – social psychology and memory research.

**Students with disabilities** If you have impaired sight you might need some help with the experimental project work.

**Special features** You will be expected to have access to a calculator, and a stop watch would be useful.

### DT200 AN INTRODUCTION TO INFORMATION TECHNOLOGY: SOCIAL AND TECHNOLOGICAL ISSUES

#### Second level: full credit

It has been claimed that information technology will revolutionize our lives over the next decade, and yet how many of us really understand what IT is and what the nature of the supposed revolution is likely to be? How will IT affect you, your family, your workplace and our wider social lives? Debates, vital to our future, about such questions have arisen among many of the leading representatives of our society, and this course attempts to involve you in them.

DT200 is an inter-faculty course that explores some of the social and technological issues arising from the introduction of information technology into our everyday lives. Its aim is to enable you to make informed and critical judgements about these issues and to relate them to your own experience.

This is an introductory course, providing you with the necessary skills and background to proceed to higher level or more specialized aspects of IT, and related technologies, in either technological or social contexts.

The course examines a number of matters associated with the implementation of IT, such as social and material inequalities, the distribution of power within and between societies, and the future of work. It explores the various arguments that have been advanced and gives you the evidence to enable you to make your own assessments. The course considers the social and technological processes involved in the use, control of and access to various forms of IT so that you can make informed judgements relating to its social implications.

You will be expected to spend about 20 per cent of your study time working with a home-based microcomputer system. This will enable you to develop practical skills in the use of IT systems for such applications as databases, document processing, financial models, electronic mail and computer conferencing. The software provided will also give you practical experience of some of the different types of user-interface currently under development.

**Content** The course is presented in seven blocks, each taking about four or five weeks' study. Each block is centred on an IT application area and selected case studies are developed in a *mainstream* text. Specific knowledge or skills relating to technological or social aspects are treated in *tributary* texts. Another text supports the practical activities associated with each block.

**Block 1** *People, technology and issues* surveys the main issues to be covered by the course. The block also provides a brief history of computing and telecommunications and describes some of the new IT systems.

**Block 2** *IT in the home* explores some of the IT systems that are available in the home and examines the role of families in the acquisition and use of IT.

**Block 3** *IT in banking, finance and retailing* describes the role of IT in banking and retailing. Recent developments covered include Electronic Funds Transfer and Point of Sale technology.

**Block 4** *IT in education and training* considers how IT is used to assist in the process of education and how individuals are trained to use it.

**Block 5** *IT in manufacturing* looks at the application of IT within the UK manufacturing sector. Computer-integrated manufacture is considered as one potential strategy. The block discusses changes in the organization of companies resulting from the introduction of CIM.

**Block 6** *IT and government* considers the attitude of government towards legislation and regulations that influence the development and use of IT. The social tributary provides an introduction to the important topics of ownership of information and copyright protection, and to questions about privacy, surveillance and data protection.

**Block 7** *Conclusion: questions and issues* draws together many of the ideas raised in the course and shows how the social and technological viewpoints can be integrated to provide a more balanced analysis of the issues.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** [D102]/D103 or T102. No previous knowledge of IT is assumed and the necessary technological and social science skills are developed within the course.

**Assessment** Seven TMAs (50%), one associated with each of the first six blocks. You will also be required to complete a tutor-marked project about computer-assisted communications. The examination (50%). Substitution will apply to up to two TMAs from TMAs 01–05 and 07 but not to TMA 06.

**Tuition** Part of the tuition will be by electronic communication which will offer electronic mail and computer conferencing facilities for communication both between tutor and student and between students.

**Broadcasts and cassettes** The sixteen TV programmes are an essential part of the course, since many of the blocks use them to introduce the case studies. You should therefore make sure you have access to the programmes or to recordings of them. There are also eight radio programmes in which you can hear some of the leading figures in IT discuss the issues covered by the course. Audio cassettes are also provided.

**Students with disabilities** Visual handicap or impaired manual dexterity may prevent you from completing all of the practical exercises on the microcomputer.

**Computing facilities** You will need continuous access to a microcomputer that meets the specification of the University's home computing policy. See page 4.

A modem is included as a returnable home kit. It is used to connect to the OU ACS computer for part of the practical work and for tutorial conferences. You will need a new style BT jack socket for your telephone to use the modem and you will be paying the phone charges for connections made in this way.

**Set books** There is one set book: R. Finnegan, G. Salaman and K. Thompson (eds.) *Information Technology: Social Issues*, Hodder and Stoughton. This is a specially prepared reader containing selected papers dealing with the social aspects of IT.



# SCHOOL OF EDUCATION

## OVERVIEW

Courses in the School of Education are of interest and value to teachers and non-teachers alike. They cover a range of subjects and disciplines concerned with education both at school and beyond.

### Are you a teacher?

If you are a teacher (or otherwise professionally involved in education), the inclusion of education courses in your first degree profile can serve a dual purpose. Not only do they provide you with a professionally relevant component in your degree, but they also open up opportunities for further study towards an advanced diploma and perhaps a master's degree in education.

Most education courses in the undergraduate programme also appear in the Part A section of the advanced diplomas available in the associate programme. You can count the same courses towards both your degree and the Part A requirements, and you can even choose to complete the advanced diploma before you finish your degree. There are advanced diplomas in four subject areas – Management, Mathematics, Special Needs, Technology – and a professional diploma in Post-compulsory Education. As each has different Part A requirements you will need to take account of these when choosing your undergraduate course. The chart below summarizes the structure of the advanced professional development programme; a more detailed account of the requirements is provided in *Open Opportunities* (see Section 5).

Successful completion of a good honours degree makes you eligible for admission to the MA in Education programme. An Open University advanced diploma also qualifies you for entry to the MA programme (whether

you are a graduate or not) and exempts you from one of the three modules of the higher degree. So careful choice of courses in the undergraduate programme could put you on a ladder leading to more advanced, professionally relevant qualifications.

### Or are you interested in education from another point of view?

If you are not a teacher but are interested in education we can offer lively and varied courses with which to enrich your degree profile. Students embark on education courses from different backgrounds within the University. As the School has no foundation course, no assumptions are made about what you have already studied. Our second-level courses are accessible to all students, whatever subjects they have taken before, and they are all suitable for study straight after foundation level.

### Do you want to become a teacher?

If you want to construct your degree profile so as to improve your prospects of entering teaching, how you do this will depend on the age group you wish to teach, your subject specialism and the course of initial teacher training you want to take. With few exceptions, entry into teaching in schools follows a Postgraduate Certificate of Education (PGCE) course or a Bachelor of Education (BEd) degree through which you gain qualified teacher status (see Recognition Information Leaflet 1.3). Before you reach this stage you will probably want to build up a coherent degree in one or two subject areas, but this should not prevent you from taking some carefully chosen education courses as well. For example, you might wish to anticipate your teacher training by taking a general

course such as E208 *Exploring educational issues*, E206 *Personality, development and learning* or E271 *Curriculum and learning*. Or you might want to look ahead and take advantage of the fact that several of our more specialist courses also count towards advanced diplomas (see above).

Still, before you make any decisions, it would be wise to seek advice about entry requirements from an institution which offers teacher training courses or from the Graduate Teacher Training Registry. A few institutions are developing part-time PGCE courses, most of which last two years and are concentrated in subject areas in which there is a shortage of teachers. Several of these courses are run in collaboration with the Open University and incorporate EP228 *Frameworks for teaching*, which is available in the associate student programme only but can be transferred as a half credit towards the BA degree.

### Choosing a course

In the summaries below we give some indication of how education courses might link into particular degree profiles. These suggestions are only a starting point, and you will need to read the individual course descriptions to see how these courses might relate to your interests and plans.

#### Full-credit courses

There are three full-credit second-level courses that are particularly well suited to the earlier stages of a degree. E208 *Exploring educational issues* offers a view of a wide range of topics in contemporary education, both in and out of school. It is of interest to anyone who has a concern for current educational issues as parent, teacher, school governor or citizen. The course draws particularly on the

language and concepts of the social sciences and so would be a valuable and up-to-date education contribution to a degree profile going in that direction.

E206 *Personality, development and learning* is about developmental and educational psychology and is an important part of the set of courses recognized by the British Psychological Society as the equivalent of a degree in psychology (see Section 1). But whether included in that set or treated as a single course, it provides a lively introduction to the fascinating field of child development and serves as a preparation for the third-level course E362 *Cognitive development*.

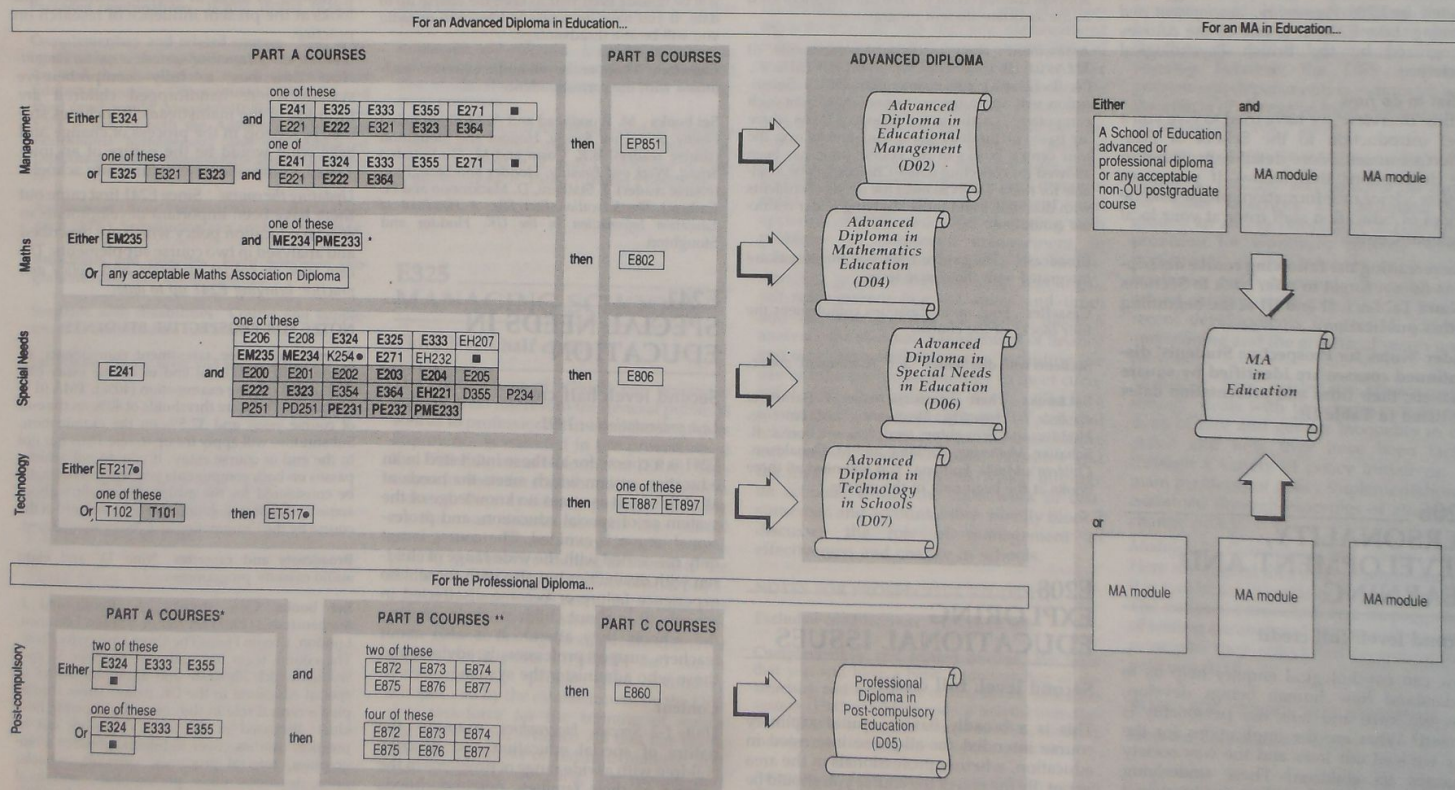
EH207 *Communication and education* is a study of human communication which draws on a variety of traditions not only from the language area but also from media and communications studies. It has a broad appeal and is particularly appropriate for those with interests in arts and social sciences.

#### Half-credit courses

There are several half-credit courses at second level, two of which will be presented for the first time in 1991. E271 *Curriculum and learning* gives an informed and up-to-date account of aspects of school life which are undergoing significant change and so is of great interest to both teachers and parents. EH232 *Computers and learning* looks at the ways in which computers affect learning in all areas of the curriculum and at all stages of the education system.

E241 *Special needs in education* has proved to be a very popular and influential course for those who have a personal or professional interest in an education system that meets the needs of all children. It is an obligatory Part A course in the Advanced Diploma in Special Needs in Education. 1991 is its last

## SCHOOL OF EDUCATION ADVANCED PROFESSIONAL DEVELOPMENT PROGRAMME 1991



Notes Courses in bold appear in more than one diploma. (You may count a course towards a maximum of two diplomas or one diploma and a BA.)

Courses with a grey background have been discontinued but will still be counted.

■ Advanced standing may be awarded for any acceptable non-OU course.

• These, and any course whose number begins with 8, are available only in the associate programme.

\*The range of Part A courses in these two diplomas may be broadened: in particular, M101 may be included in the Diploma in Mathematics Education. Ask the School of Education for more details.

\*\*The regulations about the order in which courses are studied in this diploma are being reviewed. Ask the School of Education for advice.



year of presentation and it will be replaced in 1992 by another half credit, E242 *Learning for all*.

EM235 *Developing mathematical thinking* is intended for students who are concerned with the mathematical education of children. It is one of two Part A courses in the Advanced Diploma in Mathematics Education. If you are interested in this subject you should take careful note of the requirements about access to children that are explained in the course description.

All of the half-credit courses at third level tend to look at defined areas of enquiry more closely and in greater depth. Although few of them have recommended prerequisites, they incorporate a more independent kind of study which makes them better suited to the later stages of a degree profile.

There are two courses in the area of educational management: E325 *Managing schools*, which examines the theory and practice of school management from the points of view of both the manager and the managed, and E324 *Management in post-compulsory education*, which helps you to apply the main concepts and processes of educational management to post-school education in various settings. Both courses have an important place in Part A of the Advanced Diploma in Educational Management, and E324 is also a Part A course in the Professional Diploma in Post-compulsory Education. 1991 sees the last presentation of E324 in this form.

E333 *Policy-making in education* provides an understanding of the context within which educational policies are created. It is related to the educational management courses (and is in Part A of that advanced diploma) and also fits well with social science courses on policy-making and sociology. E333 is also a Part A course in the Professional Diploma in Post-compulsory Education.

E355 *Education for adults* is an introduction to the whole field of formal and informal education for adults and so is of interest to those with a professional concern for this subject and to adult learners – such as Open University students – themselves. It is a Part A course in the Professional Diploma in Post-compulsory Education.

E362 *Cognitive development*, as mentioned above, looks in more detail at some of the areas of developmental psychology first visited in E206 *Personality, development and learning*. Like E206, it is one of the courses recognized by the British Psychological Society.

#### What to do now

In this 'overview' we have tried to give you a brief introduction to the School of Education's courses. More detail is provided in the descriptions that follow. If you want further advice or information, please ask the School of Education staff tutor at your local Regional Centre.

When reading the following course descriptions do not forget to refer back to Sections 1-3 and Tables I, II and III at the beginning of this publication.

Under 'Notes for Prospective Students' discontinued courses are identified by square brackets; their titles and presentation dates are listed in Table III.

## E206 PERSONALITY, DEVELOPMENT AND LEARNING

Second level: full credit

How can psychological enquiry help us to understand how human beings develop, how we learn and how our personality is formed? What are the implications for the way we lead our lives and the way society educates its children? These underlying questions introduce key ideas in educational psychology.

The course draws on your own experiences and examines learning beyond schools and classrooms, so it is of interest to non-teachers as well as to teachers.

### Content

The *Introduction* explores your own perceptions of psychological knowledge as a way of understanding human development and behaviour and introduces some diverse explanations proposed by psychologists.

**Block 1 Human development** examines how we develop and what significant influences there are. Development, here, is studied from several different points of view, particularly the work of Piaget. We consider the educational significance of play and the importance of parent-child relationships for children's emotional and intellectual development.

**Block 2 The nature of learning** How do we learn, remember and act intelligently? How do we learn our mother tongue? How do we learn to read and understand mathematical concepts? These are some of the questions considered in this block.

**Block 3 Personal and social development** Here the direction changes to the description and evaluation of theories of personality and self. There follows an analysis of how we form opinions and judgements about one another and how accurate these are. Some practical implications of this work are to do with children deemed maladjusted at school.

**Block 4 Psychology in practice** Here we concentrate upon the significance and adequacy of psychological interpretations of educational success and failure, examining why some people in our society fail to become literate, why black children are less successful in schools than white children, how girls can become better mathematicians and what are the needs of the dyslexic child.

**Revision and future issues** Finally the main themes of the course are drawn together and some structured revision is provided.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [E201] and [E281].

**Complementary and related courses** E206 is one of the set of psychology courses making up a degree recognized by the British Psychological Society. It is a useful preparation for E362 and it complements DSE202, [D5262]. See Section 1.

E206 contributes to Part A of the Advanced Diploma in Special Needs in Education. You can apply to count a credit in E206 towards this award in the associate student programme.

**Assessment** Three assessment components: (i) TMA01, 03, 05, 07 (28.6%); (ii) project TMAs 02, 04, 06 (21.4%); (iii) examination (50%). Substitution will apply for up to one TMA from each component. Of the seven assessed TMAs, three are based on guided project work spread over the four central blocks of the course (time has been allowed for collecting data). Choices will be available for these TMAs to meet the needs of students with disabilities and those studying under restricted conditions.

**Broadcasts** The twelve television broadcasts are integrated with the course texts.

**Cassettes** Four audio cassettes complement the four blocks of the course.

**Students with disabilities** See 'Assessment' above.

**Set books** There is a course reader, P. Barnes, et al. (eds.) *Personality, Development and Learning*, Hodder and Stoughton, and two set books: R. Schaffer, *Mothering*, Fontana, and M. Donaldson, *Children's Minds*, Fontana. You will need all three books at the beginning of the course.

## E208 EXPLORING EDUCATIONAL ISSUES

Second level: full credit

This is a broadly based, multidisciplinary course intended for all those interested in education, whether professionals in the area or not. By the end of the course you should be able to:

- Apply social scientific method and theories to educational issues.
- Evaluate various forms of educational enquiry and evidence.

- Analyse teaching and learning methods.
- Understand the main bases on which the education system and schools are organized and financed.
- Understand some of the factors associated with different educational provision and achievement.
- Understand how informal educational agencies such as the family, peer groups and neighbourhood work.
- Review the main arguments about the relationships between education, training, work and unemployment.

**Content** The course progresses from child to adolescent to adult, from family to school to work, from the individual to social structure. Prominent themes are myth and reality in education; the tension between formal and informal processes of education; the relationship between an individual's concerns and wider matters. There are seven blocks:

- 1 Introduction
- 2 Family and School
- 3 Teaching and Learning
- 4 The Organization of Schooling
- 5 Equality in Education
- 6 Work, Non-Work and Education
- 7 The course review

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [E200], [E220], EP228 (available in the associate programme only; see Section 5 for further information).

**Recommended prerequisite** Any foundation course.

**Complementary and related courses** E208 replaces [E200] and [E205], though the latter is not an excluded combination. As an introductory course, E208 relates to all of the School of Education's undergraduate courses. You could go on from here to more specialist courses at both second and third levels. As a general issue-based course it would also be useful in providing an educational perspective in any combination of courses.

**Assessment** Seven TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts** Fifteen TV programmes closely linked to the correspondence texts. The seven radio programmes take the form of bulletins to keep you in touch with the most topical issues, and will be remade each year to keep the course up to date. If you have no access to television or radio you will be at a disadvantage.

**Cassettes** There are seven audio cassettes, each linked with the correspondence texts.

**Set books** M. Woodhead and A. McGrath (eds.) *Family, School and Society*, Hodder and Stoughton (course reader), B.R. Cosin and M. Flude (eds.) *School, Work and Equality*, Hodder and Stoughton (course reader), J. Statham, D. Mackinnon and H. Cathcart *The Education Fact File: A Handbook of Education Information in the UK*, Hodder and Stoughton.

## E241 SPECIAL NEEDS IN EDUCATION

Second level: half credit

Last presentation in 1991

E241 is a course for all those interested in an education system which meets the needs of all children. It assumes no knowledge of the system or of special education, and professional jargon is avoided. The course is not only concerned with the wide range of children with disabilities but also with those who experience failure or become disaffected in schools. It is about children, their families, the schools they attend. It is also about teachers, support professionals, advisers and those who administer the system.

### Content

**Units 1-2 Special biographies** examine the nature of special education and describe children with a wide range of problems in the context of their families, neighbourhoods and schools.

**Unit 3 Family views** examines early intervention by professionals and how they can both help and constrain family responses to

handicap. The unit also studies the role of the family as an educator.

**Unit 4 Education for adult life** discusses the extent to which children are capable of and prepared for economic, social and intellectual independence when they leave special education.

**Units 5-6 A special curriculum?** introduce the institutions and content of special education by charting the many complex factors that contribute to the quality of life in special institutions.

**Unit 7 The professionals** looks at professional involvement with handicapped and troubling children and charts the historical emergence of a variety of professions.

There is no Unit 8.

**Unit 9 Origins** traces how the present system developed and the factors which produced change. It examines the legislation and moral debate on which Acts were based.

**Unit 10 National perspectives** Through a study of special education in the USA, Norway and Italy, this unit explores the reasons for the diversity of arrangements and the thinking behind recent changes.

**Unit 11 Biology and handicap** looks at the implications of biological knowledge for special education. It examines the legitimate application of biological principles in devising curricula and describes arguments about the social origins of some biological impairments.

**Unit 12 Psychology and special education** describes the influence of psychology on special education concentrating on the areas of behaviourism and child development.

**Unit 13 Handicap is social** argues that all handicaps depend on cultural conditions which are independent of the difficulties of a particular individual, and also discusses clinical and sociological points of view.

**Unit 14 Eradicating handicap** analyses medical, educational, social and political approaches to prevention. It looks at screening and early intervention in education, and policies towards learning difficulties in Scotland.

**Unit 15 Research and progress in special education** describes and evaluates research into a number of areas of special education and looks at the present influence of research on practice.

**Unit 16 An alternative system: a special imagination** describes a fully comprehensive system where handicapped children are included in the mainstream. It includes studies of schools in the process of change and asks what would be the nature of an integrated, comprehensive community school?

**Updating the course** Since E241 first came out there have been important developments in special education policy which are described and analysed in two course supplements: *The new laws on special education and Policy and practice: bringing E241 up to date*.

### NOTES FOR PROSPECTIVE STUDENTS

**Assessment** Three assessment components: (i) TMAs 02-04 (45%); (ii) end of course essay (05) (15%); and (iii) the examination (40%). TMA 01 is formative. There are thresholds of 40% on the end of course essay and 37.5% on the examination. Substitution will apply for up to one TMA but not to the end of course essay. If you do not achieve passes on both components you will not normally be considered for the award of a credit without some further investigation into your mastery of the course by the Examination and Assessment Board.

**Broadcasts and cassettes** Nine TV and eight audio cassette programmes.

**Set books** Case studies: A. Booth and J. Statham (eds.) (1982) *The Nature of Special Education*, London, Croom Helm/The Open University Press. The course team has gathered together 51 case studies which illustrate and illuminate issues in special education in the UK today. These studies play a central role in the course by showing how ideas discussed in the units can work out in practice. Studies cover individual children's biographies, referral processes, curricula, schools, units, teachers, other professionals, and local authorities. Course reader: W. Swann (ed.) (1981) *The Practice of Special Education*, Oxford, Basil Blackwell/The Open University Press. This is a collection of research and review papers, either selected or commissioned for the course.



## E271 CURRICULUM AND LEARNING

### Second level: half credit

This course, presented for the first time in 1991, explores educational issues that have aroused widespread interest and controversy in recent years. How can children's capacity to learn be extended? How can new developments and research in cognitive psychology be made relevant to learning? What are the origins and characteristics of the national curriculum in England and Wales and how have they been translated to the Scottish and Northern Irish context? What is the evidence about standards? What constitutes an effective school? How do other countries organize their curriculum? These are some of the questions raised.

No previous knowledge is required and the course is suitable for all those who have an interest in the area. Parents and governors, for example, will find it a valuable account of many of the significant educational issues of the day. Teachers and lecturers will find it a good way to keep up to date in a world of rapidly changing policy and research.

**Content** The course is divided into three parts, examining (i) learning, (ii) how successful teaching and learning can be assessed, and (iii) how schools and other educational institutions can be judged and evaluated.

Many case studies are provided both in the text and in the accompanying television series. Each part of the course has a theme that raises general questions about the social and political context of schooling in the 1990s. These include the integration of children with special educational needs into mainstream schools, the debate about the teaching of history and the core subjects of English, mathematics and science, and the effect of equal opportunities policies on the school curriculum. Comparative material examines schooling and education in Japan and a selection of European countries.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [E203], [E204], [E283].

**Complementary and related courses** E271 is an introduction to the study of curriculum and learning and therefore relates to all the School of Education courses. Other courses at second and third level would complement this new course. E271 is part of both the Advanced Diploma in Educational Management and the Advanced Diploma in Special Needs in Education (see Section 5).

**Assessment** Four TMAs (60%) and the examination (40%). Substitution will apply to one TMA.

**Broadcasts and cassettes** Eight television programmes and four audio cassettes.

**Students with disabilities** Course and supplementary materials are not available on tape.

**Set books** Study texts and four readers.

## E324 MANAGEMENT IN POST-COMPULSORY EDUCATION

### Third level: half credit

Last presentation in 1991

E324 introduces the main concepts, processes and issues of educational management and helps you apply them to the various settings of post-school education. After completing the course you should be able to evaluate and analyse the organization, management and development of provision in the post-compulsory sectors of education.

The course is of interest to:  
• Academic and administrative staff involved with technical, academic and work-

related education in polytechnics and universities, in sixth form and tertiary colleges, in further and adult education and other institutions of post-compulsory education.

- LEA advisers and administrators.
- Those working in examining and validating bodies.
- Students of government, politics, management and public administration.
- People with a general interest in education.

E324 contributes to Part A of the Advanced Diplomas in Educational Management and in Special Needs in Education; and to Part A of the Professional Diploma in Post-compulsory Education. You can apply to count a credit in E324 towards one such award in the associate student programme (see Section 5).

**Content** E324 is based firmly on the premise that good management is vitally important to the successful operation of colleges, polytechnics and universities. Financial constraints and a difficult political and economic climate make management even more demanding and important. The maintenance of educational opportunities and standards and the morale of both staff and students are big challenges for post-compulsory education institutions. Throughout the course, theoretical and conceptual approaches are illustrated by examples of practice in one or more of these institutions. Most of the blocks present a multi-media case study to extend and test the analyses given.

The course, which has been brought up to date to take account of substantial changes in the field of post-compulsory education, including the Education Reform Act 1988, is divided into six blocks of different length:

- Block 1 *The student perspective*
- Block 2 *The policy context*
- Block 3 *Policy-making, structures and leadership*
- Block 4 *Curriculum management*
- Block 5 *Managing staff*
- Block 6 *Managing for change*

#### NOTES FOR PROSPECTIVE STUDENTS

**Complementary courses** E324 is a 'partner' to E325 and complements E335 and E355.

**Assessment** TMAs 01-04 (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts and cassettes** Eight TV programmes and two audio cassettes all form part of integrated case studies or demonstrate important management processes.

**Set book** A course reader prepared by members of the course team is used throughout the course: O. Boyd-Barrett et al. (eds.) *Approaches to Post-school Management*, Paul Chapman Publishing.

## E325 MANAGING SCHOOLS

### Third level: half credit

The effectiveness of schools has become a topic of great interest to the general public as well as to professionals in our schools and its importance is reflected in the provisions of the 1988 Education Reform Act (ERA). This course looks at the contribution management makes to the way schools perform, drawing on the most recent research into school management. Management has become a priority in in-service training as a result of the findings of HMI Reports, other official publications and numerous research projects; this priority is also demonstrated by the importance given to management qualifications for promotion to posts in middle and senior management in primary and secondary schools, and by the establishment by the DES of a task-force for the training of senior managers in our schools. All this has taken place in a context of reduced material and staff resources, affecting the morale and motivation of teachers at a time when schools are being closely scrutinized and appraised by parents, employers and society in general. The ERA itself has serious implications for the management of our schools. Thus the

importance of management and leadership at all levels of school life is being stressed.

E325 is designed to be in the vanguard of thinking about school management and has been brought up to date to take account of the ERA. It has a practical approach in its emphasis on the interrelationship of theories, practices and skills in school management. It is intended for teachers and others involved in school management, including governors and parents, and shows how theoretical approaches and recent research can contribute to our understanding of real situations in primary and secondary schools. The course uses case-study material extensively in order to ground the discussion of management theory and practice in realistic school settings. Many experts have contributed to the course.

The aims of the course are to:

- Increase your knowledge of management processes in schools and to stress their importance in meeting pupils' educational needs.
- Demonstrate the relevance of various theoretical approaches to management practice.
- Develop an awareness of the need for a practical understanding of management activities and the special significance of the tasks, styles, strategies and skills of leadership in school.
- Integrate theory with your own experiences of management and enhance your identification with practical management situations in primary and secondary schools through representative case studies.
- Show the relevance of management to the curriculum and to pupils' welfare.
- Discuss the deployment, selection and development of staff and the use of other resources.
- Assess the nature of school effectiveness in relation to change.
- Analyse the main external factors which affect the management process in schools.

E325 counts towards the Advanced Diploma in Educational Management (see Section 5).

**Content** The course is divided into seven blocks. Block 1 examines the relationship between the practice and theory of school management, using case studies of a primary and secondary school. Block 2 looks at leadership, decision-making and effectiveness in schools and the key management roles of staff. Block 3 turns to the area of managing students and seeing how their academic, social and personal needs can be met by those who manage the curriculum, and the effect this has on behaviour and on curricula. Block 4 deals with the area of managing teaching and non-teaching staff, looking at careers in teaching and management, the selection, development and appraisal of staff, and ways of dealing with problems in personnel management in schools, including handling conflicts, understanding group behaviour (e.g. meetings), self-management (e.g. of stress and time) and the management of teams. Block 5 analyses the internal management of finance, and other non-staff resources, including the use of information technology to meet curricular and management needs. Block 6 investigates the management of external relations in different types of schools, taking into account socio-economic variables and the many external agencies which impinge on schools, within the framework of consumerism and accountability. Finally Block 7 discusses the role of management in effectiveness and change in schools.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [E321], [E323].

**Complementary and related courses** We hope that you will have a basic understanding of the structure and operation of the British education system. E335 would provide a helpful introduction. E324 is a 'partner' course to E325, covering management in the post-compulsory sector.

**Assessment** Four equally weighted TMAs spread throughout the course (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts and cassettes** Most of the eight TV programmes and the two one-hour audio cassettes are associated with the case studies of school

management. There are also two radio programmes which include introductory and updating material.

**Students with disabilities** Course and supplementary materials are not available on tape.

**Set books** A course reader, R. Glatter et al. (eds.) *Understanding School Management*, Open University Press, prepared by members of the course team, which is used throughout the course. S. Maclure (1989) *Education Reformed* (second ed.) Hodder and Stoughton.

## E335 POLICY MAKING IN EDUCATION

### Third level: half credit

This course will enhance your understanding of the emergence, development and implementation of educational policy by:

- Examining the importance of the historical, social and political context for educational policy initiatives.
- Explaining and discussing different points of view on educational policy-making illustrated by case studies.
- Requiring you to apply the chosen analytical approaches to the examination of a policy issue within a structured project.

E335 contributes to Part A of the Advanced Diplomas in Educational Management and in Special Needs in Education and the Professional Diploma in Post-compulsory Education.

**Content** The course has a core of five modules of main text, with additional printed material and four readers.

**Block A General policy making**

**Module 1** *Introducing educational policy* introduces a wide range of theoretical approaches and explanations about how educational policy comes to be made.

**Module 2** *The policy makers: local and central government* These two main groups of policy-makers are introduced: central government through the DES and civil servants; and local government through LEAs and interest and pressure groups (teachers, parents and governors). The relationship between the DES and other government departments is examined, as are the effects of change in local political control on important policy areas.

**Block B Examples of educational policy**

**Module 3** *Industry, vocationalism and employers' needs* describes the historical background to and development of educational provision for workforce training, looking particularly at the tensions between the academic and vocational elements of the school curriculum. It considers in detail the recent developments in post-16 education and training and the growth of youth unemployment.

**Module 4** *Race, gender and education policy making* deals with the emergence of questions of race and gender inequality in education and how they have been tackled through a variety of policy initiatives. The main problems of policy implementation are examined through examples of attempts to change policy.

**Module 5** *Curriculum and policy making* Here it is argued that what is taught and how it is taught are essentially political decisions. The national curriculum and its programme of testing are analysed in terms of the policy principles they reflect and centralization of policy-making.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [E222].

**Assessment** Five components: (i) TMAs 01 (13%); (ii) TMA 02 (13%); (iii) TMA 03 (10%); (iv) TMA 04 (14%); (v) examination (50%). Substitution will apply for up to one TMA, but not for TMA 04.

**Broadcasting and cassettes** Four TV and two radio programmes, and two audio cassettes.



**Set books** M. Arnot (ed.) *Race and Gender: Equal Opportunities Policies in Education*, Pergamon Press. R. Dale (ed.) *Education, Training and Employment: Towards a New Vocationalism*, Pergamon Press. I. McNay and J. Ozga (eds.) *Policy Making in Education: The Breakdown of Consensus*, Pergamon Press. R. Moore and J. Ozga (eds.) *Curriculum Policy* (working title).

## E355 EDUCATION FOR ADULTS

**Third level: half credit**

*Last presentation in 1991*

This course is an introduction to the whole field of education for adults. This is not the same as what has traditionally been regarded as 'adult education', but includes further education, higher education, community education and other less formal kinds of provision. The course assumes no specialist knowledge, but is designed to make use of the varied experience which students in this field will have. You are, therefore, allowed some choice in your study, both through selection from the materials included and through carrying out a project assignment on an agreed subject of interest (which may be related to your work).

E355 (and E324 and E333) can be linked with other material to form the Professional Diploma in Post-compulsory Education. You can apply to count E355 towards this award in the associate student programme (see Section 5). E355 has also been approved as a Part A course for the Advanced Diploma in Educational Management.

### Content

Blocks A and D are tackled by all students. In the middle of the course you are encouraged to concentrate on either Block B or Block C. You will be expected to be able to answer questions on all blocks in the examination.

#### Introductory block

**Block A** *Concepts of adult education* provides a common background to the field of study. A wide variety of topics is discussed, including:

- Alternative definitions of the field of study.
- The idea of adult learning projects.
- The different behaviours and methods adopted by teachers and learners in order to promote learning.
- The institutions which offer education for adults in the United Kingdom.
- Adult development.

**Block B** *Adult learning – individual, group and community* The issues in this block are presented within a three-fold framework:

- 1 The nature of the learning situation or transactional mode.
- 2 Educational processes.
- 3 Educational or learning models.

**Block C** *The institutions* Like Block B, this block is in three parts. Part 1 examines local forms of institutional provision. Part 2 considers the role of the university in education for adults. The last part considers whether national or local initiatives are more appropriate or effective in providing educational opportunities for adults.

**Block D** *Present and future* looks at some matters which are of pressing concern to adult educators now and for the future.

### NOTES FOR PROSPECTIVE STUDENTS

**Complementary and related courses** You will find the multidisciplinary full-credit courses [E200] or [E208] a useful introduction, but neither is a prerequisite. E324 and E333 may also be linked to the course; see above.

**Assessment** You will be expected to complete a dissertation of about 5,000 words (the equivalent of two TMAs) on a subject of your choice. You must also complete two TMAs and a written examination on the whole course.

Relative weightings of the various components are: the two TMAs (01.03) 26%, the project (TMA 04) 24%, the examination 50%. Substitution will apply for up to one TMA but not to the project. TMA 02 (the project outline) is formative and not used for assessment.

**Broadcasts and cassettes** Eight TV programmes and six 40-minute radio programmes. One 60-minute audio cassette.

**Set books** There are two course readers: M. Tight (ed.) *Education for Adults 1: Adult Learning and Education*, Croom Helm. M. Tight (ed.) *Education for Adults 2: Educational Opportunities for Adults*, Croom Helm.

## E362 COGNITIVE DEVELOPMENT: LANGUAGE AND THINKING FROM BIRTH TO ADOLESCENCE

**Third level: half credit**

The aims of this course are to enable you to:

- Survey and evaluate theoretical approaches to the study of child development and related methods and results.
- Describe the main changes in performance and learning potential during the course of individual development.
- Examine and evaluate situations which influence cognitive development, both within and outside the school context.
- Structure such situations in order to promote cognitive development and learning.

### Content

**Block 1** *Cognitive development in infancy* includes a discussion of genetic and environmental factors in development and how infants learn and perceive the world.

**Block 2** *Language development* covers research into the process by which children develop language ability.

**Block 3** *Cognitive development to adolescence* is about research into the development of abilities up to the start of adolescence.

**Block 4** *Cognitive development in adolescence* deals with the transition into adult modes of thought, examining changes in cognition in the period 12–16 years.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** [D102]/[D103] or [DSE202]/[DSE262] or E206. Certain areas of knowledge are required: the most important of these is a basic understanding of descriptive and analytical statistics used in the social sciences, psychological research methods and Piagetian concepts. These will have been adequately covered if you have successfully completed one or more of the courses listed above.

**Recognition by British Psychological Society** E362 may be taken by students who wish to obtain recognition of their degree by the British Psychological Society. See Section 1.

**Assessment** TMAs 01-03 (Blocks 1 to 3) (37.5%); TMA 04 (12.5%) is a report on the project; the examination (50%). All TMAs are equally weighted; there is a threshold of 40% for TMA 04 (which is not substitutable); one of TMAs 01-03 is substitutable.

**Project** All students collaborate in a course project which involves work with at least two children aged 4-8 years. Collected data are pooled centrally and partially analysed. You receive these data and analyses and complete a final analysis and report (TMA 04).

**Broadcasts and cassettes** The seven TV programmes and four audio cassettes cover several areas not extensively dealt with elsewhere in the course. Colour TV would be an advantage.

**Students with disabilities** Those with impaired vision, speech or hearing may find difficulty in adequately completing the project work. As access to children will be necessary, students who have restricted mobility may have problems unless they can arrange easy access to their subjects.

**Preparatory reading** You could begin to read one or more of the course readers. Another useful book that relates to much of the course is M. Donaldson (1978) *Children's Minds*, Fontana/Open Books.

**Set books** Each of Blocks 1-3 has its own associated reader, which is a central part of the course. 1: J. Oates and S. Sheldon (eds.) *Cognitive Development in Infancy*, Lawrence Erlbaum. 2: A. Lock and E. Fisher (eds.) *Language Development*, Routledge (2nd edn.). 3: K. Richardson and S. Sheldon (eds.) (1988) *Cognitive Development to Adolescence*, Lawrence Erlbaum.

## EH207 COMMUNICATION AND EDUCATION

**Second level: full credit**

EH207 is a study of human communication with particular reference to teaching and learning. It examines many of the questions which have informed the development of the national curriculum and so is of particular relevance to educators, but is also of interest to others who wish to pursue the study of language, media and communication. The course's topics include language variation, language learning and teaching, communication skills, communications media, communications networks and policy-making for language and communications in education.

**Content** The course is divided into an introductory unit and ten blocks, the contents of which are as follows.

**Introductory unit** A short introduction, built around a television case study, exploring the nature and diversity of human communication.

**Block 1** *Language and communication* examines the structure and functions of human language as one among many communication systems and investigates how people use these systems in combination to produce and interpret meanings.

**Block 2** *Language variation* looks at how language varies – between speakers and, even in the speech of the same speaker, from one situation to another. We also discuss language and social identity: how people judge others on the basis of their accent or dialect and how, in turn, language can be an important signal of the social groups speakers belong to.

**Block 3** *Language and inequality* examines how social inequalities are reflected in language and also how, arguably, language may help to sustain them. We have chosen three topics through which to explore this theme: conversation and control; bias in language; and the development of the standard form of English.

**Block 4** *The development of communication* examines how children learn to use language and other forms of communication. How does early language develop, for instance? How do children in this culture learn to be literate? Do different kinds of pre-school and out-of-school experience affect children's linguistic development?

**Block 5** *Communication and teaching* looks first at language teaching in schools. Most children are competent language users by the time they come to school. How do schools build on this knowledge? Or is there sometimes a conflict of interests between home and school? Does reading need formal instruction, or can it be 'taught like a cold'? We look also at communication between teachers and children (and the occasional misunderstandings that occur). Finally, we examine formal and informal attempts to extend adults' communication skills.

**Block 6** *Communication, media and society* examines the role of mass media in society (including questions of stereotyping and bias) and how one can analyse the effectiveness of communication through different media. You will also explore different methods used for media analysis.

**Block 7** *Literacy and the print media* looks at the growth of literacy, and at uses and problems of literacy in contemporary society. We consider the relationship between literacy and formal education, and also the influence of the new (non-print) media. We go on to consider text design and how this contributes to effective communication.

**Block 8** *Media for education* tackles matters such as the role of educational broadcasting, the place of media education, and the relationship between the different media, their distinctive symbol systems and how different people learn from media. The block also examines the consequences of new technology such as the microcomputer.

**Block 9** *The social organization of communi-*

cation looks at professional communication and factors in communication within and between social organizations and groups. It explores the implications for communication in education, examining two topics: the dissemination of specialized information and the role of communication in organizational innovation.

**Block 10** *Language, communication and the state* considers national (and local) policies that affect language and communication in education. As a point of comparison with Great Britain, we also examine the effects of formal communication policies in a developing country (Samoa) and a developed country (Canada).

### NOTES FOR PROSPECTIVE STUDENTS

**Assessment** Eight TMAs (50%) and the examination (50%). Substitution will apply for up to two TMAs.

**Broadcasts and cassettes** There are twelve TV programmes, three of which are particularly suitable for recording on video for later analysis. We also use audio cassettes as an important teaching device. These audio-visual components provide case studies and other illustrative material as well as material for analysis. There are also two radio programmes.

**Students with disabilities** If you have a severe hearing or visual impairment you may be at a disadvantage. Transcripts are not available for one of the audio cassette bands, illustrating the sounds of English. Some of the television programmes are closely integrated with unit texts and two programmes provide material for further analysis by students.

**Set books** There are two course readers: O. Boyd-Barrett and P. Braham (eds.) *Media, Knowledge and Power*, and B. M. Mayor and A. K. Pugh (eds.) *Language, Communication and Education*, both published by Croom Helm; and a specially written 'method book' for the first half of the course: D. Graddol, J. Cheshire and J. Swann *Describing Language*, Open University Press. The other set books are A. W. Bates *Broadcasting in Education: an Evaluation*, Constable. P. M. Greenfield (1984) *Mind and Media: The Effects of Television, Computers and Video Games*, Fontana. B. Tizard and M. Hughes *Young Children Learning: Talking and Thinking at Home and at School*, Fontana. P. Trudgill *Sociolinguistics: an Introduction to Language and Society* (revised edn.), Penguin.

## EH232 COMPUTERS AND LEARNING

**Second level: half credit**

This course is about learning; it is not about computers. More specifically, it is about how computers can help or sometimes hinder the learning of subjects in all areas of the curriculum and at all stages of the educational system, primary, secondary, colleges and universities.

The course looks at learning and the ways in which computers affect it, how curricula are developed and controlled, how information technology affects the role of the teacher or educator, how the computer can promote, enhance or interfere with learning. The methods of analysis used are historical, socio-political, evaluative, theoretical and through case studies, and topic areas include mathematics, science, language and humanities. Themes running through the course are knowledge and control, gender and special education.

The course is taught in three sections and a large part of the assessment will reflect your work on a project with learners using computer-based learning.

We will give you experience of using selected educational applications; help you understand how social and political contexts influence the use of computers in education; give you experience in analysing and evaluating particular programs; and relate research on learning, cognition and communications to the use of computers in education.

**Content** The three parts of the study year are as follows (the middle section is the



longest to allow extra time for the project work).

**Learning through computers** Here you explore the contribution computers can make to learning in particular topics, with a small project as the first assignment.

**Computers, cognition and communication** covers the use of computers in relation to current theories of learning and communication, with a two-part project for the next two assignments.

**Computers and learning in practice** You will examine the possibilities and limits of four ways of using computers in education – with hypertext, with a Microworld, for special education and through computer-mediated communication. There is one assignment.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** You should have basic familiarity with your microcomputer, which must meet the Open University specification (see page 4). You should know how to format and copy disks, and how to install and use software.

**Complementary and related courses** DT200, D309, DSE202, E206, E241, T102.

**Assessment** Four TMAs including a two-stage project, and the examination. Substitution will not be allowed for the project.

**Cassettes** One three-hour video and four 90-minute audio cassettes.

**Computing** You must have easy and regular access to a computer that meets the specification of the University's home computing policy. Dual disk drives or a hard disk, while not essential, are more convenient for this course. If you already own a modem you can continue to use the computer conferencing facility on the University mainframe computer. Twelve floppy disks of software are part of the course material.

**Students with disabilities** There is a lot of practical work: using a keyboard, sometimes guided by

audio cassette; video for observation work; project work with learners. Impaired eyesight or manual dexterity might prevent you from completing all this practical work. Course and supplementary materials are not available on tape.

**Preparatory work** You should make yourself familiar with the computer if it is new to you.

**Set books** A reader is provided with the course units: O. Boyd-Barrett and E. Scanlon (eds). *Computers and Learning*.

**Special features** You will need access to a small group of learners (of any age) at some stages of the course.

## EM235 DEVELOPING MATHEMATICAL THINKING

### Second level: half credit

Last presentation in 1991

**Note** Before deciding to apply for this course you must be certain that you will be able to work for between 10 and 15 hours with a group of not less than six children over a period of two or three weeks during the school summer term.

EM235 is intended for those who are concerned with the mathematical education of children between the ages of 5 and 14. It is likely that many will be practising teachers, but others with regular and frequent access to children in this age range would also be able to undertake the course. No mathematical qualifications are assumed. Many teachers working with this age range are not mathe-

matics specialists in any way, even though part of their responsibility is to teach mathematics. The course is intended to be well suited to the needs and concerns of such teachers, as well as to those with more specialized backgrounds.

EM235 contributes to Part A of the Advanced Diplomas in Mathematics Education and in Special Needs in Education. You can apply to count a half credit in EM235 towards one such award in the associate student programme.

**Content** The nature of needs and concerns emerges very clearly from several recent surveys carried out by the Inspectorate, and the Report of the Cockcroft Committee, *Mathematics Counts*, among others. There are two general problems. One of these is that many children find it very hard to remember how to carry out various mathematical procedures despite having spent considerable time in practising them. The other is that they find it very difficult to apply the mathematics they do know. Insights into why these problems are so persistent come from several sources. One of these is the psychology of learning. Another is the nature of the mathematics itself, while a third is provided by the attempt to identify just what is involved in effective mathematical thinking. Not one of these three approaches is sufficient on its own, but taken together they are a powerful means both of identifying the causes of the problems and of remedying them. The main aim of the course is to do just that, so that it will be easier to see how to develop genuine mathematical thinking in children. It will emerge that activity and discussion play a vital role in this process.

The course takes four traditional school topics (subtraction, measuring, algebra and fractions) and uses them to develop several frameworks within which to view the relationship between the effective teaching and

effective learning of mathematics. You will apply general principles with a group of children and bring them together in the preparation of a project in a topic of your own choosing. The course draws heavily upon video sequences of children learning mathematics in schools. Time is also given to developing and reflecting on your own mathematical thinking processes.

#### NOTES FOR PROSPECTIVE STUDENTS

**Complementary and related courses** EM235 is a natural complement to ME234. The two courses have been planned as a pair and are the only two courses whose particular concern is mathematics education. These two courses form Part A of the Advanced Diploma in Mathematics Education. For details of the Part B course you should write to the Central Enquiry Service (see also Section 5). In a more general education context EM235 relates well to such courses as E206, E208, E241 and EH207.

**Assessment** There are three assessment components: (i) TMAs 01-02, each consisting of three questions (25%); (ii) the project, consisting of two TMAs (04 and 05), one an unassessed project outline and one the final report (25%); and (iii) the examination (50%). Substitution will apply for up to one TMA in component (i) but not to the project. If you do not attain the threshold of 20% on the project you will not normally be considered for the award of a credit without further investigation of your mastery of the course by the Examination and Assessment Board.

**Cassettes** Two returnable video cassettes and four audio cassettes.

**Students with disabilities** If you have a visual handicap you may have difficulty with the taped material and are advised to ask the Office for Students with Disabilities for advice. Course and supplementary materials are not available on tape.

**Set book** A course reader to be purchased at the beginning of the course and used throughout: A. Floyd (ed.) *Developing Mathematical Thinking*. Addison-Wesley.



# MATHEMATICS

## OVERVIEW

Most of the courses produced by the Mathematics Faculty fall into four main areas: pure mathematics, applied mathematics, computing and statistics. M101, the mathematics foundation course, provides introductory mathematics for all these areas, and each of them is followed up in the corresponding second-level course. Subsequently there is sufficient choice to enable you to complete a degree in mathematics alone, choosing courses from pure and applied. If you wish to concentrate on computer science you will find that combining courses produced by the Mathematics Faculty with some of those from the Technology Faculty should meet your requirements. If you need a profile including statistics, the Faculty has courses at both second and third level in this area.

The main offerings at second level reflect this flexibility:

- M203 *Introduction to pure mathematics*
- MST204 *Mathematical models and methods*
- M205 *Fundamentals of computing*
- M245 *Probability and statistics*

M203, the full-credit second-level course in pure mathematics, has M101 as a recommended prerequisite. The topics covered in the course are linear algebra, group theory, geometry and analysis. The nine linear algebra and group theory units and four geometry units build on the algebra and geometry in Blocks IV and VI of M101; while the ten analysis units build on Block III of M101, developing further calculus techniques as well as placing the foundations of calculus/analysis on a firm theoretical basis.

M203 serves as a prerequisite for the third-level pure mathematics course M332 *Complex analysis*. M203 is also a preferred preparation for M381 and M386, and can be used as an alternative to MST204 to prepare for M371.

MST204, the full-credit second-level course in applied mathematics, has M101, MS283 or TM282 as recommended prerequisites. About half the units are about mathematical methods, developing further both calculus and matrix techniques, and the other half are about the use of mathematical models that employ such methods to solve real problems. The work on models subdivides into nine units on mechanics, two on non-mechanical models, and four weeks of project work in which you construct your own mathematical model for a chosen problem. The course serves as a prerequisite for the third-level course SM355 *Quantum mechanics*, and is good preparation for SMT356 *Electromagnetism* and S354 *Understanding space and time*. It is also a prerequisite for MST322 *Mathematical methods and fluid mechanics* and for M371 *Computational mathematics*.

M205, the full-credit second-level course in computing, does not have M101 as a prerequisite; it may be preceded by any foundation course. It is designed to be more than a general awareness course and lays a thorough foundation for further study of computer science: it concentrates on a rigorous approach to the development of computer programs using a structured top-down approach, although other important subject areas within computer science are introduced, such as operating systems, information systems and software engineering. The course serves as a prerequisite for the third-level computer science courses M353 *Programming and programming languages*, M355 *Topics in software engineering* and M357 *Data models and databases*.

The half-credit course M245 *Probability and statistics* has M101 or MS283 as a recommended prerequisite. It is designed to provide a thorough foundation in probability and statistics. The idea and practice of simulation are exploited, along with familiar random processes from real life, to build a good working knowledge of simple probability models, their underlying distributions, and the essential ideas of making inferences from statistical data. M245 is the recom-

mended prerequisite for the two third-level courses M343 *Applications of probability* and M345 *Statistical methods*.

If you require what might be described as a broad BA degree in mathematics you would be well advised to take all of the above courses. The order in which the courses should be taken depends very much upon you, but you should bear in mind that:

- The two full-credit courses M203 and MST204 both have a summer school.
- Two half credits taken in the same year demand more effort than one full credit.
- Students on M205 are expected to spend two to three hours each week throughout the course on the practical component.

With M101 these courses make up 4½ credits, and if you do a second foundation course, perhaps S102 or T102 to accompany the applied mathematics, this would bring the total to 5½. If the remaining half credit is to be taken in the broad area of mathematics, the two possibilities are either to broaden your degree or to attempt some slight degree of specialization.

If you decide to broaden your degree then some suitable courses to consider are:

MA290 *Topics in the history of mathematics*, which provides an introduction to the history of mathematics through a study of various historical texts, from Babylonian tablets to twentieth-century views. This course is suitable both for broadening a mainly mathematical degree and also for students who have taken few, if any, mathematics courses, since it introduces the history of several mathematical topics with a minimum of prerequisites.

TM222 *The digital computer* complements M205, and provides an understanding of the principles of operation and organization of a small digital computer (both mini and micro) through first-hand experience.

MDST242 *Statistics in society* complements M245 by presenting statistics in the context of everyday problems. The approach is less mathematical than that of M245 and there are no formal prerequisites. As an interdisciplinary course, MDST242 concentrates on applying statistical ideas and interpreting statistical results.

M261 *Mathematics in computing* complements M205 by introducing mathematical ideas necessary for a formal approach to computing. It concentrates on the mathematics relevant to the systematic production of computing software. The use of the mathematics for describing computing ideas is illustrated throughout. M261 requires one of M101, TM282 or MS283 as a prerequisite, and can be used as a prerequisite for M355, as well as providing material valuable for other third-level computing courses such as M353. M261 is primarily intended for students who hope to specialize in computing, but is also suitable for those mainly interested in pure mathematics, for whom it provides a 'mathematical' view of computing.

TM361 *Graphs, networks and design* is a wide-ranging course covering such topics as electrical and related networks, the geometry of tessellations and transport planning. This is one of the very few third-level courses which has no specific second-level mathematics courses as prerequisites. Its choice of topics has made it popular with teachers of modern mathematics syllabuses as well as with people who are interested in applications of pure mathematics.

If you wish to specialize by taking third-level mathematics courses we should warn you that with very few exceptions (TM361 and possibly M357) they are more difficult than the second-level courses in the same way that second-level courses are more difficult than the foundation course. For this reason you are advised not to attempt a third-level course unless you have passed the recommended prerequisite(s) with at least a Grade 3 pass and preferably a Grade 2. It is, however, possible to specialize to some extent in each of the four areas mentioned

below. The following notes are only on courses central to these areas. For a complete list of related courses you should consult the Tables of Related Courses.

### Pure mathematics (prerequisite M203)

M332 *Complex analysis* This course generalizes the analysis in M203 for functions of a real variable to functions of a complex variable. It brings in the topology of the plane and the geometry of functions as mappings, and applications to the evaluation of integrals.

M381 *Number theory and mathematical logic* This course is in two separate halves; one studies the idea of mathematical logic (which underpins all of mathematics) and the other is an introduction to number theory (a perennially fascinating subject to everyone interested in mathematics).

M386 *Metric and topological spaces and geometric topology* This course is in two separate but related halves; one introduces the idea of (point set) topology and metric spaces as a natural extension of the ideas of analysis in M203 and the other studies these topological ideas from a geometric viewpoint (along the lines of the geometry units in M203).

### Applied mathematics and mathematical physics (prerequisite usually MST204)

MST322 *Mathematical methods and fluid mechanics* Part of the course is about using mathematical models to describe some flows of real fluids and the other part is concerned with the development of various mathematical methods which prove useful in fluid mechanics and other branches of applied mathematics.

MS323 *An introduction to non-linear dynamics* This new course is an elementary introduction to simple dynamical systems with the emphasis on their qualitative behaviour. Some aspects of chaotic motion are considered.

M371 *Computational mathematics* As the title suggests, this course is about numerical techniques for solving problems by computer. It does not involve you in programming though it does require considerable use of a home computing facility.

Other courses relevant to applied mathematics and mathematical physics are listed under other faculties. They include:

- SM355 *Quantum mechanics*
- SMT356 *Electromagnetism*
- S354 *Understanding space and time*

### Computing

The Faculty offers at present three third-level computing courses: M353 *Programming and programming languages*, M355 *Topics in software engineering* and M357 *Data models and databases*.

M353 deals with the theory and practice of the design and implementation of programming languages with an emphasis on the needs of the programmer. This course requires the use of a home computing facility, and is one of the courses in the University's home computing policy.

M355 is concerned with showing how engineering techniques can be used in the development of large-scale systems. The course draws heavily on the mathematics taught in M203 or M261.

M357 is an advanced computing course presenting in detail the many aspects of database technology, including an analysis of the properties of information and its representation in terms of data models.

### Statistics

The Faculty is offering two third-level courses in statistics, M343 *Applications of probability* and M345 *Statistical methods*. M345, a course in the basic methods of

statistical data analysis, takes you on from M245 to learn mainstream techniques in such areas as regression analysis, analysis of variance, contingency table analysis, non-parametric methods and survey sampling. Use of a computer package is an important feature. Practical applications are emphasized throughout and extensive use is made of data examples from engineering, medicine, economics and other fields.

To complete the third-level statistics profile, M343 *Applications of probability* develops the ideas of probability and random processes that are introduced in M245. Using a variety of mathematical techniques, this studies the properties of random phenomena in real contexts such as changing population sizes, queues, epidemics and events occurring in space and time.

The recommended prerequisite for M343 and M345 is M245 or [MDT 241].

### General advice

Certain combinations of mathematics courses are regarded by other institutions as equivalent to an honours degree in mathematics from a traditional university, for example for the purpose of recognition as a graduate of the Institute of Mathematics and its Applications.

The computing courses, including TM222, are recognized for exemption from Part I of the professional examinations of the British Computer Society.

Further information about recognition is given in Section 1 of this publication.

### A note for teachers

The broadly based degree described above might well suit a mathematics teacher dealing with pupils across the age range 11-18, while those who concentrate on teaching sixth-form pupils might be better advised to specialize in one or two of the four main areas described earlier and to consider going on to take an honours degree. MA290 may provide useful background information for those teaching secondary school mathematics. Teachers who may or may not be mathematics specialists could be interested in the following two courses, neither of which assumes a mathematical background, nor has M101 as a prerequisite:

ME234 *Using mathematical thinking* This course is designed for teachers of pupils from 5-16 and explores a wide range of issues concerned with mathematical problem solving. Other topics such as the place of mathematics within the curriculum and assessment and evaluation are also examined in depth.

EM235 *Developing mathematical thinking* Designed to complement ME234, this course is about the mathematical education of children between the ages of 5 and 14. It identifies and suggests remedies for difficulties children have both in remembering mathematical procedures and in applying the mathematics they do know.

### Advice for science and technology students

Besides M101, there are two introductory second-level half-credit mathematics courses. These are TM282 *Modelling with mathematics: an introduction* and MS283 *An introduction to calculus*. However, M101, MS283 and TM282 are excluded combinations, which means that you can count only one of these courses for credit towards your degree, so it is important that you make the right choice between them.

If your main interest is in science or technology and you wish to take two foundation courses, you may be undecided as to which courses to take from T102, S102 and M101. If you choose S102 and T102 and either TM282 or MS283, you will be prepared to do some, but not all, higher-level courses with a significant mathematical content. If you wish to study only one foundation course, choose



advanced standing and need none, you will want to know just how much mathematics to include.

M101 is essential if you want to have a substantial amount of mathematics in your degree profile, but undoubtedly many technology and physics courses require some mathematical expertise as well, and so M101 would provide a suitable background for these areas. Alternatively you may not be able to take M101, or may prefer not to; then your choice between TM282 and MS283 may depend on the topics you wish to study later in your degree programme. In general, TM282 takes the technological approach of using mathematical results without going into too much detail about how they were derived, whereas MS283 appreciates that physicists use mathematics as a language and concentrates a little more on the principles involved. In this sense it is more akin to M101.

Points which you may like to consider when making your choice between M101, MS283 and TM282 are:

- There is likely to be much more local tuition on M101 than on either MS283 or TM282 (ask your Regional Centre for details).
- For higher-level mathematics courses M101 is by far the best prerequisite and MS283 is second best. MST204 can be taken after M101, MS283 or TM282, but M101 is the preferable prerequisite.
- For many physics courses M101 or MS283 (but not TM282) is the recommended mathematical prerequisite.
- For many technology courses TM282 or M101 (but not MS283) is the recommended mathematical prerequisite.
- TM282 assumes a slightly less mathematical background than MS283 or M101.
- TM282 and M101 give an introduction to mathematical modelling (TM282 has more on this than M101), MS283 does not.
- TM282 has no computing component. The computing in M101 and MS283 is confined to the summer school week.
- Each of MS283 and TM282 (and M101) has a one-week residential summer school.

When reading the following course descriptions do not forget to refer back to Sections 1-3 and Tables I, II and III at the beginning of this publication.

Under 'Notes for Prospective Students' discontinued courses are identified by square brackets; their titles and presentation dates are listed in Table III.

## M101 MATHEMATICS: A FOUNDATION COURSE

Foundation level: full credit

'Use your head to learn the subject - use the subject to learn to use your head' (G. Polya, twentieth-century mathematician). What is mathematics, and what can it do? In this course we set out to answer this question by helping you to understand mathematics and to use it. But understanding mathematics requires doing mathematics. It also requires the development of a certain degree of intellectual maturity and a willingness to do some thinking for yourself.

This means that a mathematics course, however modest its dependence on previous knowledge, presents you with a real intellectual challenge. We have tried to organize the foundation course to help you meet this challenge. The intention is to get you *doing* mathematics in order to help you understand the ideas underlying the development of this important subject.

The course has two general aims:

- To introduce and illustrate some of the methods and language of mathematics and show their relevance to those who do not intend to study any further mathematics.
- To prepare you for the study of higher-

level courses with a significant mathematical content by giving you some basic skills and concepts required for such courses.

To achieve the first aim the course is designed to be self-contained and of general interest. We hope it will give you the ability to make the transition from the common-sense view of the world to the more abstract and theoretical view that is sometimes necessary in order to interpret, analyse and control the world around us.

As part of our approach to the second aim, we stress not only the *content* of the mathematics (the need for good notation, definitions and theorems, methods of proof, techniques and applications), but also the way in which mathematical training will help you to think effectively when challenged with new problems and situations.

One of the most important objectives of the course is to help you discover something of how mathematics is learned and to acquire the confidence you need to proceed with further studies involving mathematics. For this reason we have chosen to emphasize the directed activity approach to learning mathematics because this engages you in doing mathematics. If you learn to study independently and to tackle problems effectively, then you acquire self-confidence and gain a foundation for extending your knowledge in directions which are useful and relevant to you.

**Content** The course is arranged in six blocks each of which comprises study materials for five weeks. As well as the six blocks, there is a 'floating' unit designed to synthesize and build upon some of your experience in the rest of the course.

The first block introduces you to independent study of mathematics. It covers a number of basic techniques necessary for the study of later blocks. Whatever your background, we hope that by the time you complete this block you will be in a position to start the rest of the course on a par with other students.

The material in the second block helps you consolidate the process of mathematical reasoning introduced in the first block and build a firm basis of techniques for your study of Block Three and the more advanced topics in the course.

The third and fourth blocks are the core of the course. Block Three is an introduction to the calculus and Block Four uses matrix algebra (a technique for operating with collections of numbers) to explore a number of mathematical situations, such as probability and geometrical transformations.

The last two blocks lead the way to further studies. Block Five discusses the application of mathematics to real situations and is an introduction to courses where the emphasis is on applying mathematics. Block Six looks towards courses concerned with the development of mathematics itself; the topics covered have been chosen to introduce some of the ideas which will be studied at greater depth in subsequent courses. These last two blocks will be presented alternately.

The 'floating' unit encourages you to reflect on how you think about and learn mathematics.

When you have completed the course, you will have a general view of some of the characteristic ideas in mathematics and appreciate how they are used in other subjects. You will have mastered a number of basic skills and be able to apply them to the study of new concepts and problems, and you will also know how to use a pocket electronic calculator and a computer as aids to solving mathematical problems.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [M100], MS283, [MS281], [TM281] and TM282. See Advice for Science and Technology based students in the Mathematics Overview.

**Preparatory advice** Before beginning the course you will need some basic mathematical skills, corresponding very roughly to those covered in the first four years of secondary school mathematics.

We shall provide a preparatory package which should be mailed to you in October. This introduces the techniques required to study mathematics successfully within the Open University, as well as guiding you through some preparatory work. A

diagnostic quiz will enable you to judge the extent to which your previous experience meets the entry requirements of M101. You will then be invited to do preparatory study based on Volume 2 of *Countdown to Mathematics* by L. Graham and D. Sargent, which is included in the package. Work with a calculator forms part of this preparation, and there are also two optional computer-marked assignments which you may wish to submit for some indication of your progress.

**Assessment** Three assessment components: (i) eleven TMAs (35%); (ii) six CMAs (15%); (iii) the examination (50%). Substitution will apply for up to two TMAs and one CMA. The TMAs are of two types: mid-block TMAs, based on the first three units of each block, and end-of-block TMAs, designed to review the ideas of a block. There is also an assignment on the summer school work, which includes some computing and problem-solving, using the ideas taught in the 'floating' unit. Assignments are equally weighted so you will have considerable choice as to where to concentrate your studies.

**Broadcasts and cassettes** The thirty-two TV programmes are an essential part of the teaching material. Although the course units contain summaries of them, we feel that if you have not seen the programmes you will be at a disadvantage since they contain assessable material. You are therefore advised not to attempt the course unless you have access to a television set or to recordings of the programmes.

There are sixteen radio programmes which have a magazine format, but the core of each programme is a tutorial based on topics which previous M101 students have found difficult.

The course material includes audio cassettes which are an integral part of many units, so you will need access to a cassette player.

**Summer school** Course based. You will be able to meet other students, to revise and review the work you have done so far, to attend lectures on mathematical topics and to work in small groups with tutors on activities such as problem-solving and practical projects. You will be actively doing mathematics with other people, which should help you to put your own work into perspective and should stimulate and encourage you to tackle some of the things that have been bothering or daunting you. You will have access to a computer at summer school which will be used to solve mathematical problems.

**Calculator** You are expected to buy an electronic calculator, which is used throughout the course to explore new ideas and to solve problems. The preparatory package sent to you in October specifies the minimum facilities required in such a calculator and *Countdown to Mathematics* (details above) gives advice on how to use it so that you can become acquainted with some techniques before the course starts.

**Students with disabilities** This course has been successfully completed by students with disabilities. Some difficulty is foreseen at summer school for people with severe restrictions of mobility, aural, visual and speech handicaps, but the course should certainly not prove impossible. If you have a visual handicap you may have problems with assignments, and the frequent presence of a sighted helper is regarded as most important for cross-referencing from cassettes to correspondence material.

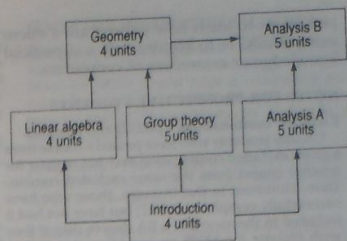
## M203 INTRODUCTION TO PURE MATHEMATICS

Second level: full credit

This course provides an introduction to many of the basic areas of pure mathematics and to the relationships between them. It is not recommended for students with little previous mathematical experience (see Recommended Prerequisites below).

The course is suitable both for those who do not wish to carry the subject further and for those who wish to take third-level courses in pure mathematics. Experience has shown that only those who have obtained an excellent standard in their second-level courses have a good chance of successfully completing third-level pure mathematics courses.

**Content** M203 is split by subject into six blocks which are related as shown in the diagram.



The content of each block is as follows:

**Introduction** Revision of sets and functions; curve-sketching; symmetry, symmetry groups, co-ordinate and vector geometry; abstract groups and subgroups, group isomorphisms.

**Linear algebra** Vectors, orthogonality, matrices, linear transformations, linear equations, eigenvectors, diagonalization, abstract vector spaces and applications.

**Group theory** Cyclic groups, cosets and Lagrange's theorem, permutations, conjugacy, normal subgroups, homomorphisms, first isomorphism theorem, quotient groups, group actions, orbits and stabilizers.

**Geometry** Conics, affine geometry, quadric surfaces, projective geometry, non-Euclidean geometry, the Kleinian view of geometry.

**Analysis** Real numbers, functions, continuity, sequences and series, differentiation, integration, the fundamental theorem of calculus, power series, differential equations, flows, proofs in analysis.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [M202], [M211], [M212] and [M231].

**Recommended prerequisites** M101. M203 can also be studied if you have substantial previous experience in mathematics at near-university entrance standard (for instance, a pass in A level mathematics).

**Related courses** M203 is a recommended prerequisite for M332, M381 and, from 1992, for M431.

**Assessment** TMAs 01-08 (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts and cassettes** Twenty-nine TV programmes. Considerable use is made of audio cassettes.

**Summer school** Course based.

**Students with disabilities** If you have a severe aural or visual handicap you will not benefit fully from television and audio cassette based sections, but you should still be able to follow the course. Course and supplementary materials are not available on tape.

**Calculator** You will need a scientific calculator.

## M205 FUNDAMENTALS OF COMPUTING

Second level: full credit

This course has been devised as a first general course in computing. It should be of interest to people whose jobs require them to have more than a passing knowledge of the use of computers. This would include those already working with computers who wish to formalize or broaden their knowledge.

It is also intended for students who wish to pursue the subject at a higher level by taking third-level computing courses, its content being a prerequisite for these courses.

The main theme of the course is a rigorous approach to the development of computer programs using a structured language, Pascal. The practical work is extensive and requires access to a home computer.

The course also includes an introduction to software engineering, information systems and social implications of computing.

This course is not suitable for anyone who



just wants to learn how to program a micro using BASIC or to acquire only a superficial knowledge or awareness of computers.

#### NOTES FOR PROSPECTIVE STUDENTS

##### Excluded combinations [M252] and [PM252].

Usually students who have passed a course from a given excluded combination may not register for another course from the same excluded combination. However, in this instance, those who have successfully completed [M252] but have not had it included in the award of a BA degree may if they wish register for M205 on condition that if they pass M205 they relinquish the half credit previously obtained for [M252]. You will not be allowed to base your decision on the grade or pass obtained on M205. If you are awarded a pass for M205, you must relinquish the half credit for [M252] whatever the grade. If you wish to do this in 1991 you should consult your tutor-counsellor first.

**Complementary and related courses** M205 is a recommended prerequisite for all third-level courses in computing, namely M353, M355 and M357. M205 also links with TM222.

**Assessment** Eight equally weighted TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts and cassettes** Sixteen TV programmes and one audio cassette which is an essential part of the course.

**Computing** You will be expected to spend at least 2-3 hours each week on practical work. You will need access to a microcomputer that meets the specification of the University's home computing policy (see page 4). Software will be provided. **Note** This course does not require use of GEM or a mouse, so equipment without these can be used.

**Students with disabilities** There may be difficulties but the course is not impossible for students with visual, aural or speech handicap or impaired manual dexterity. You must, however, be able to use a microcomputer. You are advised to seek guidance and further information from the Adviser on the Education of Students with Disabilities.

**Preparatory reading** No preparatory study is necessary, but if you would like to become familiar with some aspects of Pascal we recommend the introductory chapters of any of the following: K. L. Bowles (1980) *Beginner's Guide for the UCSD Pascal System*, Byte Books; N. Graham (1983) *Introduction to Pascal*, second edition, Castle House Publications; D. Cooper and M. Clancy (1982) *Oh! Pascal!*, W.W. Norton and Co.

## M245 PROBABILITY AND STATISTICS

### Second level: half credit

This course is designed to give a mathematical introduction to the concepts of probability and statistics. It has four main aims:

- To give you a good working knowledge of simple probability models.
- To concentrate on applications and the handling of underlying distributions.
- To teach the essential ideas of making inferences from statistical data.
- To develop your statistical intuition.

M245 introduces the idea of chance mechanisms and associated results in probability and statistics. From the start, the ideas and practice of simulation are exploited along with familiar random processes taken from real life. Concepts and basic rules are developed systematically, with the emphasis on applications and the development of both statistical intuition and statistical methods.

**Content** The course consists of sixteen units each of which is designed to take about twelve hours' study time. Each unit includes a TV section and one or more audio cassette sessions, all of which are essential parts of the teaching. Units 1-5 introduce the basic concepts of probability theory, starting in Unit 1 with an informal approach to key ideas of chance happenings (random events) and chance quantities (random variables). Simulation is introduced to give an intuitive feel for the concepts. The ideas are formalized in Units 2-5.

In Units 6 and 7 the two basic ideas of

statistical inference, estimating an unknown constant (parameter) and testing the truth of a theory (hypothesis), are introduced for simple situations.

After a run on random processes such as births, deaths and the spread of a rumour, the normal distribution, which is central to much statistical theory, is introduced in Unit 9. Samples and sampling are discussed in Unit 11 and then the statistical ideas of Units 6 and 7 are applied to a variety of situations in Units 12-14. The course ends with two units of general interest, one on probability and one on statistics.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** M101 or M5283. You are expected in particular to be familiar with the calculus (which is covered in Block III of these courses). Other mathematical skills assumed are familiarity with algebraic manipulation, inequalities and simple series. If you are also planning to take M203 or MST204 you may find it helpful to take one of these before taking M245 in order to gain familiarity and confidence in using the calculus.

**Related courses** M245 is complementary to MDST242, which deals with the influence of statistics on everyday life. It is a recommended prerequisite for the two third-level courses M343 and M345.

**Assessment** Four TMAs (25%); four CMAs (25%) and the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Broadcasts and cassettes** The sixteen TV programmes are fully integrated with the texts. One of the five sections of each unit is written round the TV programme. Simulations have been used to produce computer graphics for the programme which are intended to develop your intuition.

Audio cassettes are used throughout the course mainly to help you to develop familiarity with statistical techniques.

**Calculator** You will need a calculator, preferably with basic statistical functions. Details are given in the course guide.

**Set book** Henry R. Neave *Elementary Statistics Tables*, Unwin Hyman. (This is also the set book for M343 and M345.)

## M261 MATHEMATICS IN COMPUTING

### Second level: half credit

The purpose of this course is to familiarize you with the mathematics necessary for formal approaches to computing, and in particular for the development of software. The mathematics is developed throughout with reference to the objects it can be used to describe. These may come from real situations suitable for computer analysis, or may relate to computer software. The course emphasizes the skill of translating between mathematical and 'English' descriptions of the objects modelled.

**Content** The course is divided into four blocks, each of which covers eight weeks' work. The blocks are divided into chapters, not necessarily exactly two weeks' work each.

#### Block I

- 1 Numbers and machines
- 2 Describing functions
- 3 Algorithms and pseudocode

#### Block II

- 4 Data types
- 5 Sets
- 6 Manipulating functions

#### Block III

- 7 Logic
- 8 Binary relations
- 9 Databases

#### Block IV

- 10 Recursion
- 11 Efficiency of algorithms
- 12 Proof
- 13 Operations

A calculation is seen as the evaluation of a partial function  $f: X \rightarrow Y$  (such as, for example, SQUARE-ROOT:  $\mathbb{R} \rightarrow \mathbb{R}$ ). To des-

cribe a function one must state what type of thing it inputs and what type of thing it outputs; what inputs, if any, are excluded (negative numbers, for SQUARE-ROOT); and how the input and output are related. Such a description does not tell one how the function is to be evaluated. An algorithm is a method of calculation. A Pascal-like pseudocode is introduced to describe algorithms.

Many of the functions of interest in computing do not have numerical inputs and outputs. Chapter 4 looks at other types of object, such as strings and trees, and shows examples of how these are used to describe real situations. Sets (Chapter 5) can be seen as a 'type' of object, in this context. Chapter 6 looks at examples of algorithms expressed purely in terms of composition and iteration of certain basic functions.

Chapter 7 looks at expressions that are either true or false, used in 'controlling' pseudocode algorithms. Chapters 8 and 9 cover further mathematical structures useful to describe real objects.

Chapter 10 returns to algorithms expressed in terms of functions, looking at a powerful tool for doing this. Chapter 11 covers a simple model to estimate the time taken to execute an algorithm. Chapter 12 carries on from Chapter 7 and looks briefly at checking that an algorithm does what it is supposed to do. Chapter 13 looks at a recurring topic of the course and acts to some extent as a review.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** M101 or M205 or M5283/TM282. The course requires some mathematical background. An interest in computing (in particular in the preparation of software) is certainly required, and some experience of writing programs (however small) would be helpful. The ideal preparation for the course would be M101 and M205 or [M252], but any one of M101 or M205 or [M252] or either [TM281]/2 or M5283, plus some experience of computing, should be sufficient.

**Related courses** The course is complementary to [M252] and its successor M205, which develop computing ideas in much greater depth.

M261 is a recommended prerequisite for M355 *Topics in software engineering*, and will be of assistance in studying other third-level computing courses such as M353.

**Assessment** Four equally weighted TMAs, one for each block, (50%); and the examination, forming the other 50%. Substitution will apply for up to one TMA.

**Cassettes** Four audio cassettes are an integral part of several chapters.

## M332 COMPLEX ANALYSIS

### Third level: half credit

This course introduces complex numbers and functions defined on them. It covers the basic theory of analytic functions – the Cauchy-Goursat theorem, Cauchy integral formula, Taylor series, contour integration and residue theory. The techniques introduced in this course are used in many branches of pure and applied mathematics, science and technology. The course will also be of interest to those who wish to specialize in pure mathematics.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** The course will not be intelligible without:

- A pass in [M231] preferably Grade 3 or better; or
- A pass in M203, with at least Grade 3; a good understanding of the Analysis units is necessary; or
- A pass in [M212], preferably Grade 3 or better; a good understanding of the last two Analysis units is particularly necessary; or
- A comparable background in advanced calculus from another source.

Each of the prerequisites covers material which is to be found in Chapters 3-11, 13, 14, 17, 18, 21 and 22 of Spivak, *Calculus*, W. A. Benjamin/Addison

Wesley, which could also be used for revision before the course starts. The course includes a bridging unit between any of the above recommended prerequisites and M332; this unit should be read very carefully.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Cassettes** Eleven programmes on video cassettes and seven programmes on audio cassette tapes, which amplify difficult items in the units and try to help you to solve problems.

**Preparatory reading** Chapters 24, 25 and 26 of Spivak *Calculus*, see above. This is recommended but not required reading. (There is no set book.)

## M343 APPLICATIONS OF PROBABILITY

### Third level: half credit

This course develops ideas about probability and random processes that were first introduced in M245. It sets up probability models for various real situations such as changing population sizes, queues, epidemics and events occurring in space, and investigates the properties of these models using a variety of mathematical techniques. You can get an idea of the content of this course by looking at Units 5 and 8 of M245.

**Content** The course has no formal block structure but it falls naturally into four sections. The first three units are introductory and give examples of the types of random processes to be considered in the course. One unit develops models for patterns of events occurring in time and includes several extensions to the Poisson process. Another looks at patterns in space and develops models for random scatter and clustering of objects.

The next section develops models for processes where events can only occur at discrete time points, for example a Bernoulli process. This includes practical situations such as the ruin of a gambler, the extinction of a family surname and the water level of a reservoir.

In the next five units, probability models are developed for a wide range of situations in which events may occur at any time. Practical examples include changes in size of a population due to births and deaths, queues, and the spread of epidemics.

In the last section models are developed for various situations including genetics, the renewal of components, the change in stock market prices and the movement of particles in a fluid.

The last unit consists entirely of problems and exercises based on the course material.

The emphasis in the course is on modelling practical situations and developing the properties of these models. Since this is a third-level mathematics course you will be expected to have fluency in mathematical manipulation. Some new mathematical techniques are introduced and taught in the course.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** M245 is a strongly recommended prerequisite. You are advised to have taken at least one other second-level mathematical course; MST204 is the most relevant.

**Complementary and related courses** This course complements M345. Together these two courses follow on from M245 and provide a balanced coverage of topics in probability and statistics at third level.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Cassettes** Audio cassettes are used to provide practice in techniques. A returnable video cassette enhances the written text, demonstrating the behaviour of various models, by means of computer simulations and similar techniques.

**Students with disabilities** Course and supplementary materials are not available on tape.



Calculator You will need a calculator.

**Set book** Henry R. Neave *Elementary Statistical Tables*. Unwin Hyman. (This is also the set book for M245 and M345.)

## M345 STATISTICAL METHODS

### Third level: half credit

This is a third-level course in the basic methods of statistical data analysis. It is designed to follow M245 and take you on to learn mainstream techniques in such areas as regression analysis, analysis of variance, contingency table analysis, non-parametric methods and survey sampling. It explains the reasoning underlying the various statistical methods, using mathematical and statistical arguments as necessary but avoiding heavy detailed theory. Use of a computer package is an important element of the course, and four of the fifteen units involve practical computing. You will not have to write your own programs and no knowledge of any programming language is assumed. Practical applications are emphasized throughout, and extensive use is made of data examples taken from such fields as engineering, medicine, psychology, biology, physics, economics and social science.

The titles of the fifteen units are:

- 1 Data, distributions and uncertainty
- 2 Basic methods: testing and estimation
- 3 Examining straight-line data
- 4 Statistical computing unit I: exploring the data
- 5 Regression with several explanatory variables
- 6 Experiments: planning and interpretation
- 7 Statistical computing unit II: linear models
- 8 Experiments: factorial and non-orthogonal designs
- 9 Categorical data
- 10 Distribution-free methods
- 11 Statistical computing unit III: experiments, categorical data, distribution-free methods
- 12 Survey sampling
- 13 Multivariate data
- 14 Statistical computing unit IV: survey data, multivariate data
- 15 Excursions in data analysis

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** The course is designed to follow M245. [MDT241] includes most of the statistical ideas assumed for M345 but there are a few topics that appear in M245 and not in [MDT241] which are assumed for this course. MDT242 would provide useful additional background, but is not, by itself, either a necessary or a sufficient prerequisite.

Since M245 has M101 or MS283 as recommended prerequisites, it is expected that you will be familiar with the mathematical techniques covered in those courses. If you are planning to take M203 and/or MST204 as well as M345 you would find it advantageous to take at least one of those second-level courses before M345.

**Related courses** Just as this course follows up and extends the statistical ideas introduced in M245, so M343 follows up and extends the ideas of probability.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Cassettes** Two 60-minute audio cassettes entitled *The Statistician at Work* give an insight into the wide range of statistical applications and the ways in which practising statisticians operate.

**Computing** The Academic Computing Service mainframe computers are used for the practical work by way of a terminal, modem and printer lent to you as a home kit. You will need a telephone and a domestic television set or monochrome monitor in order to use the home kit, and a new-style British Telecom jack socket to connect the terminal to the ACS computers. The kit may not be taken or sent outside the United Kingdom.

**Calculator** You will need a calculator, preferably with basic statistical functions. Details are given in the course guide.

**Students with disabilities** Course and supplementary materials are not available on tape.

**Set book** Henry R. Neave *Elementary Statistical Tables*. Unwin Hyman. (This is also the set book for M245 and M343.)

## M353 PROGRAMMING AND PROGRAMMING LANGUAGES

### Third level: half credit

In programming there is a need for ways of specifying solutions to problems which are independent of the constraints imposed by programming languages. Therefore, the course begins by differentiating between the specification of a data structure (using abstract data types) and its implementation in a programming language (using Pascal as the main example). After studying abstract data types you should be in a position to appreciate the features which should be present in a modern high-level programming language. The course also compares two contrasting approaches to programming epitomized by Pascal (a procedural language) and Prolog (a non-procedural language).

The aims of the course are:

- To extend your knowledge of programming beyond that which was taught in [M252] and subsequently in M205.
- To examine formal methods of programme specification through abstract data types.
- To examine the implementation of data structures.
- To examine high-level programming language support for these principles.
- To compare procedural and non-procedural programming languages.
- To study the methods of programming language definition.
- To study programming language translation (compiling).

The course is about technical aspects of programming languages and their use and less emphasis is placed on program development although a knowledge of such techniques is assumed.

### Content

**Unit 1** Introduction to the course. Advanced Pascal programming including user-defined types, subranges and sets.

**Units 2, 3, 4, 5 and 6** Specifying and representing data structures. The study of abstract data types (ADTs), through the formal specification of their syntax and semantics, in a way that is independent of any programming language. The implementation of ADTs and the high-level programming language support required including pointer variables, recursion and data hiding.

**Unit 7** Concurrency. How concurrent programming can be of benefit to the programmer and the problems which arise in non-sequential programming.

**Unit 8** Virtual machines.

**Units 9 and 10** A study of the programming language Prolog.

**Units 11 and 12** The definition of programming languages. Syntax and semantics.

**Units 13, 14 and 15** Programming language translation (compiling).

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** The course assumes a knowledge of the material in [M252] or M205. It would be beneficial to have gained a good grade in [M252] or M205 before tackling M353. If you wish to take M261 you should do so before taking M353. M261 is not a recommended prerequisite for M353 but does provide an introduction to some of the topics studied in depth in M353.

**Complementary and related courses** M261, [M352], M355, M357.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Cassettes** Audio cassettes are included in the course materials.

**Computing** Practical work in the form of programming and the use of packages is an important and substantial part of the course. The packages necessary for the course are provided. You will need access to a microcomputer that meets the specification of the University's home computing policy (see page 4).

**Note** This course does not require the use of GEM or a mouse, so equipment without these can be used.

**Students with disabilities** There may be difficulties but the course is not impossible for students with visual, aural or speech handicap or impaired manual dexterity. You must, however, be able to use a microcomputer.

**Other information** The following books give some indication of the nature of the topics covered in the course (they are not set books nor do we cover their entire contents in this course): R. Clark and S. Koehler (1982) *The UCSD Pascal Handbook*, Prentice-Hall; J. Welsh and M. McKeag (1980) *Structured System Programming*, Prentice-Hall; A. V. Aho, J. E. Hopcroft and J. D. Ullman (1983) *Data Structures and Algorithms*, Addison-Wesley; M. Ben-Ari (1982) *Principles of Concurrent Programming*, Prentice-Hall; Clocksin and Mellish (1981) *Programming in PROLOG*, Springer-Verlag; Goldschlager and Lister (1982) *Computer Science - a Modern Introduction*, Prentice-Hall; J. Welsh, J. Elder and Bustard (1984) *Sequential Program Structures*, Prentice-Hall; Stubbs and Webre (1985) *Data Structures*, Brooks/Cole.

**Note** You are not expected to possess any of these books, the details of which are given only for interest.

## M355 TOPICS IN SOFTWARE ENGINEERING

### Third level: half credit

This course introduces the current development of software engineering, that is, the treatment of complex software development as an engineering process. The application of mathematical methods to the process is demonstrated as a solution to many of the problems encountered because of the increasing complexity of software.

The aim of this course is to introduce the concept of software engineering and current formal and informal techniques which can be used in the development of complex systems. By the end of the course you will be able to use formal methods of software development and will have a good understanding of the main problems which occur in complex systems.

**Content** The course is presented in four blocks, the first three containing four units and the last block three units.

**Block I** introduces the concept of software engineering, defining the life-cycle of a software project from analysis of requirements through to testing, integration and maintenance. It discusses graphical data flow techniques for analysis and design, and applies them to a case study.

**Block II** teaches a formal approach to software development using the Vienna Development Method (VDM), which is a mathematical approach to the development of programs, with well defined steps and clearly defined proof obligations. The concepts of data abstraction and reification and proof of program correctness are introduced and developed.

**Block III** The problems involved in concurrent processes are described using ODM (Open Development Method), starting with process diagrams and continuing with the formal design notation CSP (Communicating Sequential Processes). This method tackles the problems which arise in communicating processes. The fundamentals of the concurrent programming language Occam are also taught.

**Block IV** covers project management including the production of a project plan, the techniques used to ensure that it is adhered to, and quality control methods to see that the final product conforms to appropriate standards. Software metrics and their use are also discussed.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** M355 is designed for students who have successfully completed M261 (or M203 if you have a computing background) and M205 or [M252]. It is strongly recommended that M353 should also be studied before tackling M355.

**Assessment** Four equally weighted TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Cassettes** Four audio cassettes are included in the course materials, for presentation of case study material and to aid understanding of the formal mathematical methods used.

## M357 DATA MODELS AND DATABASES

### Third level: half credit

This course is a replacement for M352 *Computer-based information systems*. It is an advanced computing course concerned with an application of computers which has an increasing influence on modern society.

The aims of the course are to provide a detailed presentation of the many aspects of database technology, to identify the common concepts that are used as the basis of such technology and to analyse the properties of information and its representation in terms of data models. At the end of the course you should be able to:

- Use the terminology associated with database technology.
- Use the facilities of a management database system to demonstrate the functions of data definition, storage and retrieval.
- Give the semantic interpretation of examples of different types of data model and create data models to represent the semantics of example situations.
- Design and specify schemas using standard data definition languages, evaluating some designs by practical implementation.

**Content** The course describes the role of database management in the context of the type of information systems in most modern organizations. The many facets of the subject are discussed in terms of design, creation and use of databases by a variety of people with different requirements and responsibilities.

Data models are introduced as a way of capturing the information content of an organization's data. Techniques for analysing data and representing it in terms of a data model are considered. The relational data model is described in detail, in terms of both its theoretical properties and its use in a particular type of database management system, based on SQL. Finally, there are some general topics related to the administration and control of database systems and how database technology is evolving.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [M352].

**Recommended prerequisites** [M252] or M205.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts and cassettes** Eight TV programmes and two audio cassettes.

**Students with disabilities** This course may present you with substantial difficulties if you have visual or aural impairment, because a microcomputer and audio cassette are used simultaneously. Course and supplementary materials are not available on tape.

**Computing** An important aspect of M357 is the provision of database software enabling you to gain practical experience of some of the concepts covered by the course. You will need access to a microcomputer that meets the specification of the University's home computing policy (see page 4) and has two disk drives.



## M371 COMPUTATIONAL MATHEMATICS

Third level: half credit

This course is about numerical techniques in operational research which are used to solve problems on the computer. It describes these techniques and considers how, where and when they can be applied.

The course gives you the ability to recognize whether a particular problem can be solved numerically; to formulate the problem in mathematical terms; to choose the right method; to understand the conditions in which the method works; to evaluate the results, and to estimate their accuracy.

**Content** The course examines methods which are used to tackle scientific, technological, business and social problems. These problems arise in a branch of mathematics known as 'operational research'. Because of the potential breadth of the subject, the course concentrates on a few selected areas which are currently most important in computational mathematics. The course is divided into four blocks covering the following topics:

**Block I** Methods of solving a single non-linear equation, a system of linear equations and a system of non-linear equations. Errors in numerical processes, convergence, ill-conditioning and induced instability.

**Block II** Formulation and numerical solution of linear programming problems using the product form of the inverse-basis method. Formulation of integer programming problems and the branch and bound method of solution. Sensitivity analysis.

**Block III** Formulation and numerical solution of unconstrained and constrained non-linear optimization problems using the DFP and BFGS methods with line searches. Illustrative applications.

**Block IV** Random sampling, Monte Carlo methods and variance reduction techniques. Computer simulation of queues with probabilistic arrival and service times. Use of the simulation language SIMIAN.

The emphasis is on the practical nature of the methods, but straightforward mathematical analysis is included where relevant. The topics covered include a blend of applications and case studies with the mathematical theory and computational procedures.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [M351].

**Recommended prerequisites** A knowledge of calculus and matrix theory up to the level covered by MST204 or M203. Of these two courses MST204 is the more useful.

**Complementary courses** Several important topics in numerical computation are omitted from this course. A brief introduction to the numerical solution of differential equations and eigenvalue problems can be found in MST204. A complementary course in numerical methods, M372, is planned for first presentation in 1992. If you are interested in formulating problems you are advised to study T301.

**Assessment** Four TMAs (50%) and the examination (50%). There is one TMA for each block; each has a practical element in which the packages provided by the Academic Computing Service must be used on the microcomputing facility. Substitution will apply for up to one TMA.

**Cassettes** Audio cassettes are used together with the teaching packages on the microcomputing facility.

**Computing** You will need access to a microcomputer which meets the specification of the University's home computing policy (see page 4). Both teaching and applications packages will be supplied on disks. Computer programming is not part of the course.

**Calculator** You will need a scientific calculator in order to work through some of the exercises by hand.

**Students with disabilities** This course is not recommended for students with impaired manual dexterity. Visually handicapped students will also have difficulties. Course and supplementary materials are not available on tape.

## M381 NUMBER THEORY AND MATHEMATICAL LOGIC

Third level: half credit

This course is designed for students who wish to specialize in pure mathematics. It provides an opportunity to study two topics within the field of pure mathematics comparable with honours options at conventional universities, as a first stage towards further specialized study at fourth level or in postgraduate work.

**Content** Each topic consists of eight units based on its own set book.

• **Number theory** This is based on the set book Burton, *Elementary Number Theory*, Allyn and Bacon (revised printing, 1980). You must buy this edition and no other; you will be told about special arrangements for obtaining it. It is concerned with the integers, and in particular with the solution of classical problems requiring integer solutions. The material covered is essentially that contained in Chapters 1-7, 9 and 13 of the set book. We first consider some elementary properties of the integers such as divisibility and greatest common divisors. This leads to a method of finding solutions of linear Diophantine equations  $ax + by = c$ , i.e. finding solutions to the equation which are integers. Every integer greater than 1 is shown to be a unique product of primes and some results are obtained concerning the distribution of the primes among the integers. In the theory of congruences, methods are developed for solving linear congruences  $ax \equiv b \pmod{n}$  and the classical theorems of Fermat and Wilson are obtained. We then consider multiplicative functions, i.e. functions satisfying  $f(mn) = f(m)f(n)$  for relatively prime integers  $m$  and  $n$ , and in particular Euler's  $\phi$ -function which counts the number of integers in the set  $\{0, 1, 2, \dots, n-1\}$  which are relatively prime to  $n$ . Returning to congruences we look at the solution of quadratic congruences which leads to Gauss's Law of Quadratic Reciprocity. Finally the theory of continued fractions is developed and applied as a method of solving further examples of Diophantine equations.

• **Mathematical logic** This topic is based on the set book Boolos and Jeffrey, *Computability and Logic*, Cambridge University Press, 2nd edition. Our aim is to prove Gödel's Incompleteness Theorem, a result of considerable philosophical importance on the limitations of what mathematicians can ever achieve. To lay the ground for a proof of this theorem, the first four units are devoted to discussing three apparently different notions of computability which all in fact coincide, and the second four units include an introduction to proof systems for the propositional calculus, the predicate calculus, and basic number theory. If you would like to get the flavour of this topic you can look at Chapters 1 to 8 and 14 to 16 of the set book, although these latter chapters may seem rather complex in the absence of the course material.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [M382], [M383], [M384], [M385]; and also [M335] if either of the topics you covered in the [M335] examination was a topic in M381.

**Recommended prerequisites** M101 and at least a further credit in second-level mathematics courses, with a Grade 3 pass or better, preferably M203 or [M202].

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Cassettes** Five audio cassettes.

**Calculator** Access to a calculator is desirable.

**Students with disabilities** This course may present substantial difficulties for students with visual disabilities but would not be impossible. Course and supplementary materials are not available on tape.

**Set books** See individual topics above.

## M386 METRIC AND TOPOLOGICAL SPACES AND GEOMETRIC TOPOLOGY

Third level: half credit

Last presentation in 1991

This course is designed for students who wish to specialize in pure mathematics. It provides an opportunity to study two topics within the field of pure mathematics comparable with honours options at conventional universities, as a first stage towards further specialized study at postgraduate level.

**Content** Each topic consists of eight units based on its own set book.

• **Metric and topological spaces** This topic is based on the set book Sutherland, *Introduction to Metric and Topological Spaces*, Oxford University Press. It considers point set topology from the standpoint of analysis and is particularly suitable for students who have completed M203. It presents the language of metric and topological spaces with continuity as the motivating concept, and moves from the familiar conditions of real analysis to discuss compactness, connectedness and completeness, in the more abstract context of topological spaces.

Because of the significant amount of overlap this topic is an excluded combination with [M202].

• **Geometric topology** This is based on the set book Blackett, *Elementary Topology: a Combinatorial and Algebraic Approach*, Academic Press (reprinted with corrections 1982). It investigates various surfaces such as the sphere, the torus, the Möbius band, the projective plane, the Klein bottle, etc. and shows how combinatorial techniques can be used to classify them. It continues by showing how this material can be applied to the study of quadratic equations in two complex variables, and introduces the concept of Riemann surfaces. It ends with a brief look at flows with singularities: sources, sinks, vortices, crosspoints, etc. The initial approach to this material is intuitive and geometric. The units are supported by eight TV programmes.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [M202], [M382], [M383], [M384], [M385]; and also [M335] if either of the topics you covered in the [M335] examination was a topic in M386.

**Recommended prerequisites** M101 and at least one further credit in second-level mathematics courses, with a Grade 3 pass or better, preferably M203.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts and cassettes** Eight TV programmes for *Geometric topology* only, and six audio cassettes.

**Calculator** Access to a calculator is desirable.

**Students with disabilities** This course may present substantial difficulties for students with visual disabilities but is not impossible. Course and supplementary materials are not available on tape.

**Set books** See individual topics above.

## MA290 TOPICS IN THE HISTORY OF MATHEMATICS

Second level: half credit

The main aim of this course is to introduce the study of the history of mathematics. This entails both telling the story of the development of mathematics in the past, and practising the historical judgements and methods which enable that story to be told. Subsidiary aims are to deepen your understanding of what mathematics is, and the role it has played in society and in increasing our knowledge of the world. The course will be of interest to students of mathematics seeking further understanding of its historical background, to teachers of mathematics at all levels and to students of social and cultural history.

ledge of the world. The course will be of interest to students of mathematics seeking further understanding of its historical background, to teachers of mathematics at all levels and to students of social and cultural history.

**Content** The course material falls into four blocks, of two months' study time each.

**Block 1** *Mathematics in the ancient world* This moves from the earliest evidence of mathematical activity to the achievements of classical Greece. Mathematics has ever since borne the stamp imprinted by the Greek approach.

**Block 2** *Through the Middle Ages to the seventeenth century* The Islamic development of algebra and the later European rediscovery of classical Greek texts helped lead to an unprecedented flowering of mathematics in the early seventeenth century: the time of Napier, Descartes, Kepler and Galileo. The block also contains a case study of English mathematics education during this period.

**Block 3** *The seventeenth and eighteenth centuries* What were the consequences of the independent invention of the calculus by Newton and Leibniz (building on the work of many earlier mathematicians)? We trace some developments through the eighteenth century, and examine how they blended both with the study of nature and with the algebraic concerns of the great Swiss mathematician Leonard Euler.

**Block 4** *Topics in nineteenth-century mathematics* Is Euclid's geometry necessarily true, or can other geometries be devised? How did algebra and professionalization develop together? Was the French Revolution a good thing (for the development of geometry)? What to do about the foundations of the calculus? Can calculation be mechanized? These are some of the questions discussed in the final block, which surveys some characteristic topics of nineteenth- and indeed twentieth-century mathematics.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** Any mathematics needed is generally explained through its historical development in the course, so that modest mathematical competence and a willingness to engage with mathematical explanations, where appropriate, is more important than prior knowledge.

**Related courses** History of science courses, A281 and A282.

**Assessment** Four essay-type TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts** Eight TV programmes. There are also audio cassettes.

**Preparatory reading** If you want to get a preliminary flavour of the kind of thing the course covers, you could browse through a standard work such as Carl B. Boyer, *A History of Mathematics*, Wiley. (This book is comparable in level with MA290.)

**Set book** J. G. Fauvel and J. J. Gray (eds.) *The History of Mathematics: A Reader*, Macmillan.

## MDST242 STATISTICS IN SOCIETY

Second level: half credit

What is statistics and what can it do? This course sets out to answer these questions by investigating a variety of everyday situations using statistical techniques. It is intended for students who are interested in the influence of statistics on everyday life, as well as for those who need a basic understanding of statistical ideas for their studies in other disciplines.

The aims of the course are:

- To provide an uncomplicated yet critical introduction to current statistical ideas and practice.
- To introduce a wide diversity of applications of statistics in everyday life.

**Content** We begin with a unit which introduces some basic ideas of statistics, and



various ways of presenting data. The rest of the course is divided into three blocks of five units each.

**Block A** asks 'Are we getting better off?' In this broad economic context, techniques of exploratory data analysis are developed. Methods of summarizing data, graphical representation and relationships between variables are discussed, and we look at how price indices and data are obtained from surveys.

**Block B** The topic area is education. The basic ideas of statistical inference are introduced in the context of questions such as 'Does education pay?' and 'What factors affect educational performance?' The statistical concepts covered include probability, confidence intervals, hypothesis testing, contingency tables, and the normal distribution.

**Block C** rounds off the course by looking at medicine and health. We investigate statistical aspects of experimentation in the context of drug testing. The relevance of statistics to private and public decision making is underlined by asking questions like: 'Is my child developing normally?' and by looking at the relationship between smoking and lung disease.

In the last unit of each block we review the statistical ideas of the block and illustrate how they can be applied in the field of energy research, and, in particular, in the use of energy in the home.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** There are no formal prerequisites for the course, but you will need some very basic mathematical skills. We provide a diagnostic test which will let you know in detail what we require of you, and will enable you to judge to what extent you possess these skills. A book has been specially written to help students prepare for courses such as this, and it will help you to overcome any problems with the diagnostic test. The book is Volume 1 of *Countdown to Mathematics*, by L. Graham and D. Sargent, published by Addison-Wesley.

**Related courses** M245 looks more deeply at the applications of probability theory and takes a more mathematical approach than MDST242.

**Assessment** Three components: (i) four TMAs (25%); (ii) five CMAs (25%) and (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Broadcasts** There are eight TV programmes, grouped in four pairs. Each pair is an integral part of each of the three review units and the introductory unit. The TV broadcasts are an important part of the course, and you will be at a disadvantage if you cannot watch them.

**Cassettes** Most units have a section based on an audio cassette.

**Calculator** You will need a calculator. If you have already bought the recommended calculator for a course such as M101, T102, [S101] or MS283 it will be adequate for this course. Otherwise, details of the type you will need will be given in the Course Guide.

**Students with disabilities** Some difficulty is foreseen for students with a visual or aural handicap, or who have impaired manual dexterity, but it is not impossible to overcome this.

## ME234 USING MATHEMATICAL THINKING

### Second level: half credit

This course is particularly suitable for students who are teachers of pupils between the ages of 5 and 16+, or are otherwise engaged with the education of children in this age range. It is intended to be suitable for all teachers who are interested in mathematics, as well as to mathematics specialists, and should support them in planning to implement the national curriculum. No mathematics beyond O level will be assumed, other than an interest in mathematical ideas and their application. In order to participate in the

study and assessment activities, you will need to be able to work with groups of children, preferably in a classroom.

As well as helping pupils to acquire mathematical knowledge and skills, a sound mathematics curriculum should encourage the ability to use and apply knowledge and skills in context. This is emphasized in both profile components of the national curriculum for mathematics. Such contexts may be mathematical, they may be associated with other areas of the curriculum, or they may be of an everyday nature. However, in order to be able to apply mathematical ideas, pupils also need to be able to make sense of those ideas themselves, which is often impossible to do in the abstract. This course is about helping pupils to develop their own understanding and to take some responsibility for their own learning.

You are invited to work on some mathematics yourself as a learner, to observe your own learning processes and to relate what you notice about your own learning to that of your pupils in the classroom. The aim is to help you develop an awareness of mathematical learning processes which will provide insight into ways of helping pupils to learn. The computer and associated software will be used both in your own learning and in your work with pupils. Assessment and record-keeping in the mathematical classroom are also discussed.

**Content** The course is divided into three blocks. Block I is concerned with the investigation of mathematical ideas within a mathematics context; Block II with the investigation of mathematical ideas within a wider context, for example other curriculum areas, or everyday situations; and Block III links the first two blocks in considering issues of assessment and evaluation, and of process links with other subject areas.

Block I presents a number of mathematical domains concerned with numerical and spatial ideas, from which you select two to study as the main component of Units 2 and 4. This study will take the form of investigative work in and around the content of the domain. An investigational approach allows us to cater for a wide range of mathematical backgrounds. Unit 3 looks at processes inherent in mathematical problem solving, and Unit 5 concentrates on classroom issues associated with pupils working investigatively in mathematics lessons.

Block II is concerned with tackling problems which are not initially mathematical in nature, but for which mathematics may provide a means of finding a solution. In Units 6 and 8 you will work on problems of various degrees of complexity with a strong emphasis on the links between the 'real' problem and the mathematical problem which is constructed from it. Statistical ideas and mathematical modelling strategies form a large part of this study. Unit 7 is concerned with classroom issues associated with pupils working on such problems.

Block III is about the place of mathematics in the curriculum and invites you to follow up ideas from the earlier blocks and their applicability across the curriculum. This will involve consideration of explicitly mathematical concepts and processes and of thinking and learning processes which are applicable in other subject areas. Important too will be areas of process and content of other subject areas which are applicable to the learning of mathematics.

Consideration is also given to assessment and evaluation, requiring you to examine your own criteria for evaluating your pupils' work and making assessments. In doing this, various styles of evaluation procedures will be considered and applied in the classroom.

#### NOTES FOR PROSPECTIVE STUDENTS

To complete this course successfully you will need access to a suitable group or groups of children; access to a computer (see below); access to a video recorder with playback facilities; and the course reader.

**Complementary and related courses** ME234 replaces [PME233], but it is not an excluded combination.

ME234 complements EM235, and these two courses together form the first part of the Advanced Diploma in Mathematics Education in the associate programme. Please see Section 5 for more information about diploma courses.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA but not to TMA 03. TMAs 01 and 02 are associated with Block I and contain questions related to your own study as well as questions related to work which you have done with pupils in the classroom. TMA 03 (Block II) includes describing and analysing a classroom project. TMA 04 (Block III) requires you to plan and prepare to evaluate a curriculum task.

The examination (50%) will cover the entire course, and you will be given detailed guidance about how to prepare for it.

**Cassettes** There are two returnable video cassettes. The first is in three 60-minute parts, each associated with one of the three blocks. The video material is an integral part of the study of course units.

The first 30 minutes of the second tape is about 'working with video' and is part of Unit 1 of the course. The next 60 minutes is a 'video anthology' for the whole course. Excerpts from this may be watched as referred to in units throughout the course, or used as further material for study and discussion groups or at tutorials.

There are also audio cassettes associated with some units.

**Computing** You must have access to one of the following computers: BBC B (with disc drive); BBC Master 128 (with disc drive); or Research Machines Nimbus PC.

**Students with disabilities** Students with visual handicaps may have difficulty with the taped material, and are advised to ask the Office for Students with Disabilities for further guidance. Course and supplementary materials are not available on tape.

**Set book** D. Pimm (ed.) *Mathematics, Teachers and Children*, Hodder and Stoughton (course reader).

## MS283 AN INTRODUCTION TO CALCULUS

### Second level: half credit

The aims of the course are:

- To introduce and illustrate some of the methods and language of mathematics and to show how the language of mathematics is used to describe the physical world.
- To prepare you for the study of higher-level courses with a significant mathematical content (especially physics and applied mathematics) by giving you some basic skills and concepts required for such courses.

**Content** The course is organized in four blocks.

The first two blocks (seven units) cover the basic concepts and techniques necessary for the study of calculus in the later blocks. Topics covered include: quadratic equations; the binomial theorem; the laws of indices; logarithms; the trigonometric ratios (sin, cos and tan); the concept of a function; the graph of a function; propagation of errors by functions; simple statistical concepts (mean and standard deviation).

The third block (five units) introduces the calculus. You will learn the conceptual basis of calculus and the techniques of differentiating and integrating functions of a single variable. This block is the core of the course. The techniques you learn here are used time and time again in second- and third-level mathematics and science courses.

The fourth block (four units) introduces vector quantities (quantities having direction as well as magnitude), and the calculus of functions involving vector quantities. You will learn about the partial differentiation of functions of several variables, and about line and surface integrals. These are the calculus techniques you will need in later courses for the study of, for example, the mechanics of moving bodies and the properties of electric, magnetic and gravitational fields.

The first three blocks are similar to the first three blocks of M101 *Mathematics: a foundation course*. The fourth block of MS283 consists of new material not found in M101.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [M100], M101, [MST281], [TM281], TM282. See Advice for Science and Technology Students in Mathematics Overview.

**Recommended prerequisites** None. However, you will need some very basic mathematical skills corresponding roughly to those covered in the first four years of secondary school mathematics. In November you will receive a preparatory package which not only introduces the techniques required to study MS283 but also guides you through some preparatory work. A diagnostic quiz will enable you to judge the extent to which you meet the mathematical requirements of the course. Part of the preparatory study will be based on Volume 2 of *Countdown to Mathematics* by L. Graham and D. Sargent, which is included in the package.

**Assessment** There are three assessment components: (i) four TMAs (25%); (ii) six CMAs (25%); (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Broadcasts and cassettes** The seventeen TV programmes are an essential part of the course; they contain assessable material and if you do not watch them you will be at a disadvantage. There are six audio cassettes: most units have a section based on one. Two of them contain material transferred from former radio programmes. They keep you in touch with the development of the course and explore ideas introduced in different areas of it, e.g. curve sketching.

**Summer school** This enables you to meet other students, to revise and review the work you have done so far, and to look ahead to Block IV in a timetable of lectures and tutorials. It also introduces some computing involving the mathematics of MS283 and there are some simple experiments relating to the course material.

**Calculator** You are expected to purchase a calculator, as it is used to aid problem solving and to investigate mathematical properties. The preparatory package tells you the minimum facilities you will need on your calculator.

**Students with disabilities** If you have impaired sight, hearing or manual dexterity you may have some difficulty.

## MS323 AN INTRODUCTION TO NON-LINEAR DYNAMICS

### Third level: half credit

Dynamics is one of the important areas of applied mathematics and has applications in many sciences, for instance biology and chemistry as well as physics and engineering. The subject has changed dramatically in the past decade and it is now one of the most rapidly developing areas of applied mathematics.

This course is designed to give you the background knowledge you need to understand some modern developments. It will do this by using the simplest possible mathematics and by concentrating on relatively simple systems which behave, in some sense, typically; some simplification is achieved by concentrating upon Hamiltonian systems.

By the end of the course you should understand why some non-linear systems have complicated behaviour, as well as some of the approximate theories used in understanding their behaviour.

**Content** This course is an introduction to non-linear dynamic systems. But in order to keep the mathematics as simple as possible two main restrictions are made. First, we concentrate mainly on Hamiltonian systems and second, we deal only with systems having one degree of freedom, that is systems with a two-dimensional phase, or state-space. These simplifications enable us to go a long way in understanding the complex behaviour of non-linear systems using quite simple mathematics.

The course starts by discussing the behaviour of the solutions of ordinary first-order differential equations, with the emphasis on the qualitative description of their behaviour. This theory is extended to general systems of two coupled first-order equations, again with the emphasis on the qualitative description of their solutions. After this we specialize on



conservative Hamiltonian systems and show how, for these systems, the global behaviour of the solution can be obtained without solving any differential equations.

Until this point the course has considered only the solutions of the equations of motion. Next, it briefly tackles the formulation of these equations; for this it is necessary to understand some aspects of the relation between the Lagrangian and Hamiltonian formulations of dynamics and how the equations of motion, for some systems, can be derived in the Lagrangian representation.

If the equations of motion depend explicitly upon time, the motion is generally much more difficult to understand and describe: to make a start on this problem it is necessary to develop methods of changing co-ordinates in phase space without changing the essential Hamiltonian structure of the system. These are named canonical transformations: this theory and its application to find the angle-action variables is developed in order to understand the more complex behaviour mentioned above.

These techniques are then used to understand the motion of several types of time-dependent problems. First, we use perturbation theory to describe the effect of resonant forces on a non-linear oscillator. Second, we introduce the ideas of adiabatic invariance to deal with a system having slowly varying parameters. Finally, we consider the opposite extreme of a system acted upon by a rapidly varying force; in this case we demonstrate how a vertical pendulum can be made stable when pointing upwards if its support is shaken fast enough.

These time-dependent problems show some, but not all, of the behaviour exhibited by non-linear systems. In order to demonstrate the diverse and exceedingly rich behaviour of non-linear systems the last few units are devoted to the behaviour of discrete dynamical systems, that is systems for which the 'time' or independent variable is discrete rather than continuous. These give rise to iterative systems rather than differential equations. As at the beginning of the course we introduce this subject by examples with one dependent variable, in particular the logistic map; we then progress to area-preserving maps. In both cases it is shown how simple deterministic systems can display chaotic, or statistical, behaviour.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisite** MST204.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Students with disabilities** Course and supplementary materials are not available on tape.

## MST204 MATHEMATICAL MODELS AND METHODS

### Second level: full credit

This is the principal second-level applied mathematics course for mathematics, science and technology students.

The course teaches the use of mathematics in solving real problems. Half of the course is about representing suitable aspects of the real world by means of some mathematical

model; the other half is about mathematical methods that are useful in working with such models.

**Content** The 'modelling' half of the course includes nine units on mechanics, starting with Newton's laws of motion and their consequences for a particle in one dimension, continuing with vibrations of such a particle, the mechanics of particles and systems of particles in three dimensions, the vibrations of systems of particles and the motion of rigid bodies; and ending with planetary orbits. This mechanics component of the course includes experimental work at summer school. There are also two units on non-mechanical models: population models and heat transfer. Finally, this half of the course includes forty hours of project work in which you do an extended piece of mathematical modelling yourself. You are offered a choice of problems of non-mathematical origin; your task is to use mathematical modelling to help solve the chosen problem, to test your conclusions against real data, improving the model where necessary as a result, and to write a report. Two weeks during the first half of the course are devoted to project work, at the end of which you send an outline report to your tutor as TMA 04; the work continues at summer school and after a further two weeks during the second half of the course the final report is sent in as TMA 08.

In the 'methods' half of the course there are, first of all, four units on differential equations, starting with first- and second-order differential equations, going on to simultaneous differential equations and ending with an introduction to partial differential equations. There are four units on mathematical methods for three-dimensional problems: one on vector algebra, two on partial differentiation and vector calculus and one on multiple integrals; most of this work will already be familiar to those who have done MS283. Four units deal with topics in algebra: complex numbers, linear algebraic equations, matrix algebra and eigenvalues. Finally, four units are concerned in one way or another with approximations: recurrence relations and their use in the numerical solution of differential equations, other approximation methods, Fourier analysis. As well as the numerical mathematics in these units, there is also some in the units on differential equations, linear algebraic equations and linear programming and eigenvalues.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [M201] and [MST282].

**Recommended prerequisites** A pass in M101, or a pass at Grade 1, 2 or 3 (not Grade 4) in either MS283 or TM282. The science and technology foundation courses contain useful background material but neither is a recommended prerequisite.

**Related courses** MST204 is a recommended prerequisite for MST322, SMT356, SM355, T233, T326, T394 and for future third-level applied mathematics courses. It should fit well into any programme of study in mathematics, science or technology, particularly if the programme includes M203 or [T232]. If you intend to study SMT356 or SM355, S271 is an ideal precursor, as it covers the necessary physics background.

**Assessment** There are four components: (i) TMAs 01-03, 05-07 (25%), (ii) CMAs 41-47 (12½%) project component; TMAs 04 and 08 (12½%) and (iv) the examination (50%). Substitution will apply for up to two TMAs in the TMA component. No substitution will be allowed for the project. There will be a threshold of 20% on the project component.

**Calculator** You will need a calculator.

**Summer school** Course based. This includes a variety of activities: lectures, tutorials and exercise classes on the mathematical methods and standard models taught in the course; one or two mechanics experiments and associated modelling; an opportunity to discuss the course project with fellow-students; a short summer school project; computer work relating to the numerical mathematics in the course.

**Broadcasts and cassettes** The thirty-two TV programmes are an integral part of the course. There are eight audio cassettes.

**Students with disabilities** If you have any physical disability you should consult either the Office for Students with Disabilities, your Regional Centre or your tutor/counsellor about the use of the computer terminal, the project and the summer school.

## MST322 MATHEMATICAL METHODS AND FLUID MECHANICS

### Third level: half credit

This course introduces the fundamentals of fluid mechanics and discusses the solution of fluid flow problems (i.e. the flows of liquids and gases) which are modelled by differential equations. Half of the course is about modelling simple real fluid flows; the other half is about the mathematical methods associated with such models. The methods are prompted by and interpreted in the context of fluid flow problems although they can also be applied in other subjects such as electromagnetism and the mechanics of solids.

The main objectives of the course are to continue the teaching of differential equations begun in MST204; to introduce and solve three partial differential equations: the diffusion equation, Laplace's equation and the wave equation; to give a good working knowledge of the basic models in fluid mechanics; to apply the methods taught in the course to fluid flow problems.

**Content** In simple terms we think of a fluid as a substance that flows. Examples of fluids that are very familiar are air (a gas), and water (a liquid). All fluids are liquids or gases. The analysis of the forces in and motion of liquids and gases is called *fluid mechanics*.

Because of its many applications fluid mechanics is important for applied mathematicians, scientists and engineers. The flow of air over objects is of fundamental importance to the aerodynamicist in the design of aeroplanes and to the motor car industry in the design of cars with drag-reducing profiles. The flow of fluids through pipes and channels is also important to engineers. Fluid mechanics is crucial to the meteorologist in studying the complicated flow patterns in the atmosphere.

To solve even simple fluid problems requires some skill in solving the partial differential equations of applied mathematics such as Laplace's equation, the wave equation and the diffusion equation.

The course consists of fourteen units and is arranged in four blocks. The first block (Units 1-4) forms a solid foundation on which the rest of the course is built. Unit 1 introduces some of the physical properties of fluids and the continuum model of a fluid. Unit 2 develops further the analytical and numerical methods of solving ordinary differential

equations which were begun in the prerequisite courses. Unit 3 gives an introduction to the solution of first-order partial differential equations and introduces the method of dimensional analysis. Unit 4 links line, surface and volume integrals through Stokes' theorem and the divergence theorem.

The second block (Units 5-8) starts by investigating the motion of a fluid that is assumed to be incompressible (i.e. cannot be reduced into a smaller volume) and inviscid (i.e. there is no internal friction). All real fluids do exhibit some form of compressibility and viscosity and their effect on the flow of fluids is investigated towards the end of the block. Unit 5 develops the equations of motion for the simple incompressible, inviscid model and the appropriate boundary conditions. Unit 6 solves these equations for flows in pipes, channels and through apertures. Unit 7 introduces the idea of a vortex and the effects of viscosity on the flow of a real fluid. Unit 8 develops a mathematical model for the forces due to viscosity and modifies the differential equations of motion by including these forces. The unit concludes by showing how the rather complicated equations of motion can be simplified by introducing non-dimensional quantities such as Reynolds number.

Block 3 investigates the solutions of second-order partial differential equations. Unit 9 shows that a second-order partial differential equation can be classified into one of three forms: elliptic, hyperbolic and parabolic. Examples of these forms are given as models for fluid flows. The method of separation of variables for solving partial differential equations is then introduced.

Unit 10 introduces and develops the properties of power series and Fourier series. Unit 11 extends and generalizes the ideas of Unit 10 with an introduction to Sturm-Liouville theory. The last unit in Block 3 (Unit 12) uses the ideas introduced in Units 10 and 11 in the solution of Laplace's equation. These solutions are then used to investigate, for example, the flow of a fluid past a cylinder and a sphere. The last block (Units 13 and 14) is about waves. Unit 13 investigates some of the methods of solution of the wave equation. Unit 14 applies these solutions to mathematical models of water waves.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** Either MST204 or [M201] with [MST282]. Students who were awarded a Grade 3 or 4 pass in such courses may find MST322 particularly difficult. A revision booklet is included as part of the course material to act as a refresher on the important parts of the prerequisite courses. The science and technology foundation courses contain useful background material but neither is a recommended prerequisite.

**Related courses** MST322 shows the application of mathematics to a branch of science and technology and should fit well into a programme of study in mathematics, science or technology, particularly if the programme includes MST204, T233, S271, T331, [SM351] or SMT356. T233 or T331 could be taken in parallel with MST322.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Cassettes** The course includes a two-hour returnable video cassette (VHS) as part of the teaching material to give a visual description of the flows discussed in the course texts. There are also audio cassettes.

**Students with disabilities** If you have impaired vision you may have some difficulty in studying the video part of the course. Course and supplementary materials are not available on tape.



## OVERVIEW

Undergraduate courses provided by the Science Faculty serve three purposes:

- To provide a broad coverage of courses in the four discipline areas for a 'general' degree in science.
- To provide enough courses at third and fourth levels in each discipline for you to achieve some measure of specialization (see Figs. 1-4) and/or an honours degree.
- To provide courses, including U-courses, accessible to anyone who is interested in studying some science as part of a broader degree.

The Faculty is also developing its provision in certain areas of general scientific interest and has chosen health studies, environmental science, science education, and astronomy and planetary science for this purpose. Information about courses offered in these areas is available from the Faculty. A leaflet about the astronomy and planetary science area can be obtained by sending a stamped addressed envelope (marked A & PS) to Dr Barrie Jones, Physics Department, The Open University, Milton Keynes MK7 6AA.

Links between all the courses offered by each department, and between science courses and those from other faculties, are shown in Figs. 1-4 and in the Tables of Related Courses.

## Science course prerequisites – a warning

The following advice applies to all courses with S as the first letter of the course code, and is particularly important now that a second foundation course is optional.

You should treat the recommended prerequisites included in the course descriptions, in the Table of Undergraduate Courses 1991 and in Figs. 1-4 very seriously. Post-foundation science courses assume that you have achieved the objectives of the specified prerequisite courses, and build on these. If you have not studied and passed a prerequisite course, but feel you have already acquired the necessary knowledge and skills elsewhere, then you should make quite certain that you consult your tutor/counsellor, or your science staff tutor at your Regional Centre, to make sure.

If you have achieved only a bare pass (Grade 4\*) in a prerequisite course, you should reconsider the wisdom of taking a course that builds on the prerequisite. Statistics on students' performance in science courses show that those who 'take a chance' and register for a post-foundation course without having passed the prerequisite course, or with only a bare pass, are generally much more likely to drop out or fail than those who have taken our advice.

This advice is especially important if you wish to study post-foundation physics courses where mathematical competence is stressed at second level, and is essential at third level.

If you have only just scraped through a prerequisite course, or if it is a year or more since you took the course, you should make a serious effort to revise the prerequisite course during the November-February period so that you are well prepared to start the year.

Entry to the fourth-level course S441 will be restricted to students with a Grade 3 pass in a full credit's worth of prerequisite courses.

Although some third-level courses, for example S330 and S364, list only S102 topics as assumed knowledge, the new concepts in these courses are introduced, taught and assessed at third level. It is assumed that you will have had experience in at least one related discipline area at second level before making the conceptual jump to these third-level, multidisciplinary courses.

\*This does not apply to foundation courses, which are graded only 1 and 4. Clearly if you struggled with the science foundation course, or some aspects of it, you should avoid post-foundation science, or those disciplines that caused you problems.

Fig. 1 Study guide for biology courses available in 1991. New courses to replace SD286 Biology, brain and behaviour and S364 Evolution are planned for 1992.

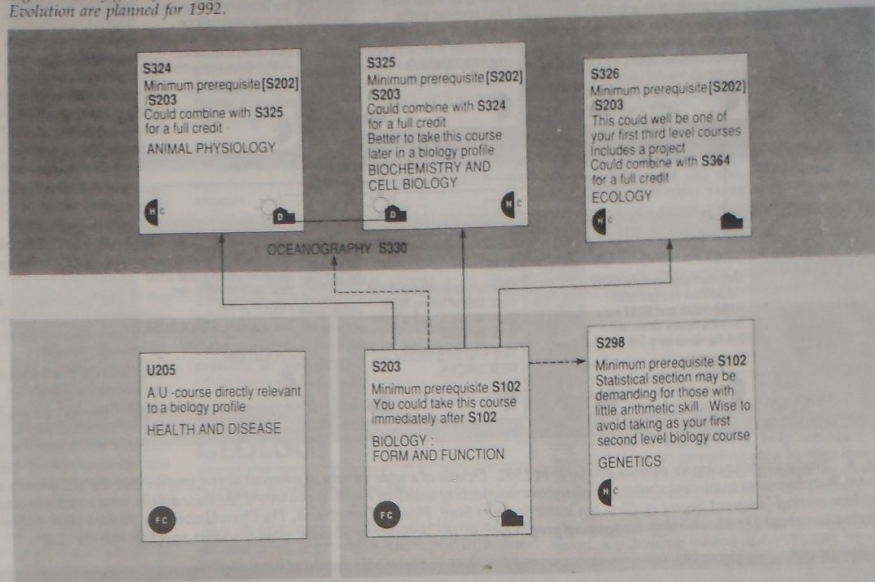
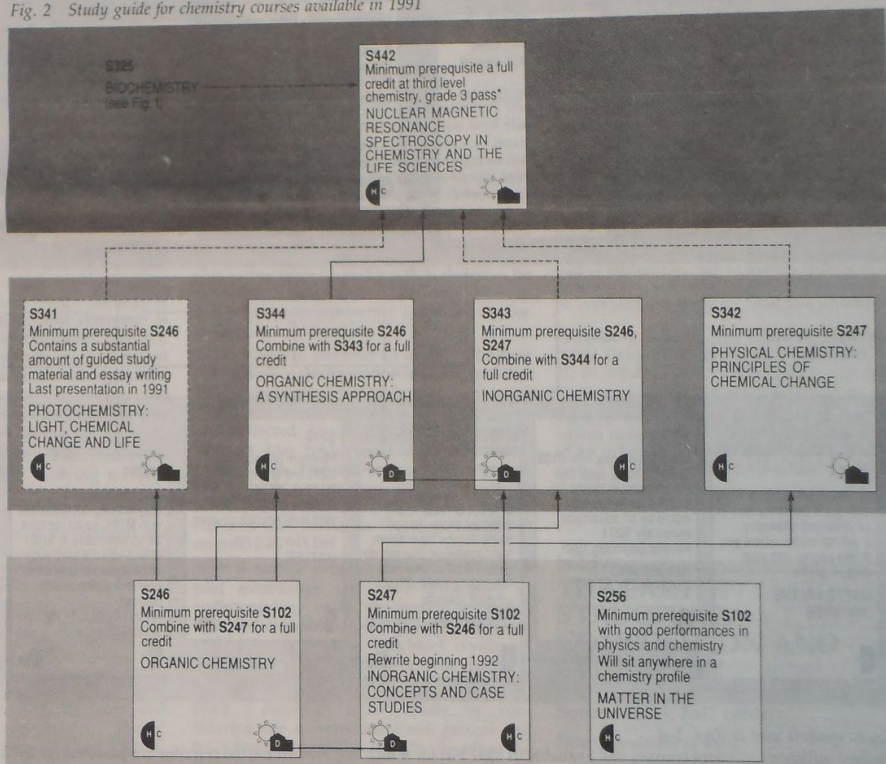


Fig. 2 Study guide for chemistry courses available in 1991



\*The full credit would usually be taken from S341, S342, S343 or S344.

## Home experiment kits and course quotas

Many courses have home experiment kits, most of which contain items that may not be taken out of the UK. Some courses with kits are very popular (for example, S236 and S271), and because we have a limited number of kits we can accept only a restricted number of students each year. If you register for such a course, and then find you cannot cope because you have not achieved satisfactorily the objectives of the prerequisite course, you may well have prevented a fellow student, better prepared than yourself, from registering on the course and completing it successfully.

## Summer schools

Studying science courses inevitably means doing some practical work so, as well as home experiment kits, many courses require attendance at a summer school. Because practical work is essential to the comprehension of the subject, as well as to the external credibility of Open University science courses, the University is not generally sympathetic to requests for excusal from attendance at science summer schools, especially when excusal has been granted from a previous science summer school. Also, failure to attend a summer school associated with a prerequisite course may prejudice your

understanding of a subsequent higher-level course.

If you know in advance that you are unlikely to be able to attend a science summer school, it is not wise to register for the course.

When a discipline-based summer school serves two related courses (for example, S246 and S247) it is advantageous, though not necessary, to study both courses simultaneously.

## Alternate presentation of courses

The Earth sciences department intends to present its related third-level courses, S338 and S339 (which replace [S336] in 1990), in



Fig. 3 Study guide for Earth science courses available in 1991. S364 is not available in 1991 but will be rewritten for 1992.

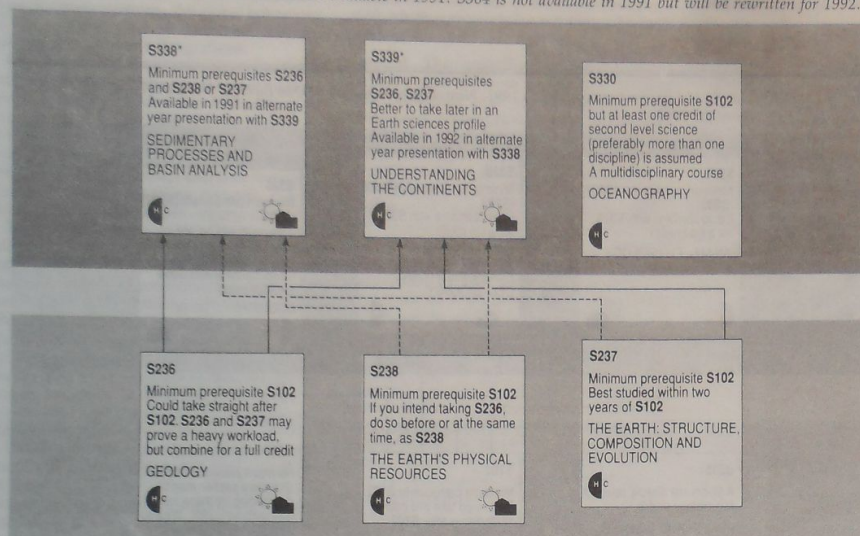
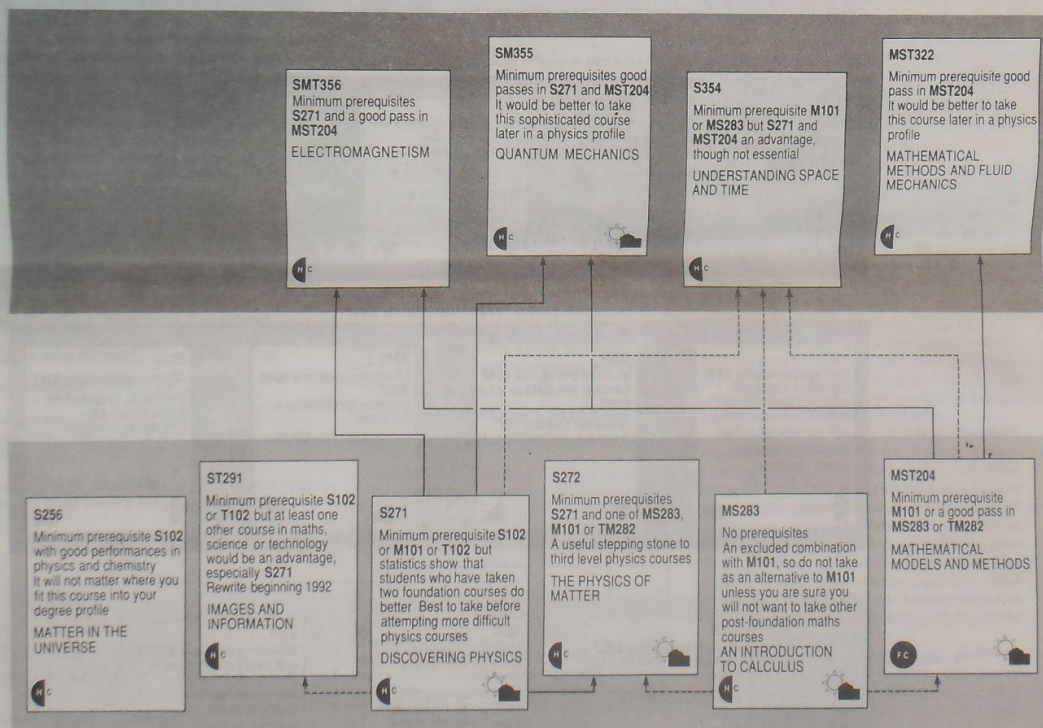


Fig. 4 Study guide to physics courses available in 1991. Details of a wide variety of coherent degree profiles that include physics courses, including study routes, have been sent to current students of all the courses starting with S in Fig. 4. If you would like these details, send a medium-sized stamped self-addressed envelope marked 'coherent degree profiles' to Course Support Staff, Physics Department, The Open University, Walton Hall, Milton Keynes MK7 6AA. For information about the membership recognition programme at the Institute of Physics, send a similar envelope marked 'IOP'.



#### Key to symbols used in Figs. 1-4

Dashed outlines represent courses still available in 1991 but for which remakes or partial rewrites are planned for 1992. The different levels at which courses are shown are an indication of their relative intellectual demands.



alternate years as follows.

1991: S338 available, S339 withdrawn

1992: S339 available, S338 withdrawn,

#### Breaks in presentation

Two courses, S286 and S364, will not be available in 1991. Both will be rewritten for presentation in 1992.

#### When reading the following course descrip-

tions do not forget to refer back to Sections 1-3 and Tables I, II and III at the beginning of this publication.

Under 'Notes for Prospective Students' discontinued courses are identified by square brackets; their titles and dates of presentation are listed in Table III.

## S102 A SCIENCE FOUNDATION COURSE

Foundation level: full credit

S102 is designed both for those who do not expect to study science beyond foundation level and for those who intend to go on to

higher-level science courses. It will be within your reach even if you have no formal education in science and no mathematical knowledge beyond simple arithmetic. However, the course is not trivial or superficial, and it will present you with a stimulating intellectual challenge even if you already have qualifications in science.

S102 introduces, explains and uses many of the basic concepts and principles of physics, Earth sciences, chemistry and biology. Our intention is that, when you have taken the course, you should be knowledgeable about a wide range of modern scientific theories and familiar with some of the techniques of experimental work in science.

#### Content Consider these questions:

- What is genetic fingerprinting and how can it be used?
- How did the Universe begin?
- What is the greenhouse effect and why could it lead to climatic problems?
- Why is there a hole in the ozone layer?

In S102 these questions (and many others) are answered scientifically. The course covers four scientific disciplines - physics, Earth sciences, chemistry and biology - and we show how they are interrelated and point out what is common and what is specific to each discipline.

The course begins by considering very familiar observations such as the alternation of day and night, the changing phases of the moon and the cycle of the four seasons. We explain how these observations can be understood in terms of simple scientific models of the solar system (that is, the sun, its surrounding planets and other nearby matter). Next, we consider in detail the concept of *measurement* (you will actually measure the distance between the Earth and the moon) before introducing simple scientific laws that enable us to understand motion, force and gravity. This discussion leads us to consider the Earth itself, in particular its internal structure and composition, which can be investigated in detail through measurements of the effects of earthquakes. In the next two units a scientific theory is used to explain many diverse features on and within the Earth. For example, why earthquakes and volcanoes occur mainly in certain zones, and why the remains of marine animals have been observed in rocks at the top of Mount Everest.

The course then considers energy and light, and in the next unit our knowledge and understanding of light is used to make a detailed investigation of the structure of atoms, the tiny 'building blocks' of matter. There are in all about a hundred different kinds of atom. In the millions of chemical changes that occur around us (and within us), atoms change partners and the different partnerships give rise to substances as different as salt, sand, water and petrol. Certain very complex groupings of molecules have properties that enable them to be regarded as *living organisms*. By considering the materials which make up animals and plants we discuss which aspects of living matter distinguish it from *inanimate* (non-living) objects. We learn how organisms become adapted to their environment by a process of *evolution*, how they grow and reproduce. The fundamental building block of organisms is the cell and its structure and function is described in some detail. We discuss how organisms work (physiology) using examples of human biology, and through genetic mechanisms we give you an insight into the fascinating world of genetic engineering. In the next unit you see how each individual shares the environment, how finely balanced that environment is and how easily it can be destroyed.

Next, turning to rocks and minerals - *inanimate* matter on the Earth's surface - the ages of rocks are estimated. This shows how the ages of the Earth and solar system can be determined. We look at different types of fossil and see how they can be used as evidence of past environments and ancient life forms.

The last part of the course is about the structure and behaviour of atoms and their constituents. This is a subtle and fascinating branch of science in which many of the results of experiments contradict common



sense. One of the theories that is needed to understand these extraordinary results is *quantum mechanics*, which is applied to atoms in order to derive insights into atomic structure. Finally, quantum ideas are used again when we look into the recent discoveries of high-energy physics (i.e. sub-atomic and sub-nuclear physics) that have made this branch of science one of the most exciting fields of human endeavour.

As you can see, S102 covers a very wide range of topics. The content is detailed and the insights the course will give you into modern science will enable you to appreciate the exciting and enormous scope of scientific enquiry. Indeed, whatever your previous training in science, S102 will increase and enrich your understanding of the world about you.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [S100], [S101].

**Assessment** Three components: (i) eight TMA's (33%), (ii) ten CMAs (17%) and (iii) the examination (50%). Substitution will apply and is explained in the Course Introduction and Guide.

The examination is computer marked and covers all four disciplines: physics, chemistry, biology and Earth sciences. You will be sent a specimen examination paper during the year to give you an idea of the structure and level of the paper.

**Broadcasts** Television is especially important in teaching science because so much of science is visual and dynamic, and also because we can use television to take you into laboratories or out into the field and have you join with us in making observations and measurements. The television programmes were made on the assumption that you have, or have access to, a colour television. The thirty-five programmes are linked very strongly to the other course components, so you will be at a grave disadvantage if you cannot receive them.

**Cassettes** We make extensive use of audio cassettes, which are usually used in conjunction with illustrations in the units and enable us to talk through certain important topics in the course. You will be expected to provide your own cassette player but you will not have to return the cassettes.

**Calculator** You will need a calculator for some of the course work and we will advise you about a suitable type. You should note, however, that you will not be permitted to use a calculator in the examination.

**Home experiment kit** You cannot learn science without doing experiments. In S102 you will be doing experimental work directly, with the experiment kit and in the laboratories at summer school, as well as indirectly through the television programmes. (You will receive the kit in two parts.) With this apparatus you will be able to carry out a wide range of experiments and observations in biology, chemistry, Earth sciences and physics. This kit may not be taken or sent outside the United Kingdom.

**Summer school** The course-based summer school gives you the opportunity to work intensively in the laboratories of a residential university. There are also tutorial classes, films and opportunities to meet staff and students in informal surroundings.

**Students with disabilities** We will do everything we can to enable students with severe disabilities to take S102.

Those with visual handicaps are advised to ask the Office for Students with Disabilities for more detailed guidance. Attendance at summer school is essential.

**Preparatory work** You will need to be competent in basic numerical and mathematical skills. In the autumn before you begin S102 you will be sent a preparatory mailing containing booklets on mathematics linked with four short TV programmes. The TV programmes are designed to help you make the best use of the booklets and will be transmitted before the course begins. Transmission times will be given in the preparatory mailing. The starting point of the preparatory material is simple arithmetic. As well as the booklets the mailing will contain a diagnostic test of simple mathematics which will indicate exactly what mathematical skills we expect you to have at the start of the course and enable you to decide in which areas (if any) you need to do some preparatory work. If you are concerned about the level of mathematics required for S102, either at this stage or before conditionally registering for the course, consult a science staff tutor at your Regional Centre. A booklet, *Preparing for the Science Foundation Course*, and an audio tape are also included in the preparatory mailing to introduce some of the study skills used in the course.

## S203

### BIOLOGY: FORM AND FUNCTION

#### Second level: full credit

The course provides a good cover of general biology for students who do not take any other biology courses and it also teaches basic biology for those who do wish to go on to any of the third-level biology courses. The aims of the course are generally similar to those of S202, the earlier course with the same title:

- To introduce the principles of taxonomy and to review the diversity of living organisms.
- To explore the relationship between structure and function in plants and animals and their cells.
- To explore cell/cell interactions and the basic features of differentiation and development in plants and animals.
- To demonstrate problems of living in selected environments and the physiological mechanisms which allow organisms to survive in various physico-chemical conditions.
- To investigate the evolution of physiological mechanisms and to demonstrate the importance of regulation and control in homeostatic processes.

By the end of the course you will have acquired some of the skills appropriate to intending professional biologists, such as using principles given in the course to suggest and test hypotheses; communicating ideas and conclusions about biological topics and the results of your own investigation; recalling facts, theories and generalizations introduced and developed in the course.

**Content** Three themes underlie the course: energy relationships, structure-function relationships and mechanisms of regulation and control. There is a general emphasis on adaptation to environment. The course consists of five books and study guides.

**Block 1 Diversity of organisms** (3 unit equivalents) The course starts with study of the diversity of organisms and introduces micro-organisms, plants and animals. Some of the biological factors that have promoted and maintained such a huge variety of organisms are examined, and reference is also made to examples from recent research that have helped to provide an explanation for diversity. The book ends with a detailed summary of the anatomy, life history and taxonomy of the most abundant and diverse groups of plants and animals.

**Block 2 Cell structure, function and metabolism** (6 unit equivalents) The unifying features characteristic of all organisms are demonstrated by study of cell structure and function. The dynamics of cell metabolism are examined with special emphasis on enzymes as regulators and cell membranes as regulatable barriers.

**Block 3 Animal physiology** (11 unit equivalents) considers the parts played in regulation and control of reproductive cycles and of homeostasis by hormones and nerve cells. There is study of respiratory and circulatory systems, then feeding, digestion, and excretion and osmo-regulation. Special emphasis is given to mammals and insects, but many references to other groups of animals are made.

**Block 4 Plant physiology** (6 unit equivalents) begins with plant structure, photosynthesis, ion uptake and transport of nutrients, followed by water relations. Cell growth and development in plants are illustrated by consideration of the life-cycle of flowering plants from germination to seed production.

**Block 5 Development** (5 unit equivalents) Developmental biology follows with a discussion of the processes of growth, cell differentiation and morphogenesis in terms of the properties of cells and their interactions which result in the integrated form and function of the mature organism.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [S202], [S221], [S223], [S225].

**Recommended prerequisites** [S101] or S102.

**Complementary and related courses** SD287 (or S206), S298, S324, S235, S326, S364, U205.

**Assessment** Eight TMAs, up to eight CMAs and the examination.

**Broadcasts and cassettes** Thirty television programmes and up to five cassettes are planned.

**Home experiment kits** The kit will include a microscope and a balance.

**Summer school** There will be a course-based summer school designed to give you practical experience and experimental work on plants and animals.

**Academic Computing Service** Computer exercises are planned on parts of the course.

**Students with disabilities** Those with visual disabilities will have particular difficulties but others should cope with most of the essential parts of the course as long as they have adequate help. Course and supplementary materials are not available on tape.

## S236 GEOLOGY

#### Second level: half credit

This is the core Earth sciences course at second level. It provides a practical introduction to geology by making use of a kit with a polarizing microscope, rock thin sections, minerals, fossil casts and geological maps. Anyone with an interest in the physical landscape should find this course interesting.

#### Content

**Block 1 Maps** (3 units) briefly considers the relationship between the landscape and the underlying rocks with illustrations from different parts of Britain. The main part of the block looks at geological maps in detail and shows how they can be interpreted systematically.

**Block 2 Earth materials** (2½ units) looks at rocks and minerals and provides an introduction to the techniques by which they can be described, identified and classified, both in hand specimen and in thin section using the polarizing microscope.

**Block 3 Internal processes** (3 units) The first half describes the formation of igneous rocks. The second half considers how rocks deform and shows how large-scale tectonic processes are reflected in small-scale deformation features like folds and faults. Metamorphism, the recrystallization of materials under high temperature and pressure, is considered in relation to the conditions that characterize particular tectonic environments.

**Block 4 Surface processes** (3 units) The first part establishes the basic principles of sedimentology while the second examines how sedimentation takes place in different surface environments. The block concludes with a look at the global pattern of sediment deposition.

**Block 5 Fossils** (3 units) starts by considering the invertebrate fossil groups and trace fossils and shows how the fossils in the home experiment kit can be identified and how the way of life of the organisms that they represent can be interpreted. The rest of the block considers the fossilization process and explores the ways in which geologists can make use of fossils by illustrating their use in reconstructing past communities, environments and geographical distributions, while the last part emphasizes their value in evolutionary studies and in stratigraphical correlation.

**Block 6 Historical geology** (1½ units) summarizes the most important events in the geological history of the British Isles over the last 2000 million years.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [S23-].

**Recommended prerequisites** You will be expected to have completed S102 or to have an

equivalent background in science, especially Earth sciences.

**Complementary and related courses** S236 is a prerequisite for the third-level Earth science courses S338 and S339. It will also provide useful background for S330 and S365.

If you are considering taking other second-level Earth science courses (either S237 or S238 or the remakes of these two courses) it is probably best to take S236 first. In our current plans S237 will not be presented in 1992, a revised version of it should be available from 1993.

**Assessment** Three components: (i) four equally weighted TMAs (30%); (ii) five equally weighted CMAs (20%) and (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Tuition** Tutorials will concentrate on the first three blocks of the course before summer school. They may include practical sessions and a field trip but the details will vary from region to region.

**Broadcasts and cassettes** Sixteen TV programmes, used to provide the 'fieldwork dimension' and to illustrate the course texts. Colour television will be an advantage and is recommended to give the maximum effect.

Six hours of audio cassettes with printed colour-plate booklets are used mainly to aid understanding of difficult text sections, help introduce the practical work by providing step-by-step instructions, and enrich main text materials by dealing with interesting peripheral subjects.

**Home experiment kit** The kit contains geological maps, a polarizing microscope, rock and mineral specimens, rock thin sections, plaster casts of fossils and a compass clinometer. It is used extensively in Blocks 1, 2 and 5 and to a lesser extent in Blocks 3 and 4. This kit may not be taken or sent outside the United Kingdom.

**Summer school** Course based, held at Durham University, devoted to fieldwork in a variety of places in Northern England. The week's programme will also include several laboratory-based sessions to support the fieldwork.

**Students with disabilities** The course requires detailed work with rock and fossil specimens, the microscope and maps, and so is unsuitable for students with badly impaired eyesight or colour vision difficulties, and may be a problem if you have severely impaired manual dexterity. The summer school fieldwork, which is an essential part of this course, may be extremely difficult for those with significantly impaired mobility and will be impossible for those confined to a wheelchair.

**Preparatory reading** The following texts from [S101]: Units 6, 7, 26, 27 and 28, or S102 Units 7, 8, 28 and 29.

**Set books** 1:625000 10-mile Geological Survey maps of Britain, North and South Sheets, 3rd edition (solid) 1979. Folded editions are probably easier to handle. These will be needed from the start of Block 1, so you must purchase them before the course begins.

## S237 THE EARTH: STRUCTURE, COMPOSITION AND EVOLUTION

#### Second level: half credit

Last presentation in 1991

S237 explores in more detail many of the aspects of Earth sciences introduced in the science foundation course. It occupies an independent place among the science courses, yet complements and marginally overlaps the subject matter of the other second-level courses in Earth sciences (S236 and S238). If you are considering taking S236 *Geology*, it would probably be advantageous to take S236 first, and then S237 (or its replacement), perhaps in combination with S238 (or its replacement). Our current plan is not to present S237 in 1992, but a revised course should be available from 1993.

The course develops a model for the history of the Earth, tracing its evolution from its early accretion, through the development of its layered structure from the core to the atmosphere, on to the establishment of the present dynamic interior and the mobile 'plate tectonic' activity at the surface. This is



achieved principally by using geophysical and geochemical techniques which reveal the main structural subdivisions of the Earth, their composition and evolution. The course takes its evidence from a wide variety of sources such as studies of earthquakes, gravity, the planets and meteorites. S237 also gives an insight into the ways in which past and present processes within and upon the Earth, such as volcanism, the generation of magmas and the formation of ore deposits, affect modern civilizations.

**Content** The main component of S237 is a series of seven blocks which amount to sixteen course-unit equivalents. (Parts of Blocks 5 and 6 will not be assessed.)

**Block 1 Earth composition: elements, minerals and rocks (2½ units)** provides a preliminary understanding of the composition and origin of the Earth. It considers the formation of the chemical elements and examines the physical and chemical factors influencing their incorporation into minerals, rocks and the Earth's layers. Finally, it summarizes the main surface and internal geological processes of the Earth.

**Block 2 Earth structure: earthquakes, seismology and gravity (3 units)** Discussion of earthquakes is followed by seismology, the internal structure of the Earth and the Earth's gravity. The Earth's internal density variations are deduced and then interpreted in terms of chemical and mineralogical composition and rock types.

**Block 3 Igneous processes: phase relations and geochemistry (2 units)** considers the formation and evolution of igneous rocks by following the likely conditions that cause melting and crystallization deep within the Earth and in the products of volcanoes, using trace element geochemistry, liquid/solid variations during crystallization and melting, and variations in isotope ratios, which can be used in the radiometric dating of rocks.

**Block 4 Earth dynamics: heat flow and mantle convection (2 units)** A discussion of plate motions and plate geometry is followed by an analysis of how the Earth's mantle convects and how the plates move. This entails using measurements of heat flowing from the Earth's surface and considering models for the production and loss of the Earth's heat.

**Block 5 Surface processes: from weathering to diagenesis (2 units)** considers the composition and evolution of the upper, sedimentary part of the Earth's crust: the process starts with weathering, proceeds by erosion, transport and deposition of the solid and dissolved weathering products, and is completed by conversion of these materials into sedimentary rocks.

**Block 6 Crustal anomalies: economic deposits and pollutants (2 units)** examines the formation of and the geophysical and geochemical surveying techniques used for finding economic deposits of fossil fuels. Environmental aspects of geochemical anomalies are also considered.

**Block 7 The Earth's origin and evolution (2½ units)** The first part of Block 7 looks at the formation of the solar system, planetary accretion processes and the development of internal layering. Later, deductions based on geological evidence of processes and patterns in the continental crust throughout Earth history are used as a key to understanding the changes that have taken place inside the Earth.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** If you have gained credits which include both the one-sixth-credit courses [S2-2] and [S2-4] you will not be able to count S237 for credit towards your degree. If your credits include only one of these courses you will be eligible for credit in S237.

**Recommended prerequisites** You will be expected to have successfully completed S102, or to have achieved at least A level standard in some scientific subjects. In particular, you should have a basic understanding of simple mathematical and chemical equations.

**Assessment** Three components: (i) TMAs 01-04 (35%); (ii) CMAs 41-44 (15%) and (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Broadcasts and cassettes** Seventeen TV programmes, which should be seen in colour for full benefit; 5½ hours of audio cassette time.

**Home experiment kit** The kit contains models for the study of silicate mineral structures (Block 1) and of phase diagrams (Block 3) and a suite of rock specimens. This kit may not be taken or sent outside the United Kingdom.

**Students with disabilities** As the course includes no outdoor fieldwork, students with mobility problems should have little difficulty. Those with serious visual handicaps may find some of the home experiments and audiovisual activities demanding.

**Preparatory reading** This reading is entirely voluntary and you are not expected to buy these books.

Geochemical topics: B. Mason (1966) *Principles of Geochemistry*, John Wiley and Sons, chapters 1-3, 5 and 11. K. K. Turekian (1971) *Chemistry of the Earth*, Holt, Rinehart and Winston, chapters 1-5 and 8.

Rocks, minerals etc: I. G. Gass, P. J. Smith and R. C. L. Wilson (1972) *Understanding the Earth*, Artemis Press, chapters 1, 3 and 8. W. G. Ernst (1969) *Earth Materials*, Prentice-Hall, chapters 1 and 5.

Geophysical topics: B. A. Bolt (1987) *Earthquakes: a Primer*, W. H. Freeman (second edition), all chapters. P. J. Smith *Topics in Geophysics*, The Open University Press, especially chapters 1 and 4.

General view: P. J. Wyllie (1976) *The Way the Earth Works*, John Wiley and Sons. G. C. Brown and A. E. Mussett (1981) *The Inaccessible Earth*, George Allen and Unwin.

Revision of [S101], Units 10 and 11, 14 and 15, Section 5 of Unit 26, all of Unit 27, Sections 2 and 3 of Unit 28 or S102, Units 11 and 12, 15 and 16, 27 and Sections 4, 7 and 8 of Units 28/29 is also recommended.

## S238 THE EARTH'S PHYSICAL RESOURCES

### Second level: half credit

Why is coal found where it is, and why is it so plentiful in Britain (or is it)? Why has china clay replaced tin and copper as the most valuable export from south-west England? Why does good drinking water cost one pound a litre in Saudi Arabia, where petrol costs 20 pence a litre? The answers to questions like these and many others are to be found in this course. The availability, the economics and the methods of exploring for and extracting the Earth's physical resources are profoundly influenced by the geological setting in which they are found. S238 will show you the nature and extent of that influence.

The course has a strong topical appeal. Students who have taken it use phrases like 'relates to everyday life', 'relevant to the real world', 'practical approach', and 'makes one better informed on current news issues', to express their views about it. They have also shown great appreciation of the value of the course-based summer school.

As well as being part of the Earth sciences course profile, S238 is also particularly appropriate for those concerned with economic and applied geology, the exploitation, use and management of resources, environmental and pollution control, and land reclamation.

**Content** The sixteen units are divided into six blocks. *Block 1* provides an introduction to the concepts of resources and reserves, to basic economic principles controlling their use, to their economic history, to their role in industrial society and to the geological principles which govern the global distribution of resources.

Blocks 2-5 are the 'core' of the course and cover the formation and distribution of, the exploration for and the extraction and processing of the four main groups of resources. *Block 2 Constructional and other bulk materials* deals with the raw materials used in the construction and chemical industries. *Block 3 Ore deposits* is about the rocks from which metals are extracted. *Block 4 Water resources* discusses all aspects of water resources. In *Block 5 Energy resources* the main sections deal with coal, petroleum, nuclear power, and renewable energy resources. *Block 6* looks at predictions of the availability

of and the demand for physical resources in the future, with special reference to the 'limits to growth' debate and the future demand for electric power in Britain.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [S266], [S26-].

**Recommended prerequisites** You are expected to have completed [S101] or S102 or to have acquired an equivalent knowledge of science. You will also be expected to be able to use simple linear and logarithmic graphs and to perform simple calculations.

**Complementary and related courses** S236 would provide a useful geological background. If you intend to study both courses you are advised to complete S236 before S238. S237 also complements parts of S238.

**Tuition** Tutorials concentrate on the study of Blocks 2-5. They may also include practical sessions or a visit to local sites of resource extraction (quarries, opencast or underground mines and reservoirs) but details will vary from region to region.

**Assessment** Three components: (i) four equally weighted TMAs (30%); (ii) four CMAs, two of which are half-weighted (20%), and (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Broadcasts** Seventeen TV programmes mostly filmed on location, about half of it abroad. The programmes are used to illustrate the most difficult concepts presented in the text (such as the three-dimensional nature of deposits), to raise the level of understanding of the material, and to link many of the strands of the course with case studies.

**Cassettes** Four and a half hours of audio cassette time to be used in conjunction with printed colour-plate booklets.

**Calculator** A calculator is desirable.

**Summer school** A course-based summer school will be held at the University of Nottingham. At least half the time will be spent on fieldwork at active resource sites in the East Midlands. The rest will include the field and laboratory use of various exploration, evaluation and processing techniques, a group resource planning exercise and tutorials.

**Students with disabilities** Students with impaired mobility or manipulative or visual problems should cope with all parts of the course; if your mobility is significantly impaired you may find the summer school difficult; it may be impossible if you are confined to a wheelchair.

## S246 ORGANIC CHEMISTRY

### Second level: half credit

Organic chemistry is a subject that affects our lives in many different ways. Living things are largely made of organic materials. Many fabrics are made from synthetic organic compounds. The pharmaceutical industry is almost completely dependent on organic chemicals. A knowledge of organic chemistry is essential to an understanding of these and other aspects of everyday life.

The course provides an introduction to organic chemistry for those with an interest in science. An important aim of the course is to show how problems in such diverse areas as petrochemicals, polymers, pharmaceuticals and biological systems can be tackled using basic principles of organic chemistry.

**Content** The course comprises five blocks covering different aspects of organic chemistry. In each block the principal concepts and methods are established and applied to systems of particular relevance and interest.

One of the topics dealt with is how chemists design new drugs or modify the active ingredient in traditional remedies to provide safer or more effective drugs. In another study, we look at how plants build up some quite complex compounds from simple starting materials, and the plant chemistry is shown to be analogous to much laboratory chemistry. We also look at complex natural molecules such as proteins, and synthetic fibres such as terylene and

nylon. These polymers are made by joining together thousands of simple molecules often arranged in easily recognizable repeating units.

An examination of the isolation of compounds and the determination of molecular structure follows. Structure determination relies heavily on a study of the interaction of radiation with matter and this subject, spectroscopy, is dealt with in some detail. This leads on to a description of how the atoms in molecules are bound together.

Having established the structure of organic molecules, we look at their reactions from a mechanistic point of view. That is, we try to understand, at the molecular level, how reactions proceed and the molecular features that affect reactivity. We show that with a small number of basic ideas we can explain many reactions occurring in the laboratory, the chemical industry and even in the cells of living organisms.

The course ends with a look at synthesis, arguably the highest form of art within organic chemistry. Synthesis is about building more complex molecules from simpler, more readily available starting materials. This topic brings together much of what has been covered in the earlier part of the course. It also leads us back to a consideration of the present sources of organic compounds and possible future changes in these sources.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [S24-], which it replaces.

**Recommended prerequisite** S102.

**Tuition** There will be tutorial classes and four CALCHEM (computer-assisted learning in chemistry) programs. These programs will be available on disks.

**Assessment** Three components: (i) TMAs 01-04 (32%); (ii) CMAs 41-44 (18%) and (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Broadcasts** Eight TV programmes, three-hours of video cassette material and four radio programmes which provide reports about the CMAs. There are also three audio cassettes.

**Home experiment kit** There will be a home experiment kit, which may not be taken or sent outside the United Kingdom.

**Summer school** A discipline-based summer school which also satisfies the requirements for S247.

**Students with disabilities** Although there is a fair amount of experimental work to be carried out at home and at the summer school, you should not be discouraged from taking this course. Please ask the Office for Students with Disabilities or the S246 course manager at Walton Hall for more information.

## S247 INORGANIC CHEMISTRY: CONCEPTS AND CASE STUDIES

### Second level: half credit

Last presentation in 1991. S247 will be rewritten for 1992.

The course introduces contemporary ideas in inorganic chemistry: ideas which are not only required by those with a direct interest in chemistry but which provide a basis for the study of several other courses. This course is at the centre of any degree programme that involves a molecular view of science.

The course is in seven blocks, varying from 3¼ units for Block 4 to just over one unit for Block 7. The blocks are supplemented by four case studies, each about ¼ unit.

#### Content

*Block 1* opens with the structure and reactions of metals. The industrial extraction of sodium, magnesium and aluminium is discussed, and the possibility of grading metals according to their 'reactivity' is explored. This idea is then examined quantitatively using thermodynamic concepts.



**Block 2** covers the solid state. The concepts of lattices, unit cells and close-packing are discussed and illustrated through model-building exercises. Lattice energies are calculated theoretically and values compared with those obtained from the Born-Haber cycle.

**Block 3** deals with the typical metals sodium, magnesium and aluminium, coordination chemistry and three bioinorganic topics: membrane transport, the role of haemoglobin and Wilson's disease.

**Block 4** introduces the concept of symmetry and its application to bonding. The block starts with a treatment of valence shell electron pair repulsion theory for determining the shapes of simple molecules. This is followed by a description of symmetry elements, simple point groups and character tables. The combination of atomic orbitals to produce molecular orbitals in diatomic and polyatomic molecules is then examined leading to band theory in metals and semi-conductors.

**Block 5** relates the chemistry of the elements to periodic trends in the atomic properties (size, electron affinity, ionization energy and electronegativity). There is a discussion of the chemistry of the second row elements, hydrogen, the halogens and the noble gases.

**Block 6** looks at rotational spectroscopy and then uses the symmetry concepts to study vibrational spectroscopy. Infrared and Raman techniques are used to establish the shapes of simple inorganic molecules.

**Block 7** is about the chemistry of non-metals, mainly silicon, phosphorus and sulphur.

The four case studies look at topics of current scientific or social importance, using principles learned in the course. They cover the thermochemical generation of hydrogen and its importance as a fuel; the use of photovoltaic cells in producing electricity from solar energy; the use of rotational spectroscopy in studying molecules in space; and the influence of phosphorus chemistry on the environment.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [S25-1].

**Recommended prerequisites** There is no formal mathematical requirement for this course, but it is assumed that you have studied the science foundation course.

**Assessment** Three assessment components: (i) TMAs (01-04 (32%)); (ii) CMAs 41-45 (18%); and (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Broadcasts** Eleven TV programmes, transmitted at regular intervals, which are an important part of the course; it would be valuable, though not essential, to view in colour.

**Home experiment kit** Experimentation is important in chemistry: there is a kit which may not be taken or sent outside the United Kingdom.

**Summer school** The discipline-based summer school, shared with S246, has a large laboratory element.

**Students with disabilities** Although there is a fair amount of experimental work to be carried out at home and at the summer school, you should not be discouraged from taking this course. Please ask the Office for Students with Disabilities or the S247 course manager at Walton Hall for further information.

## S256 MATTER IN THE UNIVERSE

### Second level: half credit

Astronomy is a wide subject which draws on many branches of science. This course introduces many aspects of astronomy, though it makes only brief reference to the origin and ultimate fate of the Universe. It should serve both those who intend to go no further with astronomy and those who regard it as the start of a deeper study.

The aims of the course are

- To describe the present 'layout' of the cosmos.

- To outline how matter evolves on a cosmic scale from diffuse clouds of hydrogen and helium to yield all the various forms of matter that exist in the cosmos today.

- To develop the basic physics and chemistry you will need for the course, in particular nuclear physics/chemistry, and the various physical and chemical processes which operate within galaxies, stars, planets and interstellar clouds.

- To describe the main observational techniques used to establish the nature of the objects in the cosmos, notably imaging and spectroscopy and analysis of acquired samples.

- To introduce an active scientific endeavour in which the practical side is observational rather than experimental, and which draws on several traditional disciplines.

#### Content

**Block 1** summarizes the general 'layout' of the cosmos, and introduces some of the observational equipment which has been used to study it.

**Blocks 2-3** discuss the interstellar medium, its diverse nature, the (mainly spectroscopic) techniques by means of which it has been explored, and the chemical and physical processes that operate within it.

**Blocks 4-5** describe stars, how they form from the interstellar medium to yield a rich variety of types, their evolution, the nuclear processes that operate within them and the ultimate return of some of their material to the interstellar medium. The main techniques used to investigate stars are outlined.

**Block 6** is about galaxies, vast and complicated structures in which most stars and the other forms of cosmic matter reside.

**Blocks 7-8** introduce planetary systems, in particular our own solar system, and the various theories of the origin and evolution of planetary systems. An outline is given of the main techniques which have been used to study planetary systems.

The approach is largely descriptive. There is, however, some necessary use of mathematics, the level being that developed in S102. In particular, familiarity with graphs, and with algebraic and chemical equations is assumed, and you will be expected to perform a fairly large number of calculations.

Please note that topics such as cosmology, positional astronomy, and making your own observations are not prominent in this course.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** S256 is firmly based on S102 and contains astronomy taught at second level and much new, underlying physics and chemistry. It is essential that you have a thorough grasp of the physics and chemistry units from S102, Units 2 and 3, 5 and 6, 9-18, 28-31, or [S101] Units 2-5, 8-17, 26, 28-30 or [S100] Units 4-8, 10-12, 22, 23, 27-31. You should have obtained good grades on assignments relating to most of these units, or feel that you could obtain such good grades now. Mathematics is used fairly extensively and if you have not thoroughly grasped the mathematics in S102, you should not attempt S256. If you have not passed the science foundation course you should examine the units listed above, and only if you feel that you could grasp most of their contents fairly easily should you contemplate embarking on S256.

**Complementary and related courses** S256 is the cornerstone of Open University astronomy and planetary science, which has been chosen by the Science Faculty as an area for coherent development. At present the other courses in this area are S237, S330, S354 and ST291. Outside this area, the physics content of S256 is dealt with more fully in parts of S271 and the chemistry content in S342.

It does not matter very much where S256 comes in the order in which you take courses, but you should note that most of the above courses carry more recommended prerequisites than does S256. However, the physics department considers that S256 is more demanding than S271, and that you should bear this in mind when choosing your courses.

**Assessment** Three components: (i) four TMAs (30%); (ii) five CMAs (20%); and (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Broadcasts and cassettes** There are eight TV programmes. You will be sent a short audio

cassette which contains the CAL tutorial programs in a format suitable for the BBC microcomputer. You are not required to have access to a microcomputer: see Academic Computing Service below.

You will also be sent a two-hour video cassette, which you will be asked to use on at least three separate occasions throughout the course. Replay machines are available in some study centres in the UK; however, if you have access elsewhere to a VHS machine that would be an advantage. If you are unable to watch the video cassette, you can still complete S256 successfully.

**Academic Computing Service** There are three tutorial-type CAL (computer-assisted learning) programs. To obtain the full benefit you will need access to a computer terminal about three times during the course. But if you cannot use these programs you can still complete S256 successfully.

**Students with disabilities** The absence of a home experiment kit and a summer school makes this course a good choice, though if you have a severe visual handicap and cannot make full use of the TV programmes and the video cassette you may have some difficulties. Course and supplementary materials are not available on tape.

**Preparatory reading** There is no set book for S256. However, if you wish to do some preparatory reading, there are some recent introductory texts on astronomy which you may find useful, for example M. A. Seeds (1988) *Foundations of Astronomy*, Wadsworth (2nd edition). Make enquiries at a good bookshop or, for a list of suitable texts, send a stamped addressed envelope to The S256 Course Manager, Physics Department, The Open University, Milton Keynes MK7 6AA. You could also revise S102 Units 10-12 (or [S101] Units 9-11 or [S100] Units 6, 7 and 28). But please note that we do not require you to do any preparatory reading.

## S271 DISCOVERING PHYSICS

### Second level: half credit

S271 is your introduction to physics. To understand many phenomena, it is necessary to have a grasp of the basic ideas of physics. For example, the paths of rockets and satellites can be explained in terms of Newton's ideas about motion and gravity; the laws of electromagnetism account for lightning, and quantum mechanics explains the structure of atoms and how a laser works. S271 is designed for a wide range of students. You may want a brief taste of physics in order to satisfy your curiosity about the world around you or as a background to other science courses. If so, you can take S271 at any stage in your degree. On the other hand, you may intend to specialize in physics. In this case, we recommend that you take S271 immediately after foundation-level courses.

**Content** Although the course does not have historical aims, the progress of the sixteen units mirrors the development of physics from the time of Newton to the most recent astrophysical speculations.

**Unit 1** introduces some of the techniques of physics in a case study which establishes the distances to planets, stars and galaxies.

**Units 2-5**, a block on mechanics, examines questions such as: what is the path of a golfball; how much energy can be stored in a flywheel; how does gravity shape planetary orbits? The answers are found in the laws of mechanics expressed in the mathematics developed in Unit 2. Physics is largely framed in the language of mechanics (force, mass, momentum, energy, etc.) and one of the main tasks of this block is to introduce these important concepts.

**Units 6-8** Underlying both chemistry and biology are the electromagnetic forces which bind atoms together. In this block the ideas of electromagnetism are developed with illustrations as diverse as lightning, plasma confinement and electrical energy storage.

**Units 9-10** Looked at closely enough, everything – springs, violins, and atoms – is oscillating. In these units we introduce the general ideas of oscillations and waves that describe all these systems.

**Unit 11** A first step into the microscopic world. The macroscopic concepts of heat and temperature are related to the invisible random motion of molecules.

**Unit 12** deals with Einstein's Special Theory of Relativity. You will see why your intuitive understanding of space and time breaks down for speeds close to that of light.

**Units 13-15** Just as Einstein's work overthrew classical ideas of space and time, quantum theory requires us to abandon our conventional views of matter and light. This change in perception was the subject of anguished and prolonged debate but led to a consistent description of the structure of both atoms and nuclei.

**Unit 16** uses the content of the course in an account of the physics of stars. Our sun is at present enjoying a long stable period, but ultimately all stars collapse into a white dwarf, neutron star or black hole.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** The course assumes certain basic scientific and mathematical skills. For example, graphs, algebra and trigonometry are freely used without introduction. If you have successfully completed S102 and have enjoyed the physics-oriented units, you should have sufficient of these skills. S271 is also written so as to be accessible to students who have taken either M101 or T102. If you are in this group you should either have experience of basic physics and mathematics or have an ability to assimilate that material rapidly when it is re-taught.

**Complementary and related courses** S271 is a prerequisite for S272 and for the third-level physics course SM355; we also strongly recommend that you take it before embarking on SMT356 at third level. You will also find that S271 forms a very useful background to S256, ST291 and to S354. A higher level of mathematics is required for S272, SM355 and S354 than for S271, and you could gain the necessary mathematics background by studying M101/MS283 and then MST204.

**Assessment** There are three components: (i) five TMAs (33.3%); (ii) five CMAs (16.7%); and (iii) the examination (50%). The summer school grade is included as TMA 05 for the purpose of assessment but there is no assignment. Substitution will apply for up to one TMA and one CMA.

**Broadcasts and cassettes** The sixteen TV programmes have an important role and their content, summarized in the broadcast notes, is assessable. There are also five audio cassette tapes for use within the units.

**Home experiment kit** There is a fairly simple kit that is used in conjunction with five of the earlier course units. This kit may not be taken or sent outside the United Kingdom. Measurements are made on electrical and mechanical systems.

**Summer school** Course based, with laboratory sessions and tutorials as well as the opportunity to perform computer simulations and watch course TV programmes.

**Students with disabilities** If you have severe manipulative or visual problems which would interfere with experimental work or your appreciation of complex diagrams, you will be at a serious disadvantage in studying this course.

## S272 THE PHYSICS OF MATTER

### Second level: half credit

Everybody knows that gases expand on heating, that rubber is very stretchy and that metals are good conductors of electricity. The physics of matter will tell you why. It also answers questions such as: what is it about silicon that has led to the silicon-chip revolution? How do temperature inversions in the atmosphere arise? Why do some liquids become superfluid at very low temperatures? The answers in all cases are obtained in terms of fundamental physical ideas.

Throughout the course the emphasis is on the consequences of general principles. That makes S272 a natural choice for all science and technology students who wish to understand the behaviour of matter at a fundamental level.

S272 is designed to follow on naturally from the introductory physics course S271, but it assumes a slightly higher level of mathematical knowledge, corresponding to the first twelve units of M101 and MS283. The course is carefully pitched at such a level that



S272 is a valuable stepping stone between introductory courses like S271 and the more demanding third-level physics courses.

The course also shows the importance of experimental work in physics and teaches some essential experimental skills by means of television programmes and summer school laboratory work.

## Content

### Block 1 General preparation

**Unit 1 Temperature, energy and the structure of matter** provides a survey of the role of temperature in determining the structures and properties of matter. At high temperatures matter is in the form of a plasma; at low temperatures startling new effects such as superfluidity emerge. The methods used for attaining millikelvin temperatures are examined in the television programme.

**Unit 2 Macroscopic description of matter** Macroscopically the state of a sample of matter is specified by just a few variables: pressure, volume, temperature etc. The relationship between these variables can be represented by means of a surface, which provides a unified description of the properties of the substance and a map of its different phases.

**Unit 3 Microscopic models of matter** Deeper understanding requires that the macroscopic properties of matter be explained in terms of microscopic (atomic) models. This unit contrasts two quite different microscopic approaches to the modelling of matter: classical and quantum mechanics.

**Unit 4 The Boltzmann factor – sharing out the energy** introduces the Boltzmann distribution law which connects the microscopic models of Unit 3 to the macroscopic properties of Unit 2.

### Unit 5 Block 1 revision and consolidation

#### Block 2 Gases

**Unit 6 Equilibrium properties of gases** deals with the properties of real gases with particular reference to the properties of the atmosphere (e.g. the speed of sound and the dependence of pressure and temperature on height).

**Unit 7 Transport properties of gases** discusses 'transport processes' (such as diffusion, heat conduction and viscous flow) by extending the simple classical gas model of Unit 3.

**Unit 8 Quantum gases – photons and electrons** Units 6 and 7 were about 'classical gases'. Unit 8 deals with the more exotic quantum gases, for example the 'gas' of electrons inside an electrical conductor and the 'gas' of photons that make up light. It turns out that neither of these 'gases' obeys Boltzmann's law (Unit 4), and the reason for this can be traced back to a fascinating aspect of quantum physics.

#### Block 3 Solids

**Unit 9 Structure and bonding in solids** This first unit of the 'Solids' block discusses techniques of structure determination and surveys a variety of microscopic structures, ranging from the ordered lattices of ionic crystals and metals, through liquid crystals to amorphous materials such as glass. Microscopic models of these structures are then used to explain bonding and cohesive energies in solids.

**Unit 10 Mechanical properties of solids** looks at a wide range of phenomena from the tremendous stretchiness of a rubber band to the ductility of metals to the brittleness of glass, and attempts to model these phenomena theoretically.

**Unit 11 Thermal properties of solids** begins by discussing Einstein's pioneering work in using quantum theory to understand the specific heats of solids, which was one of his most influential contributions to twentieth-century physics. More advanced quantum models based on the concept of the phonon are then introduced and used to account for the thermal conductivity of solids.

**Units 12 and 13 Electrical properties of solids** The ability of metals to conduct an electric current and of plastics to prevent such a flow are of vital importance in our technologically based society. These units explain why metals, semiconductors and insulators have such widely differing electrical properties. The

units also explore the applications of semiconductors to several devices, including transistors and xerox machines.

### Unit 14 Block 3 revision and consolidation

#### Block 4 Liquids

**Unit 15 Classical liquids** Classical liquids are those in which quantum effects are negligible; all the liquids with which we are familiar in the everyday world fall into this class. Unit 15 describes both their equilibrium and their transport properties. A central theme is the determination of the 'structure' of liquids, a topic of current research interest.

**Unit 16 Superflow** Liquid helium can have zero viscosity and superconducting metals have zero electrical resistance. This unit discusses these spectacular properties, with emphasis on experiments rather than detailed theory.

## NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [ST285].

**Recommended prerequisites** A pass in S271 and a pass in one of the following: M101; MS283; TM282. If you have only a Grade 4 pass in the recommended prerequisite courses you should consider carefully whether you ought to take S272. T281 students are advised that they need to do additional background reading from S102 and S271.

**Assessment** Three components: (i) four TMA's (30%); (ii) five CMA's (20%); and (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Broadcasts and cassettes** Eleven TV programmes and four 90-minute audio cassettes.

**Summer school** There is a course-based summer school which is assessed by TMA.

**Students with disabilities** If you have impaired sight or manual co-ordination you may have difficulties with the summer school experiments.

## S298 GENETICS

### Second level: half credit

S298 is a broadly based course which introduces the principal concepts, theories and methods of present-day genetics and inheritance.

The course is centred upon three inter-related topics: the processes by which the characteristics of one generation are reproduced in the next – the heredity of organisms; the methods of analysis used in the study of heredity; and the theories that have been developed about heredity, and how both the inheritance of an organism and its environment contribute to the generation of its characteristics – the developmental history of organisms.

## Content

**Unit 1** introduces the main themes of S298 and provides a general view of the course. It not only revises and then builds on the material presented in the science foundation course but also gives a brief survey of how genetics and the study of heredity have changed over the last decade.

**Units 2–5** deal with the structure and properties of the genetic material and with the ways in which replication, repair and transmission of the genetic material are accomplished in a range of different organisms.

**Units 6–8** are about the control of the expression of the information encoded in the genetic material both in time and space, and how this control differs according to the complexity of the organisms concerned.

**Units 9 and 10** describe the development of characteristics by organisms, drawing examples from a wide range of living organisms. The use of model systems to aid the analysis of development is considered.

**Units 11 and 12** examine the genetics of populations and how experimentation and simple algebraic models can be combined to investigate the factors affecting gene frequencies in populations.

**Units 13 and 14** build on the previous pair of

units, and demonstrate how simple algebraic models can be useful when studying the genetic architecture of polygenic traits in populations.

**Unit 15** occupies a special place in the course, for it not only brings together the principal ideas developed in the earlier units but also illustrates the synthesis, taking human beings as its main subject.

There are also two ancillary texts: *Hist*, which traces the history of genetics and its social interactions through the nineteenth and twentieth centuries; and *Techniques*, which explains and illustrates some of the main experimental techniques used in modern molecular genetic research.

## NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [S299].

**Recommended prerequisites** It is assumed that you have studied S102 or have equivalent knowledge of basic biology.

**Complementary and related courses** It would be advantageous to have studied [S202]/S203. S298 is also relevant to S325 and S326.

**Assessment** Three components: (i) four TMA's; (ii) six CMA's, together worth 50%; and (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Broadcasts and cassettes** Ten TV programmes are linked with the units. They are an important part of the course because they demonstrate the experimental techniques and results of modern genetic research, as well as showing the living organisms referred to in the units. There are notes for all these programmes.

Four audio cassettes contain material which reinforces the units or provides an alternative way of explaining points made in the text. There are notes to be used with the material on the cassettes.

**Computing** A number of CAL (computer-aided learning) programs are available through study centre terminals on the University's VAX main-frame computer and also on tape for use on a BBC microcomputer. There are notes on how to access and use these. This CAL supports and enhances the material in the course, though it is not a compulsory part of it.

**Home experiment kit** The kit contains the equipment with which to undertake some simple genetic experiments with tomato seedlings, with the breadmould *Neurospora crassa* and with the fruitfly. This kit may not be taken or sent outside the United Kingdom.

**Students with disabilities** If you have impaired vision or manual dexterity you will be at a disadvantage, particularly with the home experiments. Course and supplementary materials are not available on tape.

## S324 ANIMAL PHYSIOLOGY

### Third level: half credit

This course illustrates some of the recent advances in whole-animal physiology, and examines the ways in which the physiological systems of a whole organism are co-ordinated to enable it to survive in different environments.

**Content** The course is designed to enable you to make use of knowledge and skill acquired at second level in the study of some aspects of animal physiology up to the current level of research. Second-level physiology (in [S202]/S203) puts more emphasis on the functioning of individual physiological systems. Our theme is that of *whole-animal physiology*, which considers how the responses of different animals relate to life-cycles, habits and habitats.

We develop this 'whole-animal' approach in each of the main sections of the course. In the first half, we follow an ontogenetic theme that considers how different physiological systems act together to cope with the different environmental problems encountered by animals at various stages of their life-cycle. The types of environment we consider therefore vary from the wall of the uterus, to the watery medium surrounding the foetus, to the comparative cold faced by

the new-born, and finally to deserts and polar regions. Within this framework we look at other important physiological principles – interactions between the mother and the foetus and the gradual increase in physiological competence shown by the neonate. In the adult the main physiological variable we consider is temperature.

Units 8–16 are concerned primarily with animal performance in relation to energy expenditure. We consider in mechanical terms the energetic costs and implications of different strategies animals use, particularly locomotion. The approach here again relates to the whole animal because we are considering the overall performance of the animal especially in relation to its energy budgets.

The important principles of the course are taught using a wide variety of animal examples, but the emphasis will be on fish, reptiles, birds and mammals.

## NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [S321], which it replaced.

**Recommended prerequisites** The course is written on the assumption that you have taken both S102 and [S202], and we therefore strongly advise you not to undertake S324 without an [S202] credit. Other biology second-level courses are not essential.

**Related course** S325.

**Assessment** Four assessment components: (i) TMA's 01, 02, and 04 (25%); (ii) project TMA 03 (10%); (iii) CMA's 41–44 (15%); (iv) the examination (50%). Substitution will apply for one TMA and one CMA but not to the project (TMA 03). The project is based on summer school work, but an alternative will be available for those not attending summer school in the year in which they take S324 (see below).

**Broadcasts and cassettes** Ten TV programmes, linked mainly with units in the latter part of the course. You must watch the programmes (in colour) in order to satisfy the course objectives. Many of the television programmes deal with the experimental techniques used to obtain the data discussed in the texts. There are also three hours of audio cassette material.

**Tuition** There are no home experiments, but the experimental work associated with the units is considered a vital part of the course. There will be one day-school which will provide an opportunity for experimental work. We hope that the day-school will take place in about a dozen centres, to reduce travelling distance. You will be at a disadvantage if you cannot attend.

**Summer school** The course shares a discipline-based summer school with S325 *Biochemistry and cell biology*. Here you will have the opportunity to undertake an extended project investigating a practical problem in depth in a sophisticated 'research' laboratory. An evening programme will include video cassettes emphasizing physiological methods and techniques.

Project work on this course will require preparation of a TMA on your summer school investigations in the form of a scientific paper. If you do not attend the summer school in the year in which you take S324 you will have to prepare a similar report using supplied data and research papers.

**Students with disabilities** We expect no special problem, although disabilities which impair laboratory skills would present difficulties (e.g. little manual dexterity, marked visual handicap).

## S325 BIOCHEMISTRY AND CELL BIOLOGY

### Third level: half credit

Six topics in modern biochemistry and cell biology are presented as separate books, each building on the basic information in S202. They show how an understanding of cell biology and biochemistry relates to problems in modern medicine, agriculture and industry, and how the techniques commonly used in research laboratories have led to advances in knowledge. The course also introduces the skills of experimental design, interpretation and handling of biochemical



data, critical assessment of review papers and scientific literature.

**Content** The six book topics have been chosen to illustrate different aspects of three fundamental concepts: regulation and control at molecular and cellular levels, the links between structure and function, the energy dependence of cellular activities.

The *muscle metabolism* book brings together a description of molecular structure and metabolic potential for a single tissue (vertebrate muscle), relating these to its physiological role in the whole organism in health and disease.

The *cell architecture* book outlines recent advances in the study of protein and nucleic acid structure. It shows how the spontaneous self-assembly of these macromolecules produces recognizable features of cell architecture; it looks particularly at chromatin and tubulin (cytoskeleton) and factors controlling assembly-disassembly during the cell cycle.

The *gene expression* book shows how genetic material is organized, and its expression controlled, in viruses, bacteria and higher organisms. A substantial part of the book introduces the recently developed techniques of genetic engineering.

The *microbial metabolism* book examines the diversity of structure and function of microorganisms (bacteria, micro-fungi and algae) in relation to their increasing importance as producers of antibiotics, alcohol, etc. The tremendous industrial potential of microbes with the advent of genetic engineering is emphasized.

The *receptors* book examines ways in which animal cells communicate with one another using the nervous and hormonal systems. The case study discusses various types of signal molecules, their receptors and the ways in which they interact.

The *immunology* book outlines molecular and cellular responses of the immune system to invasion by foreign material giving you the basic information you need to follow developments in this rapidly moving field. It discusses medical aspects of immunology and the use of immunological techniques in medical diagnosis and in basic biological research.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [S322].

**Recommended prerequisites** S102 and [S202]/S203. The course builds directly on [S202]/S203, and if you were happy with the cell biology in that course (Units 4-10) you should have no problems with S325. However, if you found these units difficult, particularly the chemistry in them, you are strongly advised to take a second-level chemistry course (S246 or S247) before embarking on S325.

**Complementary and related courses** [S202], S298, S324, S341.

**Assessment** Four components: (i) TMA 01-02 and 04 (25%); (ii) the project, TMA 03 (10%); (iii) CMA 41-43 (15%); (iv) the examination (50%). Substitution will apply for one CMA and one TMA in component (i), but not to the project component (ii). The project is based on summer school work, but an alternative is available for those not attending the summer school.

**Tuition** There are no home experiments but one intensive four-hour tutorial session may be used to illustrate experimental techniques, to allow you to perform a short experiment, and to discuss handling of experimental data.

**Broadcasts and cassette** A returnable video cassette contains material designed to elucidate selected passages of the books, presenting conceptually difficult material in an alternative form. You should arrange to have access to a video recorder for at least two study sessions during the year. There are also eight television programmes.

**Summer school** The experimental component of the course is completed at a discipline-based summer school.

**Students with disabilities** Students with impaired manual dexterity may have difficulty in manipulating pipettes, syringes and other apparatus at the summer school. Those with a visual handicap are warned that many of the course components are difficult to transcribe onto tape, because they rely heavily on complex diagrams. Course and supplementary materials are not available on tape.

## S326 ECOLOGY

### Third level: half credit

The study of ecology encompasses all aspects of the interactions of organisms with one another and with their environment, and so is an important part of biology. This course examines the biological principles which form the basis for analysing and understanding ecological situations.

We want you to become aware of the complexity of interrelationships between living organisms and to acquire some of the skills and knowledge needed by professional biologists. The experimental approach is stressed as the one most likely to lead to a better understanding of the basic principles and so to a greater success in making predictions and constructing models.

**Content** There are four main blocks:

**Block A Ecosystems** (Units 1-4) examines the role of primary producers, consumers and decomposers in ecosystems. This block concludes with the study of a number of different examples of whole ecosystems.

**Block B Distribution and interactions** (Units 5-8) The distribution of individuals is discussed in the light of their tolerance to environmental factors; their environmental requisites; their means of dispersal; historical aspects; their interactions with members of the same species and with members of other species.

**Block C Population ecology** (Units 9-14) considers how sizes of populations can be measured or estimated and the processes which determine or regulate the sizes of plant and animal populations. A wide range of examples is discussed. This part of the course requires study of the set book, Begon and Mortimer *Population Ecology* (see below).

**Block D Humans and ecology** (Units 15 and 16) The conflicts of interest between conservation, food production and increase in human population are discussed in the light of ecological principles developed earlier in the course.

Practical fieldwork is carried out in two important parts of the course: a one-week residential school at a Field Studies Council Centre (see below), and individual projects. You are required to plan and carry out an ecological project in your home locality. Advice and support for this is provided by the Project Guide, which includes advice on the analysis of results and the use of statistics, and by close liaison with a course tutor. Two TMAs relate to the project.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [S323].

**Recommended prerequisites** It is assumed that you have taken both S102 and [S202]/S203.

**Complementary and related courses** This course complements other third-level biology courses S324, S325 and [S364], and is related to S330 [S334].

**Tuition** Tuition will be mainly concerned with the development of individual projects; there will be no course-based tutorials.

**Assessment** Three components: (i) four TMAs (two course-based and two project-based) (35%); (ii) four CMAs (15%); (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Broadcasts and cassettes** Sixteen TV programmes (which should be seen in colour) and four audio cassettes.

**Home experiment kit** A limited range of items is available on loan to support your project work if necessary. There is not a home kit sent to all students.

**Residential school** One-week residential schools are held during April and May at six centres run by the Field Studies Council. This is an essential part of the course because basic training is given in planning and carrying out fieldwork, and in identification of organisms.

**Set books** M. Begon and M. Mortimer *Population Ecology* (2nd edition) Blackwell Scientific Publications. N. Chalmers and P. Parker *Fieldwork and*

*Statistics for Ecological Projects* – the OU Project Guide, Field Studies Council, Occasional Publication No 9 (2nd edn.). (An order form for this book will be enclosed in the first mailing.)

## S330 OCEANOGRAPHY

### Third level: half credit

'Black smokers' on the East Pacific Rise and Mid-Atlantic Ridge pumping out plumes of sulphide particles at 350°C or more; the relationship between the greenhouse effect and rising sea-levels world-wide; great eddy systems in the ocean resembling atmospheric cyclones and anticyclones; subtle changes in sea-surface temperature distribution across the Pacific which not only bring disaster to Peruvian fisheries (El Niño) but are also related to drought in the African Sahel; the intermittent and sporadic pattern of sedimentation in the deep oceans; the global view of many ocean properties that satellite technology can provide – these are just some of the latest developments in the science of oceanography.

This is the most interdisciplinary course presented by the Earth sciences discipline. Oceanography is literally a 'whole Earth' science, for the oceans cover seventy per cent of our globe and interact continuously with the solid Earth beneath and the atmosphere above, while providing the setting for a large part of the planet's biological production. Physics, chemistry and biology are all prominent in the course because their relationship in the marine environment is the essence of oceanography.

The aims of the course are to provide a scientific basis for understanding:

- The oceanic environment.
- The interrelationships between the various disciplines within oceanography.
- The rates at which fundamental processes operate in the oceans.
- How the present-day oceans evolved.
- The technical problems of investigating the oceans.
- The effect of human beings on the oceans and the legal and environmental problems involved in managing the oceans responsibly.

**Content** The course consists of seven volumes, one of which is a set book on marine biology.

**Ocean basins** Nature and formation of ocean crust; effects of hydro-thermal circulation.

**Seawater** Composition, properties, history; transmission of light and sound.

**Ocean circulation** Surface and deep current systems; interaction between ocean and atmosphere.

**Waves, tides and shallow water processes** Propagation of wind driven and tidal wave motions; how waves and tides shape shelf and shoreline.

**Introduction to marine ecology** Marine biology from an ecological viewpoint.

**Ocean chemistry and deep-sea sediments** Chemical cycles and fluxes in the oceans; deposition and diagenesis of sediments in the deep oceans.

**Case studies** Selected topics illustrating the interdisciplinary aspects of oceanography and the legal and political aspects of ocean exploitation and management.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [S334].

**Recommended prerequisites** Good passes in S102 and two second-level science courses, preferably in different disciplines. The basic principles of physical oceanography are the key to understanding many aspects of the science as a whole, but the 'physical' concepts involved in S330 are not much more complex than those to be found in the science foundation course, and probably simpler than anything encountered in second-level physics courses.

**Assessment** Three assessment components: (i) four equally weighted TMAs (35%); (ii) five equally weighted CMAs (15%) designed to test progressively your grasp of multidisciplinary relationships

in oceanography; (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Tuition** Tutorials will be supplemented by regionally organized day schools wherever possible.

**Broadcasts and cassettes** There is a fifty-minute introductory programme and eight standard TV programmes, three of which cover basic principles of oceanography; the rest are case studies illustrating interdisciplinary aspects of the science. Four and a half hours of audio cassette time are used mainly to help with the more difficult parts of the course.

**Set books** R. S. K. Barnes and R. N. Hughes (1988) *An Introduction to Marine Ecology*, Blackwell Scientific Publications (2nd edn.).

**Students with disabilities** The course contains relatively complex visual material which is difficult to transfer to alternative media. Course and supplementary materials are not available on tape.

## S338 SEDIMENTARY PROCESSES AND BASIN ANALYSIS

### Third level: half credit

This course is presented in alternate years, in 1991, 1993 and so on

This is one of two specialist Earth science courses at third level, and is intended to make you aware of:

- Some of the main concepts used in palaeo-environmental and basin analysis.
- The economic relevance of such concepts.
- The contribution of geophysical techniques to palaeoenvironmental and basin analysis.
- How 'doctrines' or paradigms have changed as the 'soft rock' field of geological science has advanced.

The course is also intended to develop your skills in:

- Describing and interpreting geological materials in the field and laboratory.
- Describing and interpreting data sets (such as stratigraphic sections, lithofacies maps, borehole logs and seismic sections).

**Content** The course is designed to give you practical experience of examining and interpreting actual geological materials and data; an up-to-date summary of the most important surface environments as producers of rock assemblages; an awareness of recent advances in soft rock geology (with an emphasis on economic aspects); and a training in the use of primary literature sources. There are four main components.

**Siliclastic sediments and environments** (4½ units) and **Carbonate sediments and environments** (3 units) examine the petrography and depositional environments of sedimentary rocks. Two set books (one of which is supplied, on loan, as part of the home kit) are supported by study commentaries, the home kit and video programmes.

**Basin analysis techniques** (5½ units) The techniques of gravity and magnetic surveys, borehole logging, seismic reflection, seismic stratigraphy and the tectonics of extensional and thrust belt terrains are taught to such a level that you will be able to interpret original data independently.

**Case study** (3 units) draws on the principles and techniques taught in the early part of the course to examine the development of a sedimentary basin, the North Sea Basin.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [S333], [S335], [S337].

**Recommended prerequisites** As a specialist course, S338 relies heavily on knowledge gained in [S101] or S102 and second-level geology courses; S236 and S237 or S238. These recommended prerequisites reflect the 'soft rock' bias of S338.

**Complementary and related courses** [S336], S339, half-credit third-level Earth science course with a 'hard rock' specialism. S338 will be presented in alternate years with S339 from 1990.



**Tuition** Local tuition may take the form of a one-day field trip or day school. There will probably be a national programme of field trips to places related to the course.

**Assessment** Four TMAs (30%) and four CMAs (20%) and the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Cassettes** Six video cassettes are supplied in the home kit, giving twelve hours of programmes. As about twenty per cent of study time is devoted to this medium you must have regular access to a video cassette machine.

**Home kit** The kit consists of a petrological microscope, sets of more than twenty rock hand specimens, thin sections and a loan copy of the set book Roger G. Walker (ed.) *Facies Models*. This kit may not be taken or sent outside the United Kingdom.

**Summer school** The summer school is course based and held in the Department of Geology, University of Durham. It provides practical experience of field and laboratory work appropriate to third-level studies. It also introduces the North Sea case study.

**Students with disabilities** The summer school will be impossible for those with mobility difficulties because of the fieldwork element. If you have a visual or manual handicap you will have substantial difficulty with the visual aspects of the course and the necessary use of maps and the microscope. Course and supplementary materials are not available on tape.

**Set books** M. E. Tucker *Sedimentary Petrology: An Introduction*, Blackwell. K. W. Glennie (ed.) *Introduction to the Petroleum Geology of the North Sea*, Blackwell Scientific Publications.

## S341 PHOTOCHEMISTRY: LIGHT, CHEMICAL CHANGE AND LIFE

Third level: half credit

Last presentation in 1991

S341 is about light-induced chemical change, or photochemistry, and is particularly important for students whose main interest is chemistry. But it will also be a highly appropriate ancillary half credit if you are interested in physics, biochemistry, energy studies or environmental science. The course will also be a very useful component of degree programmes that are broadly based in science and technology, and of those where the main emphasis is on the applications of science and its role in society.

S341 will increase your knowledge, understanding and interest in photochemical change – the fundamental chemistry and physics that explain it, and how these explanations are used to explore natural light-induced phenomena, laboratory and industrial applications, and environmental aspects of solar radiation.

**Content** The course is divided into six blocks. The introductory block (1 week) widens your perception of the importance of chemical changes brought about by light, and sets up a series of questions to be examined in each of the blocks that follow. The second block (2 weeks) answers the first of these questions, 'how and why is light absorbed by matter?', and is concerned with spectroscopy and molecular structure.

A short block (1 week) on 'colour' follows, and then the central question of photochemistry – what happens to the energy acquired by a material once light is absorbed? – is tackled in two stages. The photophysical part, where the energy is degraded and/or released without chemical change, is considered in the first part of Block 4 (2 weeks), and the photochemical part, where the energy leads to changes in molecular constitution, is considered in the first part of Block 5 (3 weeks). In between, the second part of Block 4 (2 weeks) investigates the photochemistry of the atmosphere, and dwells particularly on the chemistry behind anxieties about photochemical air pollution, and about the threat to the ozone layer in the

stratosphere (which protects terrestrial life from lethal solar radiation).

Block 5 (3 weeks) continues by investigating the scope of photochemistry as a tool in chemical synthesis, polymer formation, photoimaging, electronics (photoresist) and isotope enrichment. It also examines the photochemistry of vision, bioluminescence, the degradation of artificial materials and biological damage caused by ultraviolet light.

Block 6 (2 weeks) is a study of photochemistry as a means of securing renewable and storable sources of energy. Natural photosynthesis is discussed in some detail, as it is the base from which a number of potentially important processes for solar energy conversion are being designed. These are evaluated as possible solutions to what is seen by many as the most important scientific problem facing the human race today.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** S102 and S246.

**Assessment** Three assessment components: (i) TMAs 01-04 (01, 6%; 02-04, 24%); (ii) CMAs 41-44 (20%) and (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

The project work is not practical work and does not necessarily require research with printed materials not supplied by the Science Faculty. It involves undertaking a set task on three occasions throughout the course, and you will be expected to write a short paper on each task as part of your TMA work. For three two-week periods, you study substantial subject areas by producing work of your own in response to a set task, using a variety of source materials including the source book, offprints, TV broadcasts and audio cassettes. The three subject areas are:

- Photochemical air pollution and the threat to the ozone layer.
- Light-induced synthesis and degradation.
- Photosynthesis as a model for solar energy conversion and storage.

For each task, the resulting written work forms one of the last three TMAs. Considerable help is given with the first TMA, but this is progressively reduced, so that by the end of the series you are well equipped in a wide range of important problem-solving and writing skills. It is through the acquisition of these and other related skills that students who, initially, were dependent on the highly structured style of foundation and second-level courses may become independent learners, able to extract and make use of information from a wide variety of sources. The scheme also gives an opportunity, unusual in undergraduate science, for an original, individual approach and for the expression of personal opinion. Furthermore, a choice in the examination will allow you if you wish to concentrate a little more on the topic that most interests you.

**Broadcasts and cassettes** Eleven TV programmes and sixteen half-hour audio cassettes, each supported by notes and visuals.

**Summer school** Course based. The course has no home experiment kit and the summer school therefore consists largely of essential experimental work, but it also includes tutorials and discussion sessions.

**Students with disabilities** If you have a severe visual or aural handicap you will find some course components very difficult. The TV broadcasts and audio cassettes are essential. The summer school includes a considerable amount of laboratory work which may prove difficult. Course and supplementary materials are not available on tape.

## S342 PHYSICAL CHEMISTRY: PRINCIPLES OF CHEMICAL CHANGE

Third level: half credit

The course takes as its main theme an examination of the general chemical principles that govern whether, how, and in what conditions substances will react with one another. Broadly speaking, these principles are derived from two of the most important cornerstones of physical chemistry: thermodynamics and chemical kinetics. In this sense, the course complements other courses in the chemistry profile, and is essential for students mainly interested in chemistry or other aspects of molecular science.

A second important aim of the course is to stress the far-reaching practical importance of these same principles – not only in the chemical industry, but also in material science and in regulating the vital processes that underlie life itself. So the course will also be a useful component of degree programmes that are broadly based in science and technology.

**Content** The course comprises eight main blocks (of different length), together with three roughly unit-length Topic Studies. Each of these takes a real problem (one from the life sciences, one from the chemical industry, and one from material science) and examines it in the light of the chemical principles developed up to that point.

The 'core' areas of physical chemistry covered are:

- *Chemical thermodynamics*, which provides a set of precise criteria for predicting the equilibrium position for a given reaction.
- *Chemical kinetics*, which governs the rate of a chemical reaction and gives information about the reaction mechanism which, in turn, can be used to suggest means of providing a faster reaction pathway: *catalysis*.
- *Surface chemistry*, which examines the underlying reasons for the inherent catalytic activity of metal and metal oxide surfaces, *heterogeneous catalysis*, and also discusses spectroscopic and diffraction techniques for studying surfaces.
- *Electrochemistry*, in which both thermodynamic and kinetic principles can be applied to improve our understanding of electrochemical processes (such as the operation of batteries and the electrolytic extraction of metals).

Through the Topic Studies, the course stresses the practical importance of a knowledge of physical chemistry in areas as diverse as understanding the regulatory control of enzymes in the body; the potential for using coal as an alternative raw materials base for the chemical and fuel industries; and the prevention of metallic corrosion.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** S102 and S247. The subject matter of S342 requires a quantitative approach, and the course builds on the skills in logical argument and analysis developed in the prerequisite courses. However, the only mathematical skill assumed is elementary algebra, for which S102 provides an adequate background. Any further mathematical techniques required are developed in the course.

**Assessment** Three components: (i) four TMAs (30%); (ii) five CMAs (20%); (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Broadcasts and cassettes** The first six blocks have a closely linked television component. Six of the seven programmes will be transmitted during the study of these blocks. You must watch these programmes, preferably in colour.

There are also audio cassettes providing structured exercises, TV back-up, and discussion and debate on Topic Study areas. Access to a cassette player is essential.

**Calculator** A basic scientific calculator is necessary; it must give the functions: common and natural logarithms (and their inverses); powers and reciprocals of numbers.

**Summer school** A course-based school consisting largely of experimental work, but also including tutorials, computing work and a problem-solving session.

**Students with disabilities** Students with severe restrictions in mobility or manual dexterity or severe visual handicap will have difficulty with the summer school. Course and supplementary materials are not available on tape.

## S343 INORGANIC CHEMISTRY

Third level: half credit

Over the last decade inorganic chemistry has undergone a revolution and is now the basis of many aspects of modern technological life. Solid state processors, high-temperature

superconductivity, ceramics, enzyme action, chemotherapy and nuclear reactions can all come under the widening umbrella of inorganic chemistry. This course is designed to bring you to the forefront of the contemporary ideas and theories of the subject and to show how they provide the impetus for practical developments of the future.

**Content** The first half of the course is concerned with the theories that link the many facets of transition metal chemistry. After an introduction to the behaviour of the transition metals and their aqueous ions, the course moves to the application of molecular orbital theory. The disparate properties of magnetism, spectra and bonding are brought together with one powerful unifying theory. After a consideration of the thermodynamic aspects of transition metal compounds, their structure is investigated using nuclear magnetic resonance spectroscopy.

The rest of the course is divided into four sections, each examining a particular area where inorganic chemistry has a significant effect on modern society. Organometallic chemistry gives us the means to custom-build molecules to perform special roles, to design catalysts and to aid stereospecific synthesis. Progress in high-temperature superconductivity and its potential for revolutionizing the electronics and electrical industry is part of solid-state chemistry. Designer ceramics and zeolites are two more exciting areas.

It is now recognized that metals often play a crucial role at the active site of an enzyme. The operation of natural nitrogen-fixing systems gives an insight into the versatility of the coordinated metal environment. Completing the main text is a study of the chemistry of the transuranic elements and an assessment of how this knowledge can be applied to the problems associated with nuclear fuel manufacture and its reprocessing.

As well as the course texts there is a selection of original published papers.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [S304], [S351], [S352].

**Recommended prerequisites** S102, S246 and S247. (The course will rely especially heavily on knowledge gained from S247.)

**Complementary and related courses** S342, S344.

**Assessment** Four CMAs and four TMAs (50%); and the examination (50%). Substitution will apply for not more than one CMA and one TMA.

**Cassettes** An interactive video programme gives you the means to acquire a critical approach to experiment design and assessment. The two returnable video cassettes also contain programmes which look at the application of inorganic chemistry to a range of commercially important areas, together with short sequences dealing with selected teaching points. You will need access to a VHS video player. Structured exercises are presented on a 90-minute audio cassette.

**Home experiment kit** There are no home experiments for this course but a kit for the construction of molecular models is included.

**Summer school** Discipline-based (shared with S344), featuring advanced laboratory work, supported by evening tutorials and seminars.

**Students with disabilities** Students with severe restrictions in mobility or manual dexterity or severe visual handicap will have difficulty with the summer school. Course and supplementary materials are not available on tape.

## S344 ORGANIC CHEMISTRY: A SYNTHESIS APPROACH

Third level: half credit

'Histamine discovery could help insomniacs'; 'Malaria vaccine may be close'; 'Sex lure keeps tabs on crop pests'. These headlines from recent newspaper and magazine articles draw attention to current progress in the development of new substances



for use in health care and agriculture. It is one of the aims of S344 to explore, by means of a carefully graded series of four case studies, the many facets of the complex process involved in the discovery and use of such substances.

The course is designed to stimulate interest in and increase your knowledge and understanding of advanced organic chemistry, through the medium of organic synthesis. It introduces a wide range of modern organic reactions, with particular emphasis on those with a high degree of selectivity, illustrating their use for the synthesis of organic compounds of interest in chemical research and in industry.

The case study materials have the additional role of developing your skills as an independent learner and in problem-solving.

**Content** The course is split into eight core blocks plus the four case studies:

- Block 1 Fundamentals of organic synthesis
- Block 1.1 Strategy and selectivity
- Block 1.2 Electronic and steric effects
- Block 1.3 Elements of stereochemistry
- Block 2 Home experiment project
- Case study 1 Peptide synthesis
- Block 3 Spectroscopy and structure
- Block 3.1 Mass spectrometry
- Block 3.2 Infrared spectroscopy
- Block 3.3 Nuclear magnetic resonance spectroscopy
- Block 4 Functional group interconversion
- Block 5 Organoheteroatom reagents
- Case study 2 Pheromones
- Block 6 Enols, enolates and enamines 1
- Block 7 Enols, enolates and enamines 2
- Case study 3 Prostaglandins
- Block 8 Synthesis of cyclic compounds
- Case study 4 Beta-lactams

The course begins with revision and extension of the disconnection approach to organic synthesis strategy introduced in S246. Treatment of electronic theory and stereochemistry provides the basis for understanding a wide variety of different types of reactions and of organic reactivity in general; special attention is given to the use of selective reactions to achieve a particular molecular transformation. Modern chromatographic and spectroscopic techniques for the purification and identification of organic compounds are also introduced. The four case studies described above illustrate in depth the use of both the theoretical concepts and the experimental techniques in organic synthesis.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [S304], which this course replaces, [S351] and [S352].

**Recommended prerequisites** S102 and S246.

**Complementary and related courses** S325, S341, S343.

**Assessment** Three components: (i) four TMAs (32%); (ii) four CMAs (18%); (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Cassettes** You must have access to a VHS video cassette player, since about five hours of video material is provided as part of the course. The video sequences are a mixture of two types. There are some TV-style programmes, four of which are associated with the case studies; there are also video sequences of various lengths dealing with spectroscopic, chromatographic and other laboratory techniques. There are four one-hour audio cassettes for use in audio-vision sequences.

**Home experiment kit** The experiment kit is in two parts. The first, and smaller, part contains a molecular model kit, a stereoviewer and the returnable video cassettes. The second part contains the necessary equipment and materials for use in a specially developed week-long 'mini-project' which is the only work for that week. This constitutes the only experimental work undertaken at home, apart from the planned use of a pheromone lure to observe the use of insect attractants. This kit cannot be taken overseas.

**Summer school** Discipline-based, sharing with S343.

**Students with disabilities** Although the summer school includes a considerable amount of labora-

tory work and there is a fair number of audio-visual components, no students should be discouraged from taking S344. However, students with severe visual handicap or with severe restrictions in mobility or manual dexterity will find some course components very difficult. Course and supplementary materials are not available on tape.

**Set book** J. McMurry *Organic Chemistry*, Brooks/Cole Publishing Company (2nd edn.). You must buy the second edition.

## S354 UNDERSTANDING SPACE AND TIME

### Third level: half credit

The main part of the course explains the concepts of space and time as used in modern science. The emphasis is on how the ideas of space and time lead to physical theories, such as relativity, the success of which can be judged by means of experiments. The course ends by using the concepts developed in Units 1-12 to attack the questions of the origin of the Universe and its future evolution.

The nature of space and time is so fundamental that the course should be of interest in its own right, as well as to anyone who needs a firm basis for the exact sciences, especially modern physics.

**Content** The course is in six main sections which run parallel, broadly speaking, to the historical development.

**Block 1** Newton was the first person to show how to make quantitative calculations on the dynamics of moving bodies. His mathematical methods are still of great practical use and some of his assumptions about space and time (such as the Principle of Relativity) continue to be of great importance today. But Newton's ideas about lengths and time intervals will need to be greatly revised later in the course.

**Block 2** The first unit in this block surveys, with the help of experiments shown on television, the experimentally established laws of electricity, magnetism and light. The theory of electromagnetism leads us to see for the first time that the Newtonian world-view needs modifying. This fact was realized by Einstein who, in 1905, replaced Newtonian mechanics by his special theory of relativity. Block 2 describes this theory and shows that it leads to better agreement with experiments - dramatically better in the case of elementary particles and light. The basic idea is a simple one, that the observed laws should not be changed by uniform motion. That this is borne out by experiment implies a certain 'symmetry' of space and time.

**Block 3** Having discussed some continuous symmetries of space and time, we now ask whether there are additional symmetries under reflection. Some experiments with nuclei and particles show a lack of symmetry under reflections in space - they distinguish between left and right. We are led to discuss the prediction and discovery of antimatter, and the perfect symmetry under the combined reflection of space, time and matter.

**Block 4** This describes the remarkable changes which the advent of general relativity has made to our understanding of space and time. We try to give meaning to the words 'curved space-time' by discussing how general relativity describes space-time as curved in the presence of matter and predicts the motion of particles in a curved space-time. Because of the success of Einstein's predictions of physical phenomena such as light bending (which are not predictable within the Newtonian scheme), we are confident that the nature of space-time as described by general relativity is the most accurate and comprehensive picture of space-time that we currently possess.

**Block 5** All these considerations of space and time are brought together in describing the expansion of the Universe. It probably started from a 'big bang' in which energy was interchanged between matter and radiation

in a way explained by special relativity. Some of that radiation and matter has survived until the present day and still carries the imprint of the big bang. The large-scale dynamics of the Universe can now be understood through general relativity which, combined with astronomical measurements, leads to the tentative conclusion that the Universe is 'open' and will go on expanding for ever.

**Block 6** The last section discusses three topics of a less analytical and more topical nature. Part A considers the radio background radiation which is believed to fill the Universe and gives us evidence for the creation of the Universe in the 'big bang'. Part B turns to the predictions of general relativity in the most extreme conditions of matter collapsing to form black holes, and Part C discusses the intriguing question of why the laws of particle physics are almost unaffected by reflection of time. The direction of time is unmistakable: we remember the past and not the future. Could this asymmetry in time be related to another important asymmetry we know of - the expansion of the Universe?

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** Knowledge of basic calculus and traditional algebra is essential. Some key mathematical ideas will be reviewed briefly within the course. However, you should not attempt this course without a knowledge of calculus and algebra equivalent to that provided by [MST21] or MS283 or [M100]/M101. The mathematics will often be used as an aid in expressing arguments in a concise form. On the whole, we do not expect you to perform difficult calculations for yourself, but without this level of mathematical knowledge you will find it impossible to get started on the course. Similarly, we expect familiarity with basic physical concepts, to the level developed in the science foundation course ([S100] Units 1-7, 28-32, or [S101] Units 1-5, 8-11, 29-31, or S102 Units 1-4, 9-12, 30-32), together with an ability to use them in clear physical arguments.

Two other courses provide useful background material: MST204 will strengthen your mathematical skills, and S271 contains an elementary introduction to Newtonian mechanics and relativity. If you wish to study either of these courses, it would be advisable to do so before starting S354, but they are not essential prerequisites.

**Assessment** Three components: (i) four TMAs (20%); (ii) six CMAs (30%); (iii) examination (50%). Substitution will apply for up to one TMA and two CMAs.

**Broadcasts and cassettes** Seventeen TV programmes, made in collaboration with the University of California; eight former radio programmes on audio cassettes. The television programmes are, broadly speaking, more concerned with experimental aspects of space and time and we consider them essential to a balanced view of the subject. The cassettes are about the more speculative and philosophical aspects.

There are a further six cassette tapes, one for each block of the course.

**Preparatory reading** There is no set book, but R. Feynman *The Character of Physical Law*, MIT Press, discusses many of these topics in an informal way, and is strongly recommended as an introduction to, and in conjunction with, the course. Another book which we can strongly recommend is J. Schwinger *Einstein's Legacy - the Unity of Space and Time*, Scientific American.

## S442 DIRECTED STUDIES COURSE IN CHEMISTRY: NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY IN CHEMISTRY AND THE LIFE SCIENCES

### Fourth level: half credit

This is the second project-based course to be offered by the Chemistry Department and will appeal to students with a keen interest in chemistry. It is intended for those who have almost completed their honours degree, giving an opportunity to undertake an independent piece of work similar to the directed project work carried out by final-

year honours students at other institutions.

The aims of the course are divided between gaining a working knowledge of the principles and applications of modern nuclear magnetic resonance (nmr) spectroscopy and acquiring the skills of abstracting, assessing and producing a coherent piece of scientific writing within a selected study topic.

**Content** The subject material is based upon the versatile technique of nmr spectroscopy and covers the many applications and the life sciences. The approach is multinuclear and encompasses topics such as chemical shielding, modern pulse techniques including two-dimensional nmr, nmr of solids, <sup>31</sup>P nmr in biochemistry and aspects of nmr imaging.

The teaching material, equivalent to four units, is based on a set book supported by two blocks of text and three audio cassettes. The rest of the course is self-directed and requires the preparation of a literature project in a selected topic area. Topics will vary from the purely chemical to those leading into the life sciences. A week-end school will reinforce the teaching material and provide instruction in library methods appropriate to the project areas available for further study, giving you an opportunity to finalize your individual study project. After the school you will be expected to use local scientific libraries to acquire the information relevant to your project area and to write up your project work as a 5,000-8,000-word report including literature references.

#### NOTE FOR PROSPECTIVE STUDENTS

**Excluded combinations** None.

**Recommended prerequisites** A full credit in chemistry at third level, passed at grade 3 or higher. This should preferably include S343 or S344. Only about twenty-five students can be accepted each year.

**Assessment** Three components: (i) two TMAs; (ii) the literature project; (iii) examination. No substitution will be allowed.

**Residential school** The week-end school is an essential part of the course. It will be held at Walton Hall in early April.

**Students with disabilities** The nature of the course may make it difficult if you have impaired sight or mobility. Course and supplementary materials are not available on tape.

**Set book** You will have to buy the second edition of R. J. Abraham, I. Fisher and P. Loftus (1988) *Introduction to NMR Spectroscopy*, John Wiley.

**Special features** Because the main element of this course is the self-directed literature project, you must have access to a scientific library that has chemistry and life sciences abstracting services and journals.

## SM355 QUANTUM MECHANICS

### Third level: half credit

This course gives a thorough grounding in the principles, methods, and philosophy of quantum theory, and shows how the theory can lead to quantitative results particularly in the field of atomic structure.

#### Content

**Units 1 and 2** The relevant physical principles and mathematical techniques taught in the recommended prerequisite courses (S271 and MST204) are reviewed and developed.

**Units 3-8** The mathematical properties of the Schrodinger wave equation are investigated, its physical interpretation established and applied to simple physical systems (potential wells and barriers) including a study of the quantized vibrational states of diatomic molecules. These simple applications illustrate the mathematical techniques and reveal many of the surprising and essentially quantum aspects of matter, such as the existence of discrete energy levels in atoms and nuclei, and the tunnelling of atomic particles through potential barriers. The extension to two- and three-dimensional



systems leads to the quantization of angular momentum, the introduction of electron spin, and the concept of energy degeneracy.

**Units 9–11** We look more deeply into the mathematical structure of quantum theory, and the relationship between this structure and the actual observations and measurements that are made in the laboratory when the theory's predictions are tested. In doing this the postulational basis is clarified and some of the philosophical and interpretive difficulties of the theory which still inspire debate are exposed.

**Units 12–16** We return to the study of atomic and molecular systems using the Schrodinger theory, with the additional mathematical insights, techniques and notation gained from Units 9–11. Studying the behaviour of an atomic system in three dimensions leads to a further development of quantized angular momentum theory with applications to the quantized rotational states of diatomic molecules, and the orbital angular momentum states of the single electron in the hydrogen atom. The theory of the energy levels of the hydrogen atom is worked out in considerable detail. In Unit 14 two approximation techniques are introduced, perturbation theory and the variational method; in Unit 15 a study of systems containing two or more identical particles leads to the Pauli exclusion principle. These two developments allow us to investigate the main structural features of the helium atom and other multi-electron atoms. Finally these techniques are used to study the mechanism of chemical bonding between atoms as exemplified by the formation of the hydrogen molecule  $H_2$ .

#### NOTES FOR PROSPECTIVE STUDENTS

##### Excluded combination [SM351].

**Recommended prerequisites** S271 and MST204. You must be well prepared for this course in your knowledge of basic physics and mathematics, although no knowledge of quantum mechanics is required. The basic prerequisite physics material should include Newtonian mechanics, electricity and magnetism, and the wave nature of light. In mathematics, fluency is required in the techniques of differentiation (including partial differentiation), integration, and algebraic manipulations. It is also necessary to be familiar with vectors, complex numbers, and ordinary linear second order differential equations. You are strongly advised not to attempt this course unless you have obtained good passes in both these courses.

A self-assessed diagnostic quiz will be available in the preceding year. This will give you some idea of the sort of knowledge required before you take SM355, and will enable you to judge the extent to which you can meet these requirements. You will then have an opportunity to do some preparatory work before the course begins. If you wish to receive the quiz, please send a large SAE (at least 30cm x 21cm) to: SM355 Course Manager, Physics Department, The Open University, Milton Keynes MK7 6AA.

**Complementary and related courses** S271 gives a survey of the whole of physics and is an ideal precursor to SM355, containing three units introducing the physics of quantum theory. Other physics courses of interest are S272 and S256. At third level, a balanced view of physics can only be obtained by studying S354 and SMT356 as well as SM355. Quantum theory represents one of the twentieth-century revolutions in our understanding of the universe. The other revolution, a new understanding of space and time based on relativity, is covered by S354. But classical physics, as dealt with in [SM352], still has a crucial part to play.

**Assessment** Three components: (i) four TMAs (30%); (ii) six CMAs (20%); (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA but not CMA 46.

**Cassettes** There are two video and four audio cassettes.

**Summer school** Course-based.

**Students with disabilities** There should be no serious problems, although if you have manipulative difficulties you will not obtain full benefit from the summer school experiments. Course and supplementary materials are not available on tape.

**Preparatory reading** As preparatory reading, you might like to look at: [S101], Units 9, 10, 11, 29 and 30; or S102, Units 4, 9–12, 30–32; or S271, Units 13, 14 and 15. You might also like to establish a good start by taking a preliminary look at the set book on which the course is built.

**Set book** A. P. French and E. F. Taylor *An Introduction to Quantum Physics*, Van Nostrand Reinhold (UK). This book is used as the course text for eight of the sixteen units, that is, eight course units are centred on prescribed readings from the book. You will study about 70% of the book, and 95% of the book is relevant to the course. You must, therefore, obtain a copy of it if you intend to take this course.

## SMT356 ELECTROMAGNETISM

### Third level: half credit

The course gives a basic introduction to electromagnetism, leading up to Maxwell's equations and then applying these to such topics as electromagnetic radiation, microwaves and applications, reflection and polarization of light, antennae and the generation of electromagnetic radiation. The two basic ingredients for understanding much about the physical world are electromagnetism and quantum theory; this is the course where you can learn about the first of these. The technological importance of electromagnetism is obvious, and the course will balance this technological aspect with the fundamental scientific significance of electromagnetism, which is the natural force that we seem to understand most thoroughly.

**Content** The course closely follows the book *Electromagnetism* by Grant and Phillips, the second edition of which coincides with the first presentation of the course. The contents are:

Mathematics revision.

Electrostatic fields, in free space and in media.

Magnetic fields, forces on moving charges, generation of magnetic fields.

Magnetic fields in matter, magnets.

Magnetic induction, generation of electric currents by changing magnetic fields.

AC currents and circuits, resonance.

Maxwell's equations, and electromagnetic waves (light, radio, microwaves).

Interaction of EM waves and matter, e.g. reflection, absorption and refraction of light. Microwaves, waveguides.

Generation of EM waves, antennae.

#### NOTES FOR PROSPECTIVE STUDENTS

##### Excluded combination [SM352].

**Recommended prerequisites** MST204 and S271. The course has been written on the assumption that students are familiar with vectors, vector calculus and mechanics to the level of MST204, and you are advised not to attempt SMT356 without at least a Grade 3 pass in MST204 or the equivalent. In addition, basic physics at S271 level or equivalent is strongly recommended.

**Complementary and related courses** MST322, S354, SM355, T253, T283, T292, T393.

**Assessment** Three components: (i) four TMAs (25%); (ii) five CMAs (25%); (iii) the examination (50%). Substitution can apply for one TMA and one CMA. There will also be one formative CMA.

**Cassettes** Two video cassettes. The Academic Computing Service will contribute to the videos, providing simulations of spatially complex and time-dependent physical situations.

**Day school** You will be expected to attend a day school at which there will be an opportunity to use computers to apply EM theory to realistic situations.

**Calculator** You will need a calculator.

**Students with disabilities** Course and supplementary materials are not available on tape.

**Set books** You must buy the second edition of I. S. Grant and W. R. Phillips *Electromagnetism*, John Wiley, which should be available in time for the first presentation of the course. The course is based on readings from this book.

**Preparatory reading** You will benefit from a review of units to do with vectors and vector calculus from MST204. A more detailed reading list can be obtained from The Course Manager, SMT356, Physics Department, The Open University, Milton Keynes MK7 6AA.

## ST291 IMAGES AND INFORMATION

### Second level: half credit

This course is about modern imaging systems and you will see below that it contains many exciting features. However, it is not an easy course, so please read this description very carefully.

After studying this course you should be able to:

- State the ways in which man-made imaging systems increase our knowledge of the world around us.
- Give an account of the principles underlying imaging systems.
- Describe in general terms the sort of imaging system best suited to obtain the information desired from an object of interest.
- Use imaging systems to greater advantage, from the everyday camera to the more sophisticated imaging systems found in laboratory, hospital and factory.

**Content** The course divides into a 'stem' of ten units and a 'tail' of six case studies. Though practical applications do occur in the stem, it is nevertheless mainly concerned with the theoretical basis of modern image science. Modern analysis of imaging systems is based on the so-called Fourier approach. This is conceptually tricky, but in practical terms very rewarding, otherwise it would not have flourished in the past decade or so. To gauge whether you are likely to be able to cope, pay careful attention to the advice given below under *Recommended Prerequisites*.

Modern image science embraces a vast array of techniques and devices (devices such as microscopes, telescopes, cameras, television sets) by means of which scientists and technologists obtain and process information about the size and shape of objects that range from galaxies through bacteria to single atoms. Some devices work with light, others with radio waves, X-rays, electrons, acoustic waves, or even just numbers in a computer. These devices and techniques effectively extend our visual abilities so that we can 'observe' objects which are very small or very large, or objects which are a long way away, or events which are very short-lived. The ability to construct such images has had a profound effect on all branches of science, especially astronomy, physics, microbiology and geology, as well as influencing our everyday lives through, for example, photographs or television programmes.

The course thus covers a very important and substantial part of the way we learn about the world around us. At the end of it you should have a good grasp of the modern way of specifying the information required from an object, and the main steps that then have to be taken in designing an imaging system that can obtain that information.

The unit titles are:

- 1 *The eye's performance*
- 2 *Photographic film; an example of a detector*
- 3–5 *Objects and illumination; diffraction*
- 6 *Producing an image; lenses*
- 7–8 *Improving the image; spatial filtering*
- 9–10 *The recording and reproduction of visual information*

- 11 *The Crab Nebula*
- 12 *The Mariner 9 TV experiment*
- 13 *Imaging dislocations with an electron microscope*
- 14 *Alberti's atom*
- 15 *Ultrasonic imaging of the human foetus*
- 16 *The EMI-Scanner*

For more information please write to the ST291 Course Manager, Physics Department, The Open University, Milton Keynes MK7 6AA.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** Read *all* of this very carefully.

You should have passed either S102 or T102. In addition, you will need to have found (or now find) most of the units with a physical science basis in these courses fairly straightforward.

The course requires facility with basic mathematics, particularly sines, cosines, logarithms, and simple algebra. Facility with graphs is particularly important, because we have replaced the calculus and much of the algebra associated with this subject by a simpler graphical approach. Calculus is not used. But we know from students' performance and comments that the removal of calculus from a mathematical subject does not necessarily make that subject easy. The basic ideas in ST291 are thoroughly mathematical, and those who find basic mathematics unpalatable will find ST291 hard going, and will probably drop out after the first few units.

We have looked at the types of courses previously taken at the Open University by students who pass ST291, and it seems to us that your chance of success improves if you do not take ST291 in your first year after foundation level. It does not seem to matter very much which higher-level courses you take before ST291, as long as the course code begins with M, S or T (though S271 is particularly appropriate), but your chance of success on ST291 will improve if you postpone taking it until you have obtained more than a foundation credit.

In the first mailing of ST291 there is a unit-sized booklet called *Waves and Rays*. You will need to study this to a greater or lesser degree depending on your background in geometrical optics. We have deliberately made Unit 1 shorter to allow you a good start on *Waves and Rays*. You should get the first mailing a week or so before the first 'official' study week of ST291, in which case you should start on *Waves and Rays* as soon as it arrives. Throughout the course reference is made to *Waves and Rays*. If you do not have a chance to study it before Unit 1 then you will have to study it in association with the main texts.

**Complementary and related courses** T292, T326.

#### Tuition and Academic Computing Service

There are two sorts of ST291 tutorial – conventional tutorials and a computerized tutorial system called MERLIN (not an acronym, but the Celtic wizard). The conventional tutorials are concentrated in the first six units of the course, since this is where such support is most necessary. The computer tutorials cover Units 1–10 and are taken through the Academic Computing Service terminals at local study centres.

**Assessment** Three components: (i) four TMAs (30%); (ii) five CMAs (20%); (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Broadcasts and cassettes** Eight former radio programmes on audio cassettes (four of which are audiovision) and seventeen TV programmes. The broadcasts are so important that we believe you will be at a serious disadvantage if you are unable to receive them.

**Home experiment kit** This includes a laser, a camera and an optical bench with fittings. Ample instructions are provided and ample time is allowed to use it. Though ST291 requires no special experimental skills, the home experiments are an essential part of the course. This kit may not be taken or sent outside the United Kingdom.

**Students with disabilities** This course is not suitable for visually handicapped students, and will cause difficulties if you have impaired manual dexterity.

**Set book** G. Harburn, C. A. Taylor and T. R. Welberry *Atlas of Optical Transforms*. This will be sent with your course material.



# TECHNOLOGY

## OVERVIEW

The pace of technological change is increasing and the implications and applications of technology are becoming more widespread and of concern to all members of society. Therefore this faculty is firmly committed to providing courses which enable you to:

- Understand current technological developments and their underlying assumptions, their implications and the surrounding issues.
- Develop and practise your skills in particular aspects of technology, its design and management.

We see this as a contribution to increasing understanding of today's world as well as tackling the problem of the serious shortages of technologists in various fields.

For those of you with a clear view of your degree aspirations in technology or engineering, Table II will provide guidance. For others, this overview should prove useful in explaining how technology courses can make a valuable contribution to your degree profile.

An important part of planning your profile will be to consider, at an early stage, your long-term aims and their implications for your choice of courses. Your decision whether to study one or two foundation courses, for example, will need to be taken in the light of the recommended prerequisites of the higher-level courses you intend to take. Similarly, if you hope eventually to apply for membership of a professional body, you will need to plan accordingly: the requirements of the professional engineering institutions are summarized (and kept up to date) in Recognition Information Leaflet 3.3 obtainable from either the Central or your local Enquiry Service. Because of the Faculty's dual aim of breadth and depth and the correspondingly wide variety of courses offered, it is impossible to give any hard and fast rules about choosing your profile. The best advice is to think ahead, and make sure you read the course descriptions carefully.

The foundation course, *Living with technology*, exemplifies the Faculty's aim of combining breadth and depth. It sets some of the many technological developments in the context of people's everyday lives and discusses both the problems and the benefits they bring. It introduces a number of technical subjects and the use of a microcomputer and is also designed to help you develop your study skills along with literacy and numeracy skills. The course is included in the University's home computing policy. The choice of topics is deliberately broad and is concentrated around basic human needs of shelter, work, energy, material resources, food and health. The Faculty's higher-level courses continue to teach their particular topics in the context of real practical problems encountered in industry or elsewhere. In this way they each provide a self-contained study as well as a stepping stone to other courses.

Whether you study a range of courses across the Faculty's offerings or split your studies more evenly between this faculty's courses and disciplines in other faculties, we would emphasize the need to balance depth and breadth. In order to meet this important requirement, we present two types of courses: those which are designed for students who want to know enough about technology to understand its effects and some of the principles it depends on, but who do not wish to develop sufficient skills to practise in this field; and those which are designed for students who want to acquire professional skills and understanding in selected areas of technology. We do not claim that all our courses provide breadth and depth in equal measure, so you should read the course descriptions carefully, with particular attention to the recommended prerequisites.

At second level there are, to begin with, two introductory courses: TM282 *Modelling with mathematics: an introduction* (which can be

taken at the same time as T102 *Living with technology*) and T281 *Basic physical science for technology*. These are half-credit courses which prepare those of you who have not taken the corresponding foundation courses for the more scientific and mathematical courses in technology. They can be taken at the same time, but if taken separately, T281 should follow TM282.

The subsequent courses that lead to a degree have been grouped roughly according to the Faculty's disciplines; however, you should consider the whole of the Faculty's offering, the sample degree profiles and the course descriptions before choosing courses.

Design courses are concerned with the underlying processes common to decision making in technology. At second level T263 *Design: processes and products* leads on to T362 *Design and innovation*, T363 *Computer-aided design*, T392 *Engineering product design* and the inter-faculty course TM361, on *Graphs, networks and design*.

In electronics and communications the second-level courses are T202 *Analogue and digital electronics*, T292 *Instrumentation and the inter-faculty course TM222 The digital computer*. An appropriate selection from these courses prepares you for T394 *Control engineering*, T326 *Electronic signal processing*, T393 *Electronic materials and devices* and a new course T322 *Digital telecommunications*.

In engineering mechanics the second-level courses T233 *Thermofluid mechanics and energy*, T234 *Environmental control and public health* and T235 *Engineering mechanics: solids*, as well as the interdisciplinary course T292 *Instrumentation*, lead on to the third-level interdisciplinary courses T394 *Control engineering* (which is shared with electronics) and T392 *Engineering product design*, and to T331 *Engineering mechanics: solids and fluids*, T333 *Heat transfer: principles and applications* and T334 *Environmental monitoring and control*.

In the subject of materials, T201 *Materials in action* gives a broad introduction and there are also three half-credit courses derived from this course: T253 *Materials for electronics*, T254 *Stress on materials* and T255 *Materials in manufacturing*. These lead on to the third-level courses T353 *Failure of stressed materials* and T393 *Electronic materials and devices*.

The systems discipline offers three second-level half-credit courses. T247 *Working with systems* provides a starting point if you are interested in tackling complexity and the general applicability of systems ideas. T244 *Managing in organizations* covers human and organizational issues, business and management. T274 *Food production systems* is a global case study of the many systems involved in access to adequate food. These three are not excluded combinations, and your choice and sequence depend on your interests. Any (or all) of these courses can lead on to the third-level full-credit course T301 *Complexity, management and change: applying a systems approach*.

DT200 *An introduction to information technology* presents a survey of the technical and social aspects of microcomputers and their effect on society. (See Social Sciences Overview.)

The Faculty's profile of courses culminates in the fourth-level T401 *Technology project*, which will enable you to bring what you have learnt to bear on a substantial practical task. This is an essential course for those looking for professional recognition.

Finally, do remember that although this overview has been arranged according to disciplines, coherent degree profiles can be constructed across disciplines. In particular, systems and design courses are applicable to all other fields of technology.

When reading the following course descriptions do not forget to refer back to Sections 1–3 and Tables I, II and III at the beginning of this publication.

Under 'Notes for prospective students' discontinued courses are identified by square brackets; their titles and dates of presentation are listed in Table III.

## T102 LIVING WITH TECHNOLOGY: A FOUNDATION COURSE

Foundation level: full credit

Whether we like it or not, technology has become an important force in all our lives. If you would like to know more about the technological problems facing our society and the possible solutions open to us, and if you are interested in acquiring skills which will help you make up your own mind about current and future technological controversies, then T102 is the course for you. It teaches you some of the characteristics of the technologist's approach to problem solving – particularly the use of systems thinking, design and modelling – together with some basic engineering and scientific principles – particularly in computing, mechanics, chemistry and materials. The course also introduces the use of an industry-standard personal computer as a technological tool. You will be taught how to use word-processor, spreadsheet, database and graphics software (but not any programming). The course will also help you to develop basic skills in numeracy and in communicating your ideas in written form.

The title, *Living with technology*, reflects the double-edged view of technology explored in the course. Although our way of life relies totally on the products of technology, we are also conscious of the problems it poses, such as the 'energy crisis', pollution of the environment and the effects of automation on jobs.

T102 gives an insight into the extent to which our existence depends on a complex infrastructure of technology, and the problems of deciding the appropriate level of technological activity for a reasonable way of life, in terms of the resources available to us, the social, political and economic systems in which we live, and the values that govern our behaviour.

Technological activities which provide our basic needs of shelter, work, energy, material resources, food and health are approached by considering contemporary issues relating to them. At the end of the course you will be more aware of what is involved in meeting these basic needs. You will also have acquired some of the skills of a technologist in tackling complex problems.

No previous scientific or technical knowledge is assumed, but you are expected to be able to add, subtract, multiply and divide ordinary numbers. Any other mathematics needed (e.g. decimals, simple algebra, reading and plotting graphs) is taught in special texts and computer-assisted learning (CAL) packages. If these topics are completely new to you, you will need to spend extra time on them.

You will need to have access to a computer which meets the University's home computing policy specification, and will be taught how to use it. Appropriate applications and teaching software will be supplied as part of the course material.

**Content** The course is presented in seven blocks, each requiring four to five weeks of study and each centred around an 'issue' of current concern. The issue of each block is developed in a 'mainstream' text designed to give a general view of how the issue and the topics covered in the block fit together. The knowledge and skills you need to understand and appreciate the important aspects of the issue are covered in 'tributary' texts (and CAL material) which can be studied as required by the mainstream text or according to your own needs and preferences.

Block 1, *Home*, is concerned with assessing the function and effectiveness of your own home. To help with this there are tributaries on heat and structures. The computing tributary introduces some basic

facilities of the computer and of the main software package you will be using throughout the course. The block culminates in a design task in which you plan a small house to meet a certain specification. The computer-based spreadsheet helps with the calculations associated with this task.

The second block is about *Work* and the influence of new technology on it. It considers how different kinds of work in the retailing and distribution sector are being affected by microelectronics. There is a tributary on information technology. The computing tributary is about using your computer to help organize note-taking and report-writing.

The issue in Block 3, *Energy*, is 'Are district heating systems a good idea?' There are tributaries on energy conversion and electricity. The computing tributary further develops the use of spreadsheets introduced in Block 1.

In the fourth block, which is on *Resources*, the issue is 'Are resources running out and if so what can be done about it?' Block 4 has tributaries on chemistry and materials. There is also a computing tributary on databases, with the development of a T102 course index as an example of their use.

The fifth block, *Food*, asks 'Can current UK agricultural practices be sustained for at least the next thirty years?' Block 5 has a tributary on biology and a computing tributary on the use of graphics software, which uses data from the agricultural census to provide examples.

*Health* is the subject of the sixth block, which explores whether technological progress is making us more healthy or less. The issue is explored by looking at the complex set of processes which affects the health of modern urban populations and at our ways of assessing and minimizing the health risks associated with particular activities. There are tributaries on statistics and on the printing of integrated documents.

The last block does not demand any new learning of concepts or knowledge. Based on what you have learnt from the course as a whole, you are required to present a report on a given topic. This report forms part of the examination.

Two general skills are taught throughout the course, as well as those involved in using a desktop computer. The mathematical skills (including how to use a scientific calculator) needed are developed gradually, using numeracy tributaries supported by CAL packages. Literacy skills are developed through study notes in the mainstream texts, by a gradual increase in the sophistication expected in TMAs and by the final block report.

## NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [T100], [T101], ET217. Note ET217 is only available in the associate student programme.

**Assessment** Six TMAs (30%) and six CMAs (15%), one of each associated with each of the first six blocks; an end-of-course report (10%) associated with the last block; and the examination (45%). Substitution will apply for up to one TMA and one CMA.

**Broadcasts and cassettes** There are sixteen TV and eight radio broadcasts. Audio cassettes are used extensively: for further discussions about the TV programmes; in audio-vision, e.g. to talk you through a set of calculations; and in association with the computing tributaries.

**Summer school** Course based, providing project work (some of which is laboratory based), tutorials on all aspects of the course, lectures and discussions.

**Computing** You will need access to a microcomputer that meets the specification of the University's home computing policy (see page 4).

**Students with disabilities** You are advised to discuss your special requirements with the technology staff tutor in the Welsh Regional Centre, Dr A. Armstrong.



**Preparatory work** A preparatory package will be sent to you before the course begins.

## T201 MATERIALS IN ACTION and also T253, T254, T255

**Second level: full credit**

*These four materials courses are all excluded combinations: you will only be able to take one of them. You will need to consider your choice very seriously before you make your decision.*

This set of courses has been specially designed to meet the needs of different groups of students. It offers either a broad full-credit course (T201) or, for those who are pursuing a more specialized degree profile, a choice from three half-credit courses (T253, T254, T255). The structure of and relationship between the full and half-credit courses is explained more fully below.

There are very few things we can do without using materials. Whether sitting and drinking, or flying or computing, we rely on a myriad of products to support our activities. Each product is made from materials chosen specially for the task, won from the Earth and fashioned into the required shapes.

Choosing materials for a product depends on a mixture of technical and commercial considerations but, above all, to perform satisfactorily 'in service' the materials must have the required characteristics (properties): sufficient strength, electrical conductivity, transparency, resistance to corrosion. Of course, failures do occur, from the mundane breaking of a plastic fork or a rusting car to dramatic disasters with an oil rig or space shuttle. Such failures usually happen because, for one reason or another, the wrong material was used or the properties of the material were not properly understood.

Ultimately, the properties of a material are determined by its constitution and internal structure – the types of atom or molecule it contains, the bonding between them and how they are arranged in relation to one another and so on. In turn, the structure of a material is strongly influenced by its processing history: whether, for example, it has been cast from a liquid, pressed from a powder, moulded under pressure, or heat-treated. Over the last fifty years especially, scientific understanding of these structure/property relationships and how processing influences and controls them has made enormous progress and now provides a firm basis for making wise choices of materials and production routes for particular products. New and improved materials and processes have also been developed from this knowledge.

T201 explores these structure/properties/process relationships for a wide range of materials including plastics, metals, ceramics, glass, composites and some natural materials, and sets the technical considerations into the context of the economic and commercial factors which govern the successful use of materials.

The full-credit course consists of four 1/4-credit modules, the first of which, on materials principles, introduces the fundamental scientific and technological ideas that aid understanding of the behaviour of materials and their exploitation, providing a foundation for the three subsequent modules. In each of the later modules these ideas are expanded and developed for more specialized purposes:

**Electronic materials** The emphases here are on the extraordinary diversity of materials that are exploited for special electrical, electronic and magnetic properties, and on the research-led nature of the industries involved. A selection of artefacts is examined: power machines (from conventional to superconducting), several clever transducers made of carefully tailored ceramic materials, and memories (including semi-conductor and magnetic devices, and the magneto-optic disc).

**Structural materials** This module concentrates on illustrating the breadth and diversity of materials that have been developed to meet a wide range of load-bearing applications. The interrelationships between structure, properties, processing and function are emphasized, and are exemplified by short case studies of actual products which also develop the theme of materials selection. The examples chosen cover not only the conventional range of engineering materials such as steel, plastics and ceramics, but also high performance materials such as advanced composites and high temperature alloys, on the one hand, and more everyday materials such as textiles, paper and timber on the other. The frequent necessity of balancing the need for good mechanical performance with requirements such as environmental resistance, cost, ease of processing and mass of a product is highlighted in many of the case studies.

**Manufacturing with materials** While most of this module is taken up with the four principal materials processing techniques, casting, forming, cutting and joining, emphasis remains on the links between product design, process choice and materials selection. The design activity is charted from initial concept to a detailed specification for manufacture, stressing the role of materials selection and process choice and a method for choosing processes is introduced. By adopting a theoretical approach processes are modelled largely independently of the material being processed and this allows the likely performance of any process to be assessed. The latter part of the module is concerned with those areas of manufacturing operations that surround and influence the manufacturing process. These include marketing, costing and quality assurance. The need for effective market research and quality control is discussed and the methods by which manufacturing options can be compared using standard costing techniques are illustrated. Finally, a case study shows how manufacturing decisions involving product design, process choice and material selection lead to a diversity of products and manufacturing solutions in a highly competitive market.

As well as the full-credit course (T201), pairings of the 1/4-credit modules are also available as half-credit courses (T253, T254 and T255). The whole scheme can be illustrated as follows:

<b>T201: full credit</b>	
Materials principles	Electronic materials
Structural materials	Manufacturing
<b>T253: half credit</b>	
Materials principles	Electronic materials
<b>T254: half credit</b>	
Materials principles	Structural materials
<b>T255: half credit</b>	
Materials principles	Manufacturing

So, you can choose from a broad full-credit course and three, more specialized, half-credit courses. The half-credit courses will be particularly suitable if you wish only to cover those aspects of materials pertinent to, say, a certain special vocational interest, for instance T253 for electronic engineering, T254 for mechanical engineering and T255 for production/manufacturing engineering.

## NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [T252], T253, T254, T255, [TS251].

**Recommended prerequisites** T102 and T281, or S102 and S271.

**Related courses** T353, for which T201 or T254 is a recommended prerequisite. All other engineering related technology courses.

**Assessment** Two components: (i) eight TMAs and eight CMAs (50%); (ii) the examination (50%). Substitution will apply for up to two TMAs and two CMAs.

**Broadcasts and cassettes** Eight television programmes, and returnable video cassettes taking about four hours of viewing time.

**Summer school** Course based.

**Students with disabilities** These courses are not recommended for visually handicapped students, nor for those with impaired manual dexterity. If you have any other disability please ask your tutor-counsellor for advice. Course and supplementary materials are not available on tape.

**Special features** A calculator is essential.

## T202 ANALOGUE AND DIGITAL ELECTRONICS

**Second level: full credit**

This course is intended to give a thorough understanding of electronic principles, components, circuits and systems, and to develop the fundamental theoretical and practical skills required to carry out engineering analysis and design. It replaces the half-credit course [T283] *Introductory electronics*, with which it is an excluded combination. The extension to a full credit enables a wide range of topics to be treated in sufficient depth to provide a sound basis for an understanding of this rapidly developing subject area.

T202 provides essential background knowledge for third-level courses in electronics and so is an important core course for students specializing in this area. It is also suitable for those in other disciplines who require a good working knowledge of electronics. It should be appreciated, however, that the treatment is by no means superficial and you should make sure that you have the necessary mathematical and scientific background (see prerequisites described below).

The central theme of the course is the analysis and design of analogue and digital circuits. To provide an understanding of these circuits, the first part of the course teaches the principles of the electronic components which form the basic building blocks, and also the application of appropriate mathematical methods of modelling components and circuits. The second part of the course looks at aspects of more complicated circuits and systems, such as filters, preamplifiers, power amplifiers, radios, computers and so on.

Practical skills in electronics are developed using the home kit, which includes a combined signal generator and oscilloscope, and at the summer school, where you will use a wider range of equipment and take part in more complicated projects than can be attempted with the home kit.

Computers now play an important role in the design process, and an innovation on this course is the use of a computer-aided design package to help with circuit design. You will need to have access to a microcomputer which meets the University's home computing specification (see page 4).

**Content** The course teaches the principles of devices and circuits, with a substantial practical component provided by the home kit, and includes: AC circuit analysis, including step and frequency response, nodal analysis, and Thevenin and Norton equivalent circuits; properties of amplifiers, feedback and operational amplifiers; transistors and the design of integrated circuits; principles of digital electronics, including combinational and sequential logic circuits; digital-to-analogue and analogue-to-digital converters.

These principles are then used to study more complicated circuits and systems (with a substantial home kit element), including oscillators and filters in analogue-digital applications; design of an audio pre-amplifier and power amplifier; high-frequency aspects of analogue and digital circuits and interfacing.

## NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [T283], [TS282].

**Recommended prerequisites** T281 and TM282, or equivalent knowledge gained elsewhere, for example from HNC or ONC in mathematics, physics and/or electrical and electronic principles.

**Assessment** Three components: (i) eight TMAs (25%); (ii) eight CMAs (25%); and (iii) the examination (50%). Substitution will apply for up to two TMAs and two CMAs. Some of the TMA questions are based on home and summer school experiments and computer work, which are an integral part of the course.

**Summer school** Course based, consisting of laboratory experiments and projects together with remedial lectures and tutorials.

**Home experiment kit** There will be a considerable amount of electronic experimentation to be done at home, using a combined oscilloscope and signal generator together with other apparatus and components. You will need simple tools and a multimeter. The kit may not be taken or sent outside the United Kingdom.

**Computing** You will need access to a microcomputer that meets the specification of the University's home computing policy (see page 4).

**Special features** You will need a scientific calculator and a multimeter.

**Students with disabilities** This course is not suitable for students with severe visual handicaps and will be difficult if you have impaired manual dexterity.

## T233 THERMOFLUID MECHANICS AND ENERGY

**Second level: half credit**

*Last presentation in 1991*

This course considers how energy conversion takes place; how energy exchange occurs through processes involving working and heating; and how fluids can be used to exert forces and do work. The emphasis throughout the course is on the few recurring principles and laws of engineering thermodynamics and fluid mechanics in order to show that various processes and systems can be modelled and analysed in a similar manner. A firm understanding of certain basic concepts will provide the knowledge necessary to investigate many engineering applications of thermofluid phenomena.

The course includes a study of various fluid phenomena, similarity analysis and modelling, and introduces the fundamentals of heat transfer. Case studies are included on various energy technologies.

The treatment of the subject matter throughout is such as to indicate how the efficient conversion and use of energy can be achieved, and it will provide a grounding for those who intend to study the course topics at an advanced level.

After completing the course you should be able to:

- Understand the ways in which energy conversion or transformation occur.
- Understand the fundamental laws of engineering thermodynamics and the mechanics of fluids.
- Model thermodynamic and fluid mechanics processes and systems.



## Content

**Unit 1** Introduction to energy and thermodynamics. This unit introduces the concept of energy and shows how energy can be transferred by heating and working. The emphasis is on introducing the various concepts and principles by means of a study of everyday situations. The first and second laws of thermodynamics are introduced, and modelling and energy analyses of thermodynamic systems are considered.

**Unit 2** The first law of thermodynamics for non-flow processes. Thermodynamic properties and state. Internal energy and total energy. Gas laws and thermodynamic relationships. Processes.

**Unit 3** The second law of thermodynamics. Availability and irreversibility. Heat engines. The Carnot and Stirling cycles. Heat pumps. Efficiency and coefficient of performance.

**Unit 4** Available energy and entropy. This unit includes an experimental component.

**Unit 5** Introduction to fluids. The continuum model. Fluid properties and fluid flow phenomena. The mass continuity equation. Looking at fluids in motion, an introduction to fluid flow with recourse to the observation of fluid phenomena. Laminar and turbulent flow.

**Unit 6** Similarity analysis and dimensionless groups. This unit introduces a technique which is fundamental to physical modelling, and the analysis of various fluid phenomena.

**Units 7-8** The first and second laws of thermodynamics for flow processes. Control volume analysis. Steady-state energy balance. Entropy balance. Introduction to tables of thermodynamic properties.

**Units 9-10** Fluid mechanics: energy and momentum. Bernoulli's equation. The force-momentum relationship.

**Units 11-12** Water wheels and turbines: a case study. Turbo-machinery: performance and selection.

**Units 13-14** Heat transfer analysis. Introduction to heat transfer by conduction, convection and radiation. Case study: human thermal comfort. Includes experimental work.

**Unit 15** Power station cycles: Rankine cycles and their developments, energy transfers in a power station. Brief introduction to gas turbines.

**Unit 16** Revision: structured help with revision and approaches to examination questions.

## NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [T231].

**Recommended prerequisites** The strongly recommended prerequisite is either [T232], T235 or TM282. If you have passed either [MST282] or MST204 you should also be equipped for this course.

**Assessment** Four components: (i) six TMAs (25%); (ii) two tutor-marked project assignments (10%); (iii) eight CMAs (15%) and (iv) the examination (50%). Substitution will apply for up to two CMAs, and up to two TMAs in component (i) but not to the project component (ii). A threshold of 25% will apply to component (ii).

**Broadcasts and cassettes** The emphasis throughout the course is on an integrated presentation of the course material. It is essential to make full use of the eight television broadcasts and audio cassettes in order to ensure a good grade.

**Home experiment kit** The home experiment work is also essential. It makes use of a kit as well as other items available in the home, and enables fluid flow and heat transfer phenomena to be analysed. The kit may not be taken or sent outside the United Kingdom.

**Students with disabilities** If you cannot make full use of TV and experimental work you will be at a serious disadvantage. Course and supplementary materials are not available on tape.

**Set book** *Thermodynamics and Transport Properties of Fluids (SI Units)*, arranged by E. F. C. Rogers and Y. R. Mayhew, Basil Blackwell (3rd edition or later).

**Special feature** Scientific calculator essential.

## T234

## ENVIRONMENTAL CONTROL AND PUBLIC HEALTH

### Second level: half credit

This course gives you a basic understanding of our natural resources (land, air and water) and of related environmental problems. It will enable you to:

- Explain the necessity for conservation of land, air and water resources and for keeping pollution to a minimum.
  - Quantify and assess the nature and extent of pollution, its dangers and its effects on the physical environment.
  - Describe and discuss various methods of pollution identification, assessment, measurement and control available in the fields of land, air, water and noise pollution.
  - Read, interpret and criticize published data, and perform relevant calculations in the fields of epidemiology, water supply, conservation, and environmental management.
- T234 is complementary to many areas of study in science and technology, such as engineering, environmental and urban management, resource planning, natural resources and environmental health. It lays the foundation for career development and keeping up to date in many environmental areas.

## Content

**Unit 1** deals with natural cycles, the time they take and the influence of man's intervention on natural processes.

**Unit 2** on epidemiology describes the use of this subject in assessing the possible effect on health of environmental pollution.

**Unit 3** on pollution chemistry is necessary for the home kit work and for an understanding of water and air pollution. If you have no knowledge of chemistry you may need to spend more time on this unit.

**Units 4-6** on air pollution include the monitoring of pollutants, health and environmental effects, and methods of control, with reference to relevant legislation.

**Units 7-10** discuss water supply, pollution and pollution control. The home experiment kit work is a central feature of these four units, ranging from a BOD test to a river quality survey.

**Units 11-13** on noise pollution include monitoring of the health and environmental effects and methods of control, with reference to relevant legislation. Home kit work is included, e.g. measuring traffic noise.

**Units 14-15** discuss the problems and methods of management (collection, disposal, reclamation) of domestic, hazardous and special wastes, including the relevant legislation.

**Unit 16** discusses radioactive wastes and their management.

## NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [PT272], which it replaces.

**Recommended prerequisites** T102 or S102 or T281.

**Complementary and related courses** Generally, Science Faculty Earth science courses such as S238; also selected biology courses. Technology Faculty: design/systems courses such as T274, T362. Social Sciences Faculty: planning, human geography and socioeconomic courses such as D205 and D310.

**Assessment** Four assessment components: (i) one TMA (8%); (ii) three TMAs (three projects linked to HEK) (30%); (iii) two CMAs (12%); (iv) examination (50%). Substitution will apply for up to one CMA, and one TMA in component (i), but not to the project component (ii). There will also be two formative CMAs not used for assessment. (The course team feels that the nature of the course material and kit requires that all three projects in TMA component (ii) should be assessed, although a wide choice is available. Feedback is to be provided on formative CMAs.)

**Broadcasts and cassettes** Eight TV programmes reinforce the teaching material and home experi-

ment work. Audio cassettes include material on legislation, help with home experiments and revision.

**Home experiment kit:** The main components are: a burette; a rainfall collection apparatus; a pH meter and a noise meter. All the items, although not complicated, are manufactured to a high standard of accuracy, comparable to industrial equipment. This kit may not be taken or sent outside the United Kingdom.

**Students with disabilities** Some problems are likely because of the home experiment work. Visual and aural impairment will affect satisfactory completion of experiments. Manually disabled students are strongly advised to seek specialist advice before registering for the course; it will be necessary to use glassware such as a burette for titration.

**Set books** There is one set book and one ancillary text: *The National Society of Clean Air Reference Book* to cover the relevant legislation; this is used throughout the course. An order form for this book will be included in the first course mailing. Celia Kirby (1984) *Water in Great Britain* (2nd edn.) Penguin; part of the water block.

**Special feature** A calculator would be an advantage.

## T235

## ENGINEERING MECHANICS: SOLIDS

### Second level: half credit

This course is designed to give a good introduction to the fundamentals of solid mechanics, including statics and dynamics. This basic understanding is an important element in the training of engineers with a wide range of interests and specialisms. The course provides the basic analytical tools which design engineers need to create and assess the design of mechanical components and systems.

**Content** The course is divided into several principal areas of study, namely kinematics, statics, dynamics and structures. Kinematics is the representation and analysis of motion itself, that is the position, speed and acceleration of mechanisms and free bodies. Graphical methods in terms of velocity and acceleration diagrams are introduced. Statics is the study of forces in equilibrium and hence leads to an appreciation of the design of structures. Dynamics is the study of the relationship between force and motion. It tells us how to find the forces needed to cause a required motion or how to find the motion that will result from known forces. When the forces are known then the effect of the forces on the components of the structure or machine can be investigated, a process called stress analysis. The dynamics component includes the concepts of momentum, work, power and energy and the elements of vibration. The course is concluded by a case study.

## NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [T231] and [T232].

**Recommended prerequisites** No knowledge of engineering is required, but it is absolutely essential to have some mathematics skills, particularly geometry, algebra and calculus: M101 or TM282 offer suitable preparation.

**Complementary and related courses** T235 is an excellent preparation for a number of other courses, including T233, T333, T394, MST204 and some third-level materials courses. It is the recommended prerequisite, as an alternative to [T232], for the third-level engineering mechanics course T331.

**Assessment** Three components: (i) four TMAs (35%); (ii) eight CMAs (15%) and (iii) the examination (50%). Substitution will apply for up to one TMA and two CMAs.

**Broadcasts and cassettes** Eight TV programmes and some audio-visual cassettes.

**Summer school** Course based. Design projects which require application of the principles taught in the course: experience of the relationship of

analysis to design and of modelling to reality: revision of the course by tutor-supervised problem-solving.

**Students with disabilities** Serious impairment of sight or manual dexterity will make this course extremely difficult. Course and supplementary materials are not available on tape.

**Special features** A scientific calculator and a simple set of drawing instruments are essential.

## T244

## MANAGING IN ORGANIZATIONS

### Second level: half credit

If managing were something that could be easily taught it would not be such a problem. In fact, a great deal is simply learned by experience, and so one purpose of this course is to help you learn from and make sense of your own experiences in organizations. Hence the course has a definite practical orientation: it is appropriate for anyone who has to get things done with or through other people and may be especially suitable for those moving into positions with greater managerial or administrative responsibilities, perhaps from a more technical background.

The course's aim is not just to teach a number of 'tools for thought' applicable to organizational matters but to ensure that you can apply them to your own organizational life. It will help you to see your own work in a wider context; to understand better your organizational relationships (whether inter-departmental or supervisory); to recognize when your initial interpretation of problems may be inadequate; and to know how to go about generating a more rounded understanding of and response to complicated issues.

**Content** The course neither uses nor teaches mathematics.

**Block 1** *Problems about organizations* (2 units) introduces the course by discussing the nature of organizations and their problems and the scope of the course. Some conventional ideas about organizations and organizational problem-solving are called into question.

**Block 2** *Work groups* (4 units) explains practical concepts in individual and group psychology to account for the frustrating (and the creative) ways in which organizational relationships can develop. The 'control model' is introduced as a simple framework for thinking about the control of processes, tasks and workgroups.

**Block 3** *Organizations* (5 units) deals with organizational structures and processes, with power and conflict, and with decision-making. Several more practical frameworks for thinking about problems are taught and a wide range of organizational problems and practices are discussed along the way.

**Block 4** *Inter-organizational relations* (3 units) demonstrates that inter-organizational relationships frequently provide the wider context needed to make sense of events and difficulties. Market (self-regulation) and institutional (hierarchical) patterns of inter-organizational relations are contrasted, and some reasons why neither works quite as intended are explored.

**Block 5** *Wider perspectives* (2 units) draws together some of the systems ideas which have been built into the course and prepares for part of the examination by giving a structured exercise around a case study. The last unit provides further integration of the course material, but from an entirely different point of view.

## NOTES FOR PROSPECTIVE STUDENTS

**Current organizational involvement** The course requires you to apply course concepts to your own experience in organizations, so anyone whose involvement with people (other than family) is severely restricted, infrequent, or casual will be handicapped by lack of such experience to draw upon in answering assignments. Being currently in



paid employment is not necessary, however. Many students have successfully met the demands of the course on the basis of involvement in, for example, voluntary organizations. Certainly the possession of a job with the title 'Manager' is by no means necessary. The great majority of intending students find that their organizational involvement provides an ample basis. If you have particular grounds for doubt about the extent of your organizational involvement please ask your regional technology staff tutor or the T244 course manager at Walton Hall for advice.

**Excluded combinations** [T242], [T243].

**Complementary and related courses** T301, [T241], T247, T274, [T341], [TD342], [PT281], [D208], [DE351] E333, [E323], E324, [D336], DE325. To help students who wish to take T247 in the same year as T244, a joint study guide is provided; these courses share the same broadcasting 'slot', and assignment dates are staggered.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts and cassettes** Five TV programmes exemplify concepts discussed in the units. Four other programmes are relevant to summer school. Audio cassettes are used in two ways: for direct teaching, as with diagramming techniques, and to support the TV programmes with additional material.

**Summer school** Discipline based. T244 shares a summer school with one of the other second-level systems courses, T247. Attendance at the summer school is required only once, as long as you do both courses either concurrently or in successive years and pass at least one of them.

**Students with disabilities** If you have a visual handicap there may be difficulties arising from the reading load or the considerable dependence on diagrams. Those with an aural handicap should note that TV and cassette material is important for TMAs. Summer school may cause difficulty for you if you have severe restriction of mobility.

**Set book** R. Paton *et al.* (eds.) *Organizations: Cases, Issues, Concepts*, Paul Chapman Publishing, used throughout the course.

**Preparatory reading** R. Carter *et al.* *Systems, Management and Change: a Graphic Guide*, Paul Chapman Publishing; D. S. Pugh *et al.* (eds.) *Writers on Organizations*, Penguin. You are not expected to buy these books.

## T247 WORKING WITH SYSTEMS

**Second level: half credit**

We depend on health and financial systems, and they depend on information systems. We call parts of our bodies systems and insecticides systemic. We all work in and with these complex systems and we don't really understand them. We haven't got the time or the information to think through all interactions which made the systems as they are and which determine the success or failure of what we do. We probably haven't got the mental capacity either. So in order to be effective we need to adopt a different way of thinking about these systems. This course teaches this distinctive and practical way of thinking.

The course will be of interest to anyone who has had the experience of being intrigued, puzzled, frustrated, trapped, squashed or enraged by the behaviour of a system and wants to make the system work better next time. Such people could be managers at any level in the public, private or voluntary sectors, technologists in engineering, or computing, NHS medical staff or administrators – in fact, the course has relevance for most jobs in a highly developed and interdependent society. There are two kinds of content, topics and skills. Topics include the design of a simple information system, ethical investments, the ecology of a garden, how acupuncture works and how groups make decisions. In other words, there are examples of many different kinds of systems. The main skill taught is modelling. By the end of the course you will be able to build and

use models of various kinds to help you deal with problems presented to you by a variety of systems.

**NOTES FOR PROSPECTIVE STUDENTS**  
**Excluded combinations** [T241].

**Recommended prerequisite** T102.

**Assessment** Four TMAs, two CMAs and the examination.

**Broadcasts and cassettes** Four TV programmes and two audio cassettes.

**Computing** You will need access to a micro-computer that meets the specification of the University's home computing policy (see page 4). Audio cassettes will be included in the computing material. If you have not studied T102 you will be sent a 'starter pack' which you will have to work through before the course begins.

**Residential school** Discipline based.

**Students with disabilities** The computer screen and keyboard may be difficult if you have visual impairment or problems of manual dexterity. Course and supplementary materials are not available on tape.

## T253 MATERIALS FOR ELECTRONICS

**Second level: half credit**

*For aims, objectives and content of this course please see the entry for T201.*

**NOTES FOR PROSPECTIVE STUDENTS**

**Excluded combinations** T201, [T252], T254, T255, [TS251].

**Recommended prerequisites** T102 and T281 or S102 and S271.

**Related courses** T202, T393 and other electronics courses.

**Assessment** Three components: (i) four TMAs; (ii) four CMAs (both components 50%); (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Cassettes** There are returnable video cassettes taking about four hours of viewing time. About half is devoted to 25-minute programmes and the rest is divided into smaller sections and linked to topics in the course.

**Summer school** Course based, but held with the T254 and T255 summer schools and some activities will be undertaken jointly with those courses.

**Students with disabilities** The course is not recommended for visually handicapped students, nor for those with impaired manual dexterity. If you have any other disability please ask your tutor-counsellor for advice. Course and supplementary materials are not available on tape.

**Special feature** Calculator essential.

## T254 STRESS ON MATERIALS

**Second level: half credit**

*For the aims, objectives and content of this course please see the entry for T201.*

**NOTES FOR PROSPECTIVE STUDENTS**

**Excluded combinations** T201, [T252], T253 and T255, [TS251].

**Recommended prerequisites** T102 and T281 or S102 and S271.

**Related courses** T353 for which T254 (or T201) will be a recommended prerequisite, [T232], T235, T331 and T392.

**Assessment** Three components: (i) four TMAs; (ii) four CMAs (both components 50%); (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA.

**Cassettes** There are returnable video cassettes taking about four hours of viewing time. About half is devoted to 25-minute programmes and the rest is divided into smaller sections and linked to topics in the course.

**Summer school** Course based, but held with the T253 and T255 summer school and some activities will be undertaken jointly with those courses.

**Students with disabilities** The course is not recommended for visually handicapped students, nor for those with impaired manual dexterity. If you have any other disability please ask your tutor-counsellor for advice. Course and supplementary materials are not available on tape.

**Special feature** Calculator essential.

## T255 MATERIALS IN MANUFACTURING

**Second level: half credit**

*For the aims, content and objectives of this course please see the entry for T201.*

**NOTES FOR PROSPECTIVE STUDENTS**

**Excluded combinations** T201, [T252], T253, T254, [TS251].

**Recommended prerequisites** T102 and T281 or S102 and S271.

**Related courses** This course will complement a range of design and systems courses as well as other courses in materials.

**Assessment** Three components: (i) four TMAs; (ii) four CMAs (both components 50%); (iii) the examination (50%). Substitution will apply.

**Cassettes** There are returnable video cassettes taking about four hours of viewing time. About half is devoted to 25-minute programmes and the rest is divided into smaller sections and linked to topics in the course.

**Summer school** Course based, but held with the T253 and T254 summer school and some activities will be undertaken jointly with those courses.

**Students with disabilities** The course is not recommended for visually handicapped students, nor for those with impaired manual dexterity. If you have any other disability please ask your tutor-counsellor for advice. Course and supplementary materials are not available on tape.

**Special feature** Calculator essential.

## T263 DESIGN: PROCESSES AND PRODUCTS

**Second level: half credit**

*Last presentation in 1991*

This course will not train you to be a designer, but it will give you an appreciation of the problems that designers face and the pressures that are put upon them, and shows how these pressures are resolved in practice.

The focus of the course is on the design of familiar products such as domestic objects, bicycles, houses, cars and community planning.

There are two main aims:

- To develop your design awareness by discussion of design processes and products.
- To develop your design ability through practical work in TMAs.

**Content** Each of the blocks (3 units) looks at a familiar artefact in terms of its context, design, manufacture and use. The examination of the artefacts is not highly technical.

**Unit 1 Introduction** discusses definitions of design and design processes. The TMA is an exercise in communication.

**Units 2-4 Everyday objects** deal with the human constraints upon design, and particularly ergonomic factors, using domestic objects as examples. The TMA is an evaluation of an everyday object.

**Units 5-7 Bicycles** deal with creativity and invention in design, showing the factors which affect bicycle design. The TMA requires you to invent some improvements to

or modified form of a pedal-powered vehicle.

**Units 8-10 Houses** deal with the constraints of energy and cost upon housing design. The TMA asks you to design a conversion scheme for a house, including an energy analysis of the proposed solution.

**Units 11-13 Cars** show the wider constraints of mass production and wider technological forces acting upon vehicle design. The TMA asks you to make conjectures about future car design.

**Units 14-15 Communities** deal with the wider political and social constraints upon design. They cover a number of experimental and utopian schemes, and show the problems of design of communities. Assessment of this block will form part of the examination but it has no TMA.

**Unit 16 Review** The last unit summarizes the main issues of the course as an aid to examination revision.

**NOTES FOR PROSPECTIVE STUDENTS**

**Excluded combination** [T262].

**Recommended prerequisites** There are no formal prerequisites for this course, but it follows directly from the design elements of [T101]/T102.

**Complementary and related courses** T263 can be found in the Tables of Related Courses under the headings Technological Systems, Engineering Design and Systems. We expect that the course will be of particular interest to students taking the broader courses in technology, particularly [T241]/T247, T244 or T274. The contextual problems of design could be further pursued in courses such as [D208] and T301. More specialized aspects of design could be taken up in T201, TM282, TM361, T362 and T392.

T263 is a recommended prerequisite for T363 *Computer-aided design*.

**Assessment** Five TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA. Within the text are also short optional exercises which are intended to improve design skills, acting as rehearsals for elements of the TMA, and practice exam-type questions.

**Broadcasts and cassettes** Eight TV programmes: six are related to the main text of the blocks, while two have a more general tutorial function, for instance showing how other students of design and designers tackle problems similar to our TMAs.

Eight audio cassettes, each about 20 minutes long. Each cassette is supported by visual documents: designers' sketches, working drawings, photographs and elements from the home experiment kit. The audio cassettes either give coaching in elementary design skills, e.g. orthographic and axonometric drawing, or allow professional practising designers to talk through their own design processes by referring to the visual facsimiles and photographs.

**Home experiment kit** The kit has two kinds of component:

- Those associated with drawing skills, e.g. board, instruments, graph paper, stencils, and so on.
- Those associated with manipulative exercises, e.g. cube kit, ergonomic manikins, and so on.

Both components are for use in the TMAs in which you gain practice in and insight into design skills. We do not expect you to develop those skills to the highest level of professionalism, but rather to gain insight by exercising the skills for yourself.

**Students with disabilities** If you have a visual handicap or impaired manual dexterity you are likely to find the TMAs extremely difficult. Course and supplementary materials are not available on tape.

**Preparatory reading** If you wish to do some reading in the area of the course you could choose from the following: J. C. Jones (1980) *Design Methods: Seeds of Human Futures*, John Wiley and Sons Ltd. W. H. Mayall (1979) *Principles in Design*, Design Council, 1979. D. Pye (1978) *The Nature and Aesthetics of Design*, Barrie and Jenkins.

**Special features** The nature of the subject of study is highly visual, so the television programmes and audio cassettes are very important parts of the course. Similarly much of the work in SAQs, exercises and TMAs is non-verbal. You do not require any prior drawing and modelling skills but you should come to the course with an interest in non-verbal forms of communication, in graphics, drawing and modelling. The course develops manipulative and analytical skills which are, albeit in a rudimentary form, like those of professional designers.



## T274 FOOD PRODUCTION SYSTEMS

Second level: half credit

The course analyses the production and supply of food on a world scale, to see how this occurs and how it may change or be changed in the future.

This course encourages you to bring together skills from a wide range of disciplines in analysing a systems approach to complex problems like that of food supply. More specialized aims are:

- To provide an understanding of the principles involved in the production, processing and distribution of food.
- To show how social, political and economic factors affect the demand for food and how food is produced.
- To enable you to comment critically on the causes and effects of changes in the production of food.

**Content** Unit 1 introduces the nature and estimates the magnitude of the world's food problem. Unit 2 looks at the nutritional needs of human beings; it includes a detailed analysis of the your own diet over a short period. Units 3-5 concentrate on the growing of crops, showing how the production of useful food products can be increased, and loss to pests and diseases kept to a minimum. Unit 6 looks at the use of animals as a source of milk and meat and at the factors which influence their efficiency. Units 7 and 8 are about the chemical, microbiological and engineering aspects of industrial and domestic processing of foodstuff.

Unit 9 is a case study on bread which also shows how the technical processes are influenced by the needs and wants of the producer and consumer, subjects treated in more detail in Units 10 and 11. Consumer and producer do not operate in isolation, but within an organizational framework for the provision of land, food distribution and storage, studied in Units 12 and 13. The interactions between people and organizations depend on political decisions which govern national priorities for the allocation of resources to food production or other activities, and on world trade (Units 14 and 15). The last unit makes use of knowledge and skills gained from the course, within a systems framework.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [T273].

**Recommended prerequisites** A pass in one of the science, technology or social sciences foundation courses. Any necessary specialized vocabulary is taught during the course, but familiarity with the elementary ideas of biology, chemistry and mathematics would be helpful. There is a preliminary test and recommended introductory reading on these topics in the first supplementary materials, but if you feel unsure of these topics you might wish to examine the biology and mathematics tributaries for T102.

**Complementary courses** The course fits closely with other technology, science and social science courses dealing with applied biological and economic problems, such as: T234, [S202]/S203, U205, T263, [S299], [D208], S238. Several of the topics in the first half of the course are treated in greater depth in S326. T274 also complements the systems courses T247 and T244. See the faculty overview for the systems second-level profile.

**Assessment** Three components: (i) four TMA's (30%); (ii) six CMA's (20%); (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA. One TMA is based on the diet study, and it would be helpful to have attended the half-day school which takes place early in the course.

**Broadcasts and cassettes** Eight TV programmes and eight audio cassette tracks cover case material and concepts which are difficult to present as text, or are used to show situations which are inaccessible to most students. Reference to these materials is frequently required to answer TMA and CMA questions.

**Students with disabilities** If you have a severe visual handicap you may find problems arising from the extensive use of graphs and diagrams.

**Calculator** Access to some form of calculator or computer for the diet study would be useful but is not necessary.

## T281 BASIC PHYSICAL SCIENCE FOR TECHNOLOGY

Second level: half credit

It has long been felt that there is a need to strengthen the scientific knowledge of those who wish to take the more technical courses in the Technology Faculty. T102, the technology foundation course, begins this process and T281 builds on this foundation to give a logical treatment of some topics in science which are fundamental to higher-level technology courses. An important aspect of the course, however, is that it emphasizes the use of science as a tool in performing the sort of calculations frequently demanded of engineers.

There are therefore three main aims for the course:

- To provide the kind of scientific literacy needed by most technologists.
  - To teach the basic science most students need to bridge the gap between the technology foundation course and many second-level technology courses.
  - To develop the skills required for the use of this scientific knowledge in dealing with simple technological examples.
- The mathematics required by this course is that reached by TM282. If you are in doubt about your mathematical skills you are strongly advised to take TM282 before attempting T281. If you are not, you may find it useful to do the two courses together in the same year. The notation used in this course is compatible with that used in TM282 and in S271.

**Content** Many of the topics dealt with in the course will be familiar to anyone who has studied A level, HNC or HND, but the emphasis is somewhat different in that we are seeking to apply the science whenever possible to technology. In addition, some topics are dealt with in more detail than in an A level, HNC or HND course. The following list of unit contents should therefore be treated as a guide to what is taught and not how it is taught.

- 1 Motion, Newton's Laws and friction.
- 2 Work and energy, density, flotation and pressure.
- 3 Deformation of solids, liquids and gases.
- 4 Temperature, heat, thermal expansion and heat transfer, elementary thermodynamics.
- 5 The 'billiard ball' model of atoms and kinetic theory.
- 6 Atoms as chemical species, the periodic table and an introduction to chemical equations.
- 7 Chemical equilibrium, the concept of equilibrium constant, pH and solubility.
- 8 Rate of reaction, rate constant and the interdependence of rate and equilibrium.
- 9 Thermochemistry, Hess's Law and the energy changes occurring in chemical reactions.
- 10 Voltage, current and resistance, electric fields and capacitance. Measuring voltage and current.
- 11 Electrostatic and magnetic fields.
- 12 Electromagnetic induction.
- 13 Alternating current. Capacitance, inductance, impedance in a.c. circuits. Power in a.c. circuits.
- 14 Electrical instruments.
- 15 Wave motion, interference and diffraction.
- 16 Geometrical optics with special reference to optical instruments and their performance.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisite** [T101]/T102 or TM282 are the only recommended prerequisites. If

you have studied [S101] or S102 you would also be able to take T281 without difficulty.

**Complementary and related courses** T281 is intended as a basic science course underpinning most of the higher-level technology courses. It would be a useful complement to S271.

**Assessment** Three components: (i) four TMA's (30%); (ii) four CMA's (20%); (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA. There are also four formative CMA's which are used as remedial exercises. They are marked in the usual way; the scores are not used for assessment, but diagnostic feedback is provided, with answers, in order to indicate where revision is needed.

**Broadcasts and cassettes** There are eight TV programmes. These amplify topics dealt with in the course units, and by approaching the material in a different way should help to answer at least some of your problems. There are three audio cassettes with an accompanying illustrated book.

**Summer school** Course based, giving you an intensive week of laboratory work and with an extensive tutorial programme.

**Students with disabilities** This course should present no particular difficulties but an inability to attend laboratory sessions at summer school would prevent you from reaping the full benefit of the course. The course team at Walton Hall will advise on the suitability of the course for you.

**Preparatory reading** There is no recommended preparatory reading, but if you have not studied O or A level science or maths you could profitably look at some of the modern GCSE and A level textbooks available in most local libraries.

**Special feature** Calculator required.

## T292 INSTRUMENTATION

Second level: half credit

Have you ever wondered how physical quantities can be measured and converted into signals for transmission, display and recording? The aim of this course is to explain the function and operation of components which achieve this and to show how they can be incorporated into instrumentation systems. The course explains the fundamental physical principles involved in measurement, together with the characteristics of transducers, signal conditioning, display and recording devices, such as accuracy, interference, step response and frequency response. Current industrial practice is illustrated by a number of manufacturers' specifications for these devices; interpreting and applying such specifications is part of the course.

**Content** T292 is about instrumentation systems for measuring, transmitting and recording the values of common physical quantities. It does not, however, cover chemical analytical instrumentation.

**Blocks 1 to 3** Transducers and signal processing devices are described for the measurement of liquid level, strain, linear and angular displacement, velocity, flow rate, acceleration, vibration, force, pressure and temperature.

**Blocks 4 and 5** describe methods of signal conditioning, the problems of noise and interference and methods of reducing their effect, together with transmission techniques.

**Block 6** covers display, recording and data-logging devices.

**Block 7** presents two case studies showing industrial applications.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [T291].

**Recommended prerequisites** The ideal preparation for this course is T281 for the physics background and TM282 for the mathematics background. (Or at a more detailed level S271 and MST04.) If you have not studied these courses you should have an understanding of such physical quantities as force, pressure, strain, acceleration, density, current, voltage and capacitance, together with a familiarity with some

of the basic laws of physics such as Newton's second law, Ohm's law and Kirchhoff's laws. The mathematical skills required include manipulating algebraic expressions and using trigonometric and exponential functions. Some familiarity with first- and second-order differential equations would be of benefit. You will not be expected to solve the equations but they are used to determine important step and frequency response characteristics. If you wish to check that your mathematical knowledge is sufficient for this course, you can obtain a maths quiz from the T292 course manager, Faculty of Technology, The Open University, Milton Keynes MK7 6AA.

**Complementary and related courses** T292 is suitable preparation for courses in applied and experimental sciences and technology. It is a recommended prerequisite for T392 and T394.

**Assessment** Three components: (i) four TMA's (25%); (ii) four CMA's (25%); (iii) the examination (50%). Substitution will apply for one TMA and one CMA.

**Broadcasts** Three TV programmes.

**Summer school** Much of the course-based summer school consists of laboratory experiments. There is also a substantial programme of lectures and tutorials revising the main parts of the course.

**Students with disabilities** The many diagrams in the course texts may cause difficulty if you have severe visual handicap. Those with severely impaired manual dexterity may have difficulty at summer school. Course and supplementary materials are not available on tape.

**Setbook** R. Loxton and P. Pope *Instrumentation: a Reader*, Open University Press (course reader).

## T301 COMPLEXITY, MANAGEMENT AND CHANGE: APPLYING A SYSTEMS APPROACH

Third level: full credit

This course will enable you to apply systems ideas and methods to difficult issues in the real world.

**Content** All of us are involved in management - in its widest sense - whether it is public, private or personal, playthings or prisons, people or products. How we organize ourselves to tackle things is a mixture of intuition, experience and skills.

Simple problems may require only simple skills, but a systems approach starts from the premise that the decisions people face in the real world cannot be neatly classified and separated into individual problems with simple solutions. They are much more likely to be what the American management writer Russell Ackoff calls 'messes', i.e. 'systems of inter-related problems'. T301 provides skills, techniques and experience to help to deal with such problems arising in complex human systems like companies, schools and governments.

The course should be of particular interest to those who have to deal with intransigent human and technical problems either in short-term tactical ways or in the development of longer-term strategies for innovation and change.

The main aim of the course is to teach you to use systems methods to understand complicated situations, model them, consider the systemic consequences of various actions and, in collaboration with others, take action to improve the original situation.

The course is centred around the teaching of three complementary systems approaches:

- The analysis of systems failures and catastrophes.
- A systems modelling approach to organizational decision making.
- A systems approach to organizational change.

You will apply one of these approaches in an extended project. The main teaching takes place during the first twenty weeks of the course and is followed by ten weeks of project work, with a final two weeks of study



during which the themes in the course are drawn together.

**Block I Systems ideas, background and philosophy** (2 weeks) introduces systems concepts and the essential features of a systems approach including its nature and phases. Block I should bring all students to a common level of understanding, and contains much that will interest continuing systems students as well as providing the grounding in systems ideas that new students will need.

**Block II The analysis of systems failures** (5 weeks) is concerned with developing a practical and useful understanding of a variety of failures ranging from small-scale incidents to large catastrophes, and from local problems to questions of regional or national policy. Particular attention is paid to the human element and the relationship between failure, or alleged failure, and the objectives and expectations of the individuals, groups and organizations concerned.

The block begins with accounts and explanations of failures some of which are indisputable and others where failure is a matter of human value judgement rather than a universally recognizable state. The particular approach used in this block for understanding failure is presented and you practise applying it.

The approach recognizes that failure is the outcome of complex activities and applies systems insights in order to identify the origins of deficiencies and mistakes and how they were allowed to develop. The aim is to arrive at a systemic understanding of a situation as a preparation for the later blocks in the course which deal with planning and making changes.

**Block III A systems modelling approach to organizational decision making** (6 weeks) studies systems which are amenable to precise modelling and definitions. The 'hard systems approach' which it teaches can be used to solve management problems and aid decision making when the system's objectives can be defined clearly and unequivocally. The introductory units outline the approach taught in T301, its development, and the role of modelling within it. Its use is then illustrated in case study material based on research and development decision making in the agrochemical industry.

The process of mathematical modelling is described and discussed and a range of modelling techniques is introduced to give you a basis for judging what kinds of model might be appropriate in a range of circumstances.

**Block IV A systems approach to clarifying and facilitating organizational change** (5 weeks) When there is agreement about what is wrong and about what would constitute an acceptable state of affairs, the modelling approach described in Block III is both appropriate and powerful. However, many real problems are not like that: the people involved have conflicting perceptions of the actual state of affairs, different ideas of what 'the problem' is, and different ideas about what might constitute a 'solution' or improvement.

To cope with such situations, the so-called 'soft' systems approach has evolved. This is an established and tested method for using systems ideas to help people understand the problems in which they are involved, and to help them to identify beneficial policies and actions. Through a series of exercises, you are taught the basic steps of a soft systems approach and given some initial experience of using it in a structured mini-project.

**Block V Comparing systems approaches** (2 weeks) reconsiders the three approaches studied in Blocks II-IV and discusses the problems of choosing an approach.

**Block VI Project** (10 weeks) You apply one of the three approaches to an appropriate situation. Guidance on how to undertake project work and suitable topics for each approach will be provided. Subject to certain restrictions you can select a topic other than one of those provided by the course team.

**Block VII** (2 weeks) considers the difficulties associated with the practical application of systems approaches along with advice on how to plan future systems investigations.

## NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [T341] and [TD342].

**Recommended prerequisites** None: the course has been devised to cater for students from a wide range of backgrounds, although those new to systems must be prepared for a heavy workload in the first two weeks. If you have studied T102 or a second-level systems course you will be familiar with the spirit behind the systems ideas presented; however, the course does not assume previous study of other courses.

**Complementary and related courses** This course fits naturally into any degree profile which requires some orientation towards action in the real world whether it is in management, technology or education. Together with the second-level systems courses [T241], T247 and T244 it provides the core of several profiles of the form 'systems and ...' etc. If you wish to undertake a systems project in T401 you will normally be expected to have completed T301.

**Assessment** Four assessment components: (i) general systems component, one TMA (4%); (ii) systems approaches component, four TMAs (28%); (iii) project component, two TMAs (18%); (iv) the examination (50%). Substitution will apply for one TMA in the systems approaches component only. There is also one formative TMA associated with the project component, and one formative CMA.

**Cassettes** There are five audio cassettes.

**Academic Computing Service** If you choose to apply the hard systems approach in your project you must have access to a personal computer with MS-DOS.

**Students with disabilities** The project (depending on the topic chosen) may require use of a computer terminal, visits to libraries or contact with officials and groups in the local community. Visually handicapped students may find difficulties, as diagrams are used extensively throughout the course. Course and supplementary materials are not available on tape.

**Preparatory reading** Those who wish to do some preparation should read the introductory units to the second-level systems courses and the set books for this course.

**Set books** R. Carter, J. Martin, B. Mayblin and M. Munday, *Systems, Management and Change*, Paul Chapman Publishing (course reader, needed for Block I). V. Bignell and J. Fortune (1983) *Understanding Systems Failures*, Manchester University Press (needed for Block II).

## T322 DIGITAL TELECOMMUNICATIONS

Third level: half credit

The techniques, applications and scope of telecommunications are changing very fast. The availability of cheap integrated circuits is leading to increasingly complex forms of signal processing. New media, such as optical fibres, allow vast amounts of digitally coded information to be transmitted over long distances with extremely low error rates. The electronic storage of signals and control information at the nodes of telecommunication networks allows optimum use of equipment and channels, and the smoothing out of demand peaks.

This course introduces important concepts and techniques relevant to the design and operation of complex modern telecommunication systems. It is essentially for students interested in electronics, telecommunications and information technology. Because of the increasing importance of distributed storage and processing in computer systems and of local area networks (LANs), the course is also appropriate for students interested in computing. Some basic electronics and mathematics is required.

Because the subject is expanding so rapidly, the main objective of the course is to enable you to understand and evaluate both current and future systems and techniques. It is not possible, in a half-credit course, to develop expertise in the application of individual techniques, but the use of some of these is illustrated through case studies.

**Content** Survey of systems currently in use or under development followed by an introduction to the basic properties of digital signals.

**First system study** Electronic mail systems. Introduction of protocols and layered systems, particularly OSI (open systems interconnection).

**Reliability, traffic information and coding for error detection and correction** The operation of telecommunication systems depends a great deal on statistical information about signal properties, demand for service and transmission impairments. This group of units develops and applies essential probabilistic concepts.

**Digital signals** Time and frequency domain models of digital signals; encoding, decoding and transmission of digital telephone signals.

**Noise** Sources and characterization; noise in circuits and systems; threshold detection and error rates.

**Digital coding and modulation** Basic principles relevant to the transmission and error control of digital signals; modems, scramblers, convolutional coding.

**Second system study** Digital exchanges; principles of exchange architecture and signalling; organization, specification and use of telecommunications software.

**Transmission** Principles of electrical and optical transmission on lines, cables and wave guides.

**Third system study** An optical fibre transmission system in the telephone network. This deals with the design of system elements and illustrates practical applications of many of the principles introduced previously.

**Fourth system study** Digital networks. This is mainly about network topologies and organization, protocols and standards.

## NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [T321].

**Recommended prerequisites** [T283], T202 or T292. Also, one credit's worth of mathematics, such as M101 or preferably MST204.

**Related courses** ST291, [SM352]/SMT356, M245, DT200, T292, [T283], T326, T393, TM361, [TS282].

**Assessment** Three assessment components: (i) TMAs 01-04 (35%); (ii) CMAs 41-44 (15%); (iii) examination (50%). Substitution can apply for one TMA and one CMA. CMA 51 is formative and not used for assessment.

**Cassettes** Three audio-visual cassettes.

**Students with disabilities** The course contains relatively complex visual material which is difficult to transfer to alternative media. Course and supplementary materials are not available on tape.

## T326 ELECTRONIC SIGNAL PROCESSING

Third level: half credit

Last presentation in 1991

T326 should appeal particularly to students who wish to develop ideas about signals and systems introduced in [T283], T202 and [T291]/T292. However, because of the wide range of applications of electronic signal processing, the course is also highly appropriate for those whose interests lie in experimental science (particularly physics) or applied mathematics. Although [T283]/T202 is listed as a recommended prerequisite, T326 is not a course on electronic design, nor does it attempt to develop an understanding of electronic systems at device level. It should therefore be accessible to students with a background in mathematics or physics who have obtained a basic knowledge of electronics elsewhere. Although part of the course deals with the processing of signals by digital computers, a background in computer techniques and a familiarity with computer

architecture are neither assumed nor developed.

There are many examples of signals in the modern world. We can generally describe the variation in any measurable quantity as a 'signal' and hope, by careful study of a signal, to learn more about the source which produced it. Similarly, by comparing signals it is often possible to highlight 'cause and effect' relationships between different signal sources or to learn something about the transmission path between a source and the point of reception.

In most cases, the information or 'message' content of a signal is not immediately obvious or accessible and it is necessary to carry out a series of signal processing operations in order to achieve a particular objective.

For example, successful interpretation of a signal might depend on estimating its average value over a particular observation period. Or the significant aspect of a signal may only be revealed when the signal is analysed into a set of elementary component waveforms, for example when identifying long-term 'trends' in a signal or searching for hidden periodicities in signal behaviour. In some circumstances it might be considered desirable to specify a set of operations in order to enhance the wanted part of a signal at the expense of unwanted random disturbances. This is often a necessary step in experimental work involving signals contaminated by noise and interference. Different sets of operations are required to convert a signal into a form suitable for transmission by radio or to make a systematic comparison of two signals from related sources. In all these cases, the signals may be continuously varying or available only as a set of 'discrete' data values, perhaps stored in computer memory.

The aims of the course are:

- To investigate a range of essentially mathematical techniques for the analysis of signals.
- To identify a number of important signal processing operations that have wide applicability and serve as a basis for more sophisticated operations.
- To investigate the properties of signal processing systems that carry out prescribed operations on signals. Here, the signal of interest provides an input to the system which responds by supplying a suitably modified signal to the output.

**Content** The course is divided into four blocks, each equivalent to four units:

**Block I Introduction to signals and systems** Introduction and review of basic concepts. Signal approximation, periodic signals and Fourier series. Aperiodic signals, the Fourier transform and discrete Fourier transform.

**Block II Signal models and system behaviour** Laplace Transforms, z-Transforms. Linear processing: time and frequency domain analysis.

**Block III Analogue and digital filters** Topics in the design and implementation of analogue and digital filters.

**Block IV Random signals and signal detection** Types of random signal. Spectral analysis and signal comparison. Signal recovery, detection and prediction.

## NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** Please read this carefully. The list of contents above shows that the course is thoroughly mathematical in nature and intended for the well prepared student. It demands not only familiarity with but facility in algebraic manipulation, the use of complex numbers, and the differentiation and integration of expressions involving trigonometric and exponential functions. A knowledge of phasor or vector analysis and a familiarity with linear differential equations are also assumed.

The ideal mathematical preparation for the course is MST204, which covers all these topics. For those who have obtained their mathematical knowledge elsewhere, the standard required is equivalent to a good pass in first-year HNC or FTC (Level 4). The recommended electronics prerequisite is [T283]/T202, which covers fundamental background ideas on circuits, signals and systems, as well as the use of phasors and complex numbers in modelling electronic systems. If you had any difficulty with the mathematics in [T283]/T202 (or T292) or achieved only a grade 4 in MST204 you are advised not to attempt T326.



An information sheet is available which gives suggestions for preliminary reading together with revision material on phasors and elementary circuit analysis. This can be obtained by sending a stamped, self-addressed envelope (at least 16 x 24 cm) to the Course Manager, T326, Technology Faculty, The Open University, Milton Keynes MK7 6AA. If you have not studied T202/T283 (but possess a sound background in physics or applied mathematics at second level) you are advised to obtain this information before registering for the course.

**Complementary and related courses** Many students who have studied ST291 would find this course interesting, and T394 makes a good combination with it.

**Assessment** Three components: (i) four TMAs (30%); (ii) five CMAs (20%); (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA. The first of the five CMAs, which is based on the introductory and revision material of Block 1, will be formative.

**Calculator** A calculator with sine, cosine and exponential functions and their inverses is essential.

**Cassettes** Three audio cassettes.

**Preparatory reading** See above.

**Set book** P. A. Lynn (1982) *An Introduction to the Analysis and Processing of Signals*, second edition, Macmillan. The set book is the basis of the course and many of the units are written as commentary on selected sections of it. This edition is only available from Eddington Hook and an order form will be included in the first course mailing.

## T331 ENGINEERING MECHANICS: SOLIDS AND FLUIDS

Third level: half credit

'Engineering mechanics' as a subject covers the theoretical methods used by engineers in the design of mechanical artefacts such as buildings and bridges, road vehicles, ships, engines, spacecraft and so on. The fundamental principles involved were introduced in [T232]/T235. In T331 the principles are further extended, making it possible to introduce many new, more advanced and interesting problems. The essence of the course, therefore, is the principles of engineering mechanics and their application to design in the hands, or at least in the mind, of the creative engineer.

**Content** The course is presented in five blocks, the first four introducing material while the last is mainly devoted to revision. The subject matter includes solids and fluids, but excludes thermodynamics.

Block 1 considers various principles and problems arising from the design of mechanisms and machinery. This is essentially the control of motion, thus leading to the study of various kinematic principles by graphical and vector methods. Once the required motions are established, the forces must be considered, bringing in the study of kinetics, which combined with kinematics gives dynamics. This block includes some review and revision of the prerequisite course [T232]/T235, interpreting some of the methods used in [T232]/T235 from a new more advanced point of view, and introduces new methods and concepts.

The second block deals with structural analysis, including such topics as beam deflections, structural instability, buckling problems and indeterminate structures.

The study of structural loads and forces often requires the consideration of the effect of fluid flows. Block 3 investigates the problem of determining the forces exerted by fluids, and many examples and problems are discussed: on the design of cars and aircraft; on the study of extreme wind forces on buildings; of wave forces on offshore structures and pipelines, and so on.

Vibration problems are very common in practical engineering, and are often the cause of the unexpected failure. The fourth block

explores vibration dynamics and vibration analysis of one-, two- and multi-degree of freedom systems, including such factors as natural frequencies, node shapes and resonance. These provide the tools required to prevent vibration problems at the design stage, or to understand and rectify them retrospectively.

The last block is devoted to organized revision and preparation for the examination.

The emphasis throughout the course is on realistic problem-solving in a design context. You will therefore spend most of your time in active problem-solving, rather than reading.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** This course is directly related to [T232] or T235 which is a recommended prerequisite. It is desirable to have a grade 3 pass or better in [T232] or T235 before undertaking T331. It is also important to have a reasonable grounding in mathematics from M101, TM282 or a similar course. The fluid mechanics block, although self-contained in principle, will be more readily worked, and more value will be obtained from it, if you have studied T233, in particular Units 5-6 and 9-10.

**Assessment** Three components: (i) four TMAs (35%); (ii) four CMAs (15%); (iii) the examination (50%). Substitution will apply for up to one TMA and one CMA. There is one additional formative CMA which is not used for assessment.

**Broadcasts and cassettes** There are two television broadcasts. It would be advantageous if you could record the programmes for repeated viewing at appropriate points in the course. The programme material has been designed to be used in this way. There is also one audio cassette.

**Calculator** You must have a scientific-type calculator, including for example trigonometry functions (sine, cosine and tangent), logarithms and exponentials, and with exponential ('scientific') display.

**Students with disabilities:** Course and supplementary materials are not available on tape.

## T333 HEAT TRANSFER: PRINCIPLES AND APPLICATIONS

Third level: half credit

The course provides a thorough understanding of the principles of heat transfer and develops the skills required to carry out engineering analysis and design applicable to industrial and other case studies.

**Content** The principles of heat transfer, including conduction, convection and radiation, are taught with the necessary mathematical background to allow the analysis of heat transfer problems. The scope and limits of various methods of analysis are covered, thus developing skills appropriate to modern industrial practice.

The analysis leads to the study of the design and optimization of devices such as heat exchangers and of complete thermal systems. Case studies include examples drawn from industry.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** T233.

**Complementary and related courses** This course builds on T233 and fits well in a mechanical engineering or thermofluids profile.

**Assessment** Three components: (i) four TMAs (30%); (ii) four CMAs (20%); (iii) the examination (50%). Substitution can be applied to one TMA and one CMA.

**Students with disabilities** The many diagrams in the course may cause difficulty if you have a severe visual handicap. Course and supplementary materials are not available on tape.

**Set book** Frank P. Incropera and David P. De Witt *Introduction to Heat Transfer* (second edition), John Wiley.

## T334 ENVIRONMENTAL MONITORING AND CONTROL

Third level: half credit

T334 is the logical step from T234 *Environmental control and public health*, which lays the foundations in this subject area. T334 consolidates the T234 material and takes you on to the design/specification stage in selected areas of pollution control.

After working through the course you should be able to:

- Analyse environmental control problems and perform design calculations.
- Set performance specifications.
- Show an appreciation of the costs and benefits of selected environmental pollution control strategies.

**Content** The course is divided into four blocks (each equivalent to four units) to each of which is linked a TMA and/or a project. The course is presented in loose-leaf format with notes and explanatory texts associated with either published textbooks or journal reprints. Any books or journal reprints you need will be sent as part of the course. The course is designed for independent study and strong motivation is essential.

**Block 1 Wastes management** The two main types of waste are domestic and hazardous. For each there is a review of the nature, characteristics and quantities. Waste disposal techniques in both cases include transport, land fill site selection and management, other methods of disposal, leachate and gas control, water pollution protection and site after-use. In the case of domestic waste, recycling with special reference to energy recovery methods and their economics is an important topic. Trends in waste management are explored.

**Block 2 Noise** The introduction includes revision of basic concepts such as units, criteria and indices, legal and social control and planning. The technical aspects of noise control including prediction schemes and sound insulation of buildings are an important topic. There are case studies of public enquiries and of industrial noise.

**Block 3 Water** The two main topics are the theory and practice of:

- Water supply (demand estimation, quality treatment processes, design and economics) for domestic, industrial and agricultural applications.
- Effluent (sewage and trade) control, sewerage systems, design and economics.

**Block 4 Air** There is a revision of the nature and characteristics of air pollution. The selection, specification, design and economics of air pollution control processes are discussed. Other topics include automobile emissions, air pollution dispersion, modelling and chimney height calculations.

Because of the experimental nature of this course, the number of places may be limited.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** [PT272] or T234 are very strongly recommended. You must have access to T234 course materials and set books. From a revision point of view you will benefit from taking T334 as soon as possible after T234. A working knowledge of basic chemistry and mathematics is essential (TM281 could be useful).

**Complementary and related courses** T334 will allow coherent environmental management degree profiles to be followed. These can range from environmental engineering to a managerial approach to environmental monitoring. T334 is interdisciplinary and linked to food production systems and engineering courses in the Technology Faculty as well as to chemistry, biology and Earth sciences courses in the Science Faculty.

**Assessment** Five TMA equivalents (50%); there is a project worth two TMAs (a range of choices is offered, one of which requires collection of home experimental data; for this project you may ask for a sound-level meter from the Home Kits Warehouse) for which there is a threshold of 35%. The examination (50%). Substitution will apply for TMAs 01, 02 and 04 but not for the project TMA 05. TMA 03 is formative.

**Students with disabilities** Difficulties can be kept to a minimum if you choose a non-experimental project. Course and supplementary materials are not available on tape.

**Cassettes** Two audio cassettes.

**Special feature** Scientific calculator essential.

## T353 FAILURE OF STRESSED MATERIALS

Third level: half credit

When materials are put under stress in structures or machines they sometimes fail, with tragic and costly results. To forestall such failures, engineers should know all the ways in which load-bearing materials can fail. It is the aim of this course to reveal the principal modes of failure in stressed materials, and the conditions in which each mode may occur.

The course draws upon the complementary disciplines of mechanics and materials science, and it is designed for the student with some knowledge of both. From mechanics is drawn information about loadings and deflections in simple components, while from materials science comes information about the make-up and properties of real, constructional materials (watts and alloys). The course is particularly appropriate for students with an interest in mechanical, civil, chemical or materials engineering.

By considering a wide range of useful materials in a variety of loading conditions, the course shows how the occurrence of failure can be predicted. Such skills are applicable both to the design of load-bearing artefacts and to the 'post-mortem' analysis of mechanical failures.

**Content** The modes of failure considered all involve either fracture or an excessive change of dimensions. The main emphasis is on modes of slow and fast crack growth and, to describe these events, the theory of fracture mechanics is presented.

The course consists of a sequence of case studies, each of which presents a new mode of failure. Most are histories of failure investigations, the object of which is to discover the mode of failure and to recommend how a repetition of the failure can be avoided. For example, one case study considers the tragic failure of a colliery lift, leading to a diagnosis of the mode and cause of failure.

The other case studies involve design, and the object is to prescribe the dimensions of a product to meet given loading requirements without failure. For example, one case study considers how thick the walls of a polyethylene gas pipe must be in order to forestall failure by creep, creep rupture and environmental stress cracking.

The last unit is a project in which you are challenged to solve a problem. The nature of the problem changes from year to year but it is either a case of 'failure investigation' or of 'design'. No new skills are taught in this unit; it contains only the information required to solve the problem. Your solution is the subject of the last TMA, the result of which is used for assessment.

### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [T351].

**Recommended prerequisites** This course assumes a certain level of knowledge in mechanics such as is contained in [T232] or T235. The necessary knowledge of materials science is contained in T201 or T235 or T254. These courses are recommended prerequisites. However, we recognize that some students who have not taken these courses may have this assumed knowledge from their experience outside the Open University. For example, in mechanics you are expected to be conversant with: torsional and bending stresses, the plotting of shear force and the Mohr's circle construction for two-dimensional stresses; topics which are traditionally covered in many engineering courses. If you have not taken the two prerequisite courses you are strongly advised to send for either (or both) of two self-test papers, one on mechanics and the other on materials science. These papers contain advice on the feasibility of successfully completing T353 based on your test



performance. They can be obtained by sending an A4 or A5 stamped addressed envelope to the T353 Course Co-ordinator/Manager, The Faculty of Technology, The Open University, Milton Keynes, MK7 6AA.

**Complementary courses** T292/T291 is a complementary course. It deals with the use of transducers to obtain information (such as strain) from a structure. [T352] is also a complementary course. It examined industrial processing techniques used to manufacture artefacts, and since these techniques affect the microstructure and properties of the product, they may bear on the failure modes of the artefacts.

**Assessment** Three components: (i) a TMA component (36%) consisting of six shorter TMAs up to two of which may be substituted; (ii) a project component (14%) consisting of a longer TMA which may not be substituted; (iii) the examination (50%).

**Broadcasts** The eight TV programmes are an important part of the course, used mainly to describe and demonstrate tests and techniques, the results of which are used within the case studies; knowledge of this may be assessed. Television is also used on location at industrial sites of particular relevance to the case studies.

**Home experiment kit** In failure analysis great importance is attached to the visual examination of the failed component because this may reveal the probable mode of failure. The kit allows you to gain experience of visual examination. It contains plastic replicas of fracture surfaces which can be examined with a watchmaker's eyeglass (also part of the kit). It also includes stereo photographs of fracture surfaces at high magnifications. A polariscope/loading frame is provided so that stress distributions can be observed in photoelastic specimens. It is also used to measure the fracture toughness and the speed of propagation of cracks in a glassy thermoplastic. This kit may not be taken or sent outside the United Kingdom.

**Students with disabilities** This course is not recommended for visually handicapped students, nor for those with impaired manual dexterity. If you have any other disability please ask your tutor-counsellor for advice. Course and supplementary materials are not available on tape.

## T362 DESIGN AND INNOVATION

### Third level: half credit

This course is designed to help you to understand the processes of industrial innovation and product design so that you can engage more effectively in, or at the very least appreciate the nature of, innovation and design activities whether you are a designer, engineer, inventor, researcher, decision-maker or simply a consumer.

Although it originates in the Technology Faculty and is technology based, the course adopts a broad interdisciplinary approach in order to give you an understanding of the commercial, economic, social and organizational, as well as the technical, factors in successful innovation and good design.

The course has three main aims:

- To give you an insight into the technical and non-technical factors that influence the creation, development and adoption of new products, technologies and systems.
- To enable you to make critical assessments of product design and technical innovation projects from various points of view (e.g. business success, social benefit, environmental consequences).

	Actor	Technology	Emphasis
Block 1	Individual inventor/entrepreneurs	Renewable energy (water turbines/solar cells)	Technical factors
Block 2	Business enterprises	Information technology (microcomputers/interactive videotex)	Market and commercial factors
Block 3	Nationalized industry	Transport (high speed trains)	Organizational factors
Block 4	Local and national government	GLEB Renewable energy	Political factors
Block 5	Global economic system	Economic cycles	Macro-economic interactions and trends

- To enable you to apply what you have learned from the course to a project.

**Content** The course consists of three related 'streams' of study – theory, case studies and project work – linked by means of a series of study guides which contain the teaching/integrating material for the course. The reader forms the basis of the theory stream while the case study material is contained in a series of blocks, each concentrating on a particular source of innovation. The chart summarizes the structure and content of the block case studies:

The project runs in parallel with the theory and case study streams and occupies at least one quarter of your total study time. You will be asked either to prepare your own new product development proposal or to develop a case history of an existing product which has passed through the various stages of the innovation process.

To help you with your project you will learn about communicating technical ideas through drawing and modelling; protecting ideas through patents; identifying demand through market research; assessing the potential social and environmental effects of innovations; presenting and promoting innovative ideas and managing the innovation process.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** You will not require any special technical or mathematical knowledge in order to study T362. However, you should have some familiarity with technological concepts and approaches to problems such as that provided by [T101]/2, which is a recommended prerequisite. It is further recommended that you should have taken at least one technology course at second level (T263 would be particularly appropriate).

**Complementary and related courses** Other courses which would provide a suitable background include [T241]/T247 and T244. At third level T362 would go particularly well with [T361] and T392. Other related courses include T301, [D208] and A281. The experience gained from project work in T362 would be a good preparation for T401.

**Assessment** Three components: (i) TMAs 01–03, which assess understanding of the course material and also contain a project element (30%); (ii) TMA 04, the project report (20%); (iii) the examination (50%). Substitution will apply for one TMA in component (i) but not to the project component (ii).

**Broadcasts and cassettes** The eight TV programmes are used to illustrate the various stages of the innovation process, taking you 'behind the scenes' into the places and organizations where new products are devised and developed. You will be expected to make use of this material in your assignments.

There are eight audio cassette programmes which serve two general purposes: skills teaching and tutorial advice on tackling the project, and interviews with individuals involved with particular aspects of design and innovation.

**Summer school** The course-based summer school will give you support for your project work and an opportunity to do practical work in a variety of areas including creativity and invention, product analysis, microcomputers in design, marketing and technology policy.

**Students with disabilities** The project work could require visits outside the home, e.g. to libraries or firms. Course and supplementary materials are not available on tape.

**Set book** R. Roy and D. Wield (eds.) *Product Design and Technological Innovation*, Open University Press (course reader).

## T363 COMPUTER-AIDED DESIGN

### Third level: half credit

This course provides an introduction to and develops an awareness of the principles of computer-aided design (CAD) and to a range of applications of CAD systems in design. The aims of the course are:

- To teach some of the principles of computer-aided design and computer graphics.
- To provide some practice in the application of those principles in design exercises.
- To illustrate the application of those principles in professional CAD packages used in engineering, electronics and building design.

**Content** The course is presented in three parallel (but interdependent) streams. Each stream uses a different teaching medium.

**Text** The text stream begins with an introduction to design and computers (Units 1 and 2) and ends with new directions in CAD (Unit 15) and implications of CAD (Unit 16). All the text between Units 2 and 15 is in the textbook *Principles of Computer-aided Design*. This deals with the ways in which various tasks and procedures in design can be formalized, how geometrical and other properties of designed objects can be represented, and the significance of computer aids for the theory and practice of design. This material is broadly divided into conceptual and mathematical foundations, modelling, analysis and synthesis. Study notes with self-assessment questions are provided for all the required chapters of the textbook.

**Microcomputer** The microcomputer stream consists of structured exercises, mainly concerned with CAD applications. The application areas chosen are in architecture, electronics and mechanical engineering design. Most of the exercises are based upon original teaching software developed at the Open University for this course. However, some exercises do provide access to commercial CAD software for modelling and draughting. Each computer exercise has its own study notes with self-assessment questions.

**Video** The video stream helps to teach some of the basic principles and demonstrates professional CAD systems in areas such as draughting, modelling, analysis and graphics. Accompanying study notes provide exercises, comments and self-assessment questions.

These three parallel streams run throughout the course. You are expected to integrate the material across the boundaries of the different media streams. For example, a typical study period might include chapters from the textbook on representation and graphical techniques, computer exercises on architectural plan layout and video study on basic graphics principles and draughting systems.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** Because of the design orientation of this course T263 is recommended as a prerequisite. However, T363 does not assume any special familiarity either with the design process or with computers. It is written for students with a wide variety of backgrounds. Some experience in reading mathematical notation, particularly the mathematics of matrices and solid geometry, will be an advantage.

**Assessment** There are four TMAs. TMA 01 is weighted 8% and TMAs 02–04 are weighted 14% each. Continuous assessment counts 50%; substitution of up to one TMA is allowed. The examination counts 50%. The examination and the continuous assessment may draw upon all course components (units, course textbook, video and computer exercises). Certain assignment questions require you to deliver answers on disk.

**Cassettes** The five sixty-minute returnable video cassettes are important components of the course, and substantial access to VHS video playback facilities is essential. Each video has its own study notes with self-assessment questions.

**Computing** You will need a microcomputer for the CAD exercises which are an essential part of the course; you will be using it for about 60 or 70

hours throughout the study year. You can either borrow a microcomputer from the University or arrange your own access to one.

### • Loan by the University

For this course only the University lends a Research Machines Nimbus microcomputer with colour monitor and mouse to 200 students on the usual home kit terms. Those who have been in the University longest will be allocated a machine first. The Undergraduate Student Office will let you know if you are not likely to get a machine on loan.

### • Making your own arrangements

There is no limit to the number of places on the course for students who arrange their own access to a suitable microcomputer. This must be an IBM PC, PC/AT (including 386 version), PS/2 or compatible microcomputer running MS-DOS version 2.1 or higher, with at least 640K RAM memory, at least one disk drive capable of reading and writing 360K 5.25" disks or 720K 3.5" disks and an EGA or VGA graphics card (or compatible) capable of displaying sixteen colours at 640 × 350 graphics resolution. (Some EGA cards will require a Graphics Memory Expansion option to achieve this.) You will also need a colour monitor compatible with the graphics card and a two or three-button mouse with driver software (usually MOUSE.COM or MOUSE.SYS) which is Microsoft mouse-driver compatible. A printer is not required. It is your responsibility to satisfy yourself that your own arrangements are adequate.

**Students with disabilities** Course and supplementary materials are not available on tape.

**Set book** J. Rooney and P. Steadman (1987) *Principles of Computer Aided Design*, Pitman.

## T392 ENGINEERING PRODUCT DESIGN

### Third level: half credit

#### Last Presentation '1991

The designer of an engineering product plays a leading role in industry, bringing together the many factors that go to influence the design of products. The designer must act upon detailed knowledge from areas such as:

- Mechanical design and engineering science.
- Safety, reliability, quality and maintenance.
- The organization of design processes.
- Production, manufacture and marketing.
- Legal obligations and standards.

The designer studies each course of action, balancing one consideration against another, and must communicate what has been decided, in instructions for manufacture, use, maintenance and repair. Because of this involvement with every stage of manufacture, the designer is the leading character in the story of any engineering product.

**Content** The course gives experience in engineering product design through case studies based on real products. There is also an engineering product design project.

The course explains how the need for a product is established, how the specification is drawn up, what affects it and why, what decisions are made in design and how the product is taken through to manufacture and marketing in the industrial-commercial environment which engineering product design ignores at its peril.

An introductory case history follows a commercial vehicle cab seat from its conception right through to its sale; we see how the whole company is involved. Another study of electronic instrumentation for cars exemplifies the problems of ensuring reliability in large-volume production. Materials selection is taken up in a case study on design in plastics of a popular dinghy, the Topper. A case study of a self-advancing mine support shows how a product operates in a hostile environment. The last case study, of a heat exchanger used in the off-shore oil industry, emphasizes the interaction between customer and designer. Computer-aided design techniques in heat exchanger design are examined.

The course explains how engineering designers communicate their work through diagrams, sketches, drawings and product specifications. You carry out a project in parallel with the teaching texts; in each phase



of the project you make design decisions for yourself, but guidelines are provided throughout the project.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** [T291] or T292. The nature of engineering design makes it highly desirable that T392 should be attempted late in any degree profile rather than early. In this way a number of other subjects will have been studied which will enhance the lessons learnt in the formal study of engineering design. Thus, while T392 can be undertaken with benefit if you possess only the minimum prerequisites, the study of some or all of the following courses before attempting this course will enrich the rewards of study: [T101], T102, T201, [T232], T235, [T252], T254, T322, T263, T281, [T283].

**Assessment** Three components: (i) four TMA's (40%); (ii) four CMA's (10%); (iii) examination (50%). Substitution will apply for up to one TMA and one CMA.

**Broadcasting and cassettes** There are eleven TV programmes. Because of the close linking between the TV programmes and the written components of the course, watching the programmes is strongly recommended.

There are three one-hour audio cassettes closely linked to each of three case studies. A one-hour video cassette is available on loan to provide extra help in making and understanding technical drawings if required.

**Home experiment kit** The kit consists of a number of small manufactured components which demonstrate particular teaching points on manufacturing methods, detail design considerations and good (and bad) design practice. The kit is accompanied by a handbook and is referred to from the course units. There is also a device to help with the work on perspective and projections. Technical literature from manufacturers is also provided.

**Students with disabilities** If you have severely impaired vision you will probably be unable to benefit fully from the course. Course and supplementary materials are not available on tape.

**Special features** You will work with reference material, tables, data sheets, catalogues and other items used by engineering designers in industry. The course requires an ability to make use of and integrate the reference material. You will be expected to tackle this and to exhibit some of the skills of an engineering designer.

## T393 ELECTRONIC MATERIALS AND DEVICES

### Third level: half credit

Although electronic components are exploited to undertake a wide range of tasks, there is often little understanding of why the black boxes used in electronics display the characteristics they do. To get to the heart of this understanding, it is necessary to have a well-founded multidisciplinary background in physics, materials science and electronics. The aim of this course is to show how these three strands interact in the modelling, manufacture and operation of some modern electronic devices. Since the concepts behind this primary aspect of the electronics revolution are extremely complex and constantly changing, the course sets out not to provide exhaustive or wide-ranging knowledge but to understand the main factors that govern the behaviour of individual devices in terms of both the underlying physics of materials and the need to deal with real materials.

#### Content

**Block 1 Resistors, resistivity and wafers** (Units 1-4) covers the basic physics of electrical conduction in solids, particularly in semiconductors. Its end point is the characterization of single-crystal wafers, which are the basis for a large range of manufactured devices.

**Block 2 Semiconductor junctions** (Units 5-8) An explanation of the behaviour of simple mathematics of the p-n junction is followed by a discussion of the fabrication and properties of diodes. There is a short case study of the design and manufacture of a commercial power diode.

**Block 3 Optoelectronics** (Units 9-10) How p-n junctions can be used for the emission or detection of light is illustrated by reference to the development of a high-performance optical-fibre transmission system for the telephone trunk network.

**Block 4 Bipolar devices and integration** (Units 11-13) The operating principles of bipolar transistors are explained. The design principles and manufacturing processes of a commercial transistor and a common operational amplifier are outlined.

**Block 5 Field-effect devices and VLSI** (Units 14-15) The mode of operation of field effect transistors is explained, but the emphasis in this block is on how enormous numbers of elements can be combined to form 'very large scale integration'.

**Block 6 New technologies** (Unit 16) uses three important new topics to tie together and revise many of the scientific and technological principles developed in the previous blocks. The three topics are: amorphous semiconductors; heterojunctions and superlattice structures; gallium arsenide integration.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** The course covers aspects of electronics, physics, mathematics and materials science, and ideally you should have some general background in each of these subjects. The minimum requirements are listed below, but you will find the course much easier if you have gone further in at least one area.

**Electronics** An elementary knowledge of the use of diodes, transistors, operational amplifiers, logic gates and memories in electronic circuitry. [T283] recommended.

**Mathematics** The main topics required are: differentiation and integration, trigonometry, logarithms and exponentials. Although these are the essential topics, it is a considerable advantage if you have studied further and have a wide experience of applying maths to physical situations. A good pass in TM282/TM281 represents the minimum mathematical background, but it is better to have taken an additional course such as MST204.

**Physics** Elementary mechanics, waves, geometric optics and basic classical atomic physics are assumed to be known. Elementary quantum mechanical principles are introduced in the course, and it is an advantage if you have some previous knowledge of these. S102 or T281 cover the minimum requirements, or S271 would be excellent preparation.

**Materials science** Only a slight knowledge of materials science is assumed, and all the necessary topics are taught within the course.

T393 is a demanding course and you are advised not to take it as your first at third level. You should take careful note of the recommended prerequisite knowledge, and be prepared to tackle conceptually difficult models and ideas which are more in line with a physics way of thinking than an electronics one.

**Assessment** Four TMAs (50%) and the examination (50%). Substitution will apply for up to one TMA. There are also six formative CMAs which revise concepts and test the understanding of each part of the course before proceeding further.

**Cassettes** An E120 video cassette will be supplied, on loan, which contains teaching material that is assessable and not repeated in print. It is recommended that you have easy access to a VHS video cassette player. There are also three audio cassettes.

**Students with disabilities** If you have a severe visual handicap you may well find that the intricate nature of many of the diagrams and the use of video cause difficulties. Course and supplementary materials are not available on tape.

**Set books** There are set books which may change from year to year. They are part of the course's assessment material. You will receive a course guide in the first course mailing, giving details of the set books.

## T394 CONTROL ENGINEERING

### Third level: half credit

Control theory is used to analyse and design systems that are controlled or are to be controlled. The term 'system' can apply in its broadest sense; control theories have been used in the analysis of sociological, biological and economic systems. However, this course concentrates on the application of control

theories, and existing engineering systems have therefore been used to illustrate the theories. Home experimental work is also provided for this purpose. The three main case studies are of a control system in a power station, the control of a satellite tracking antenna, and a digital position-controlled system for an industrial robot.

**Content** The course starts by explaining alternative fundamental control strategies. Two of the case studies are introduced: a power station and a satellite tracking station.

Next it is shown how physical laws can be used to produce models of systems in the form of differential equations and how these models can predict the behaviour of a controlled system. The case study systems are examined in more detail to show how this was done in practice. Models derived from experimental results are considered and the stability of control systems explored.

s-transform techniques are introduced, followed by aspects of root locus. Controllers and multiloop strategies, compensators and disturbances are then considered.

The third case study is introduced to illustrate methods of modelling suited to the use of digital computers, including the use of s-transform. The advantages of using digital computers to solve control problems and the effects of using sampled data are discussed, as are techniques for designing digital control systems.

You then carry out a project, using the home experiment kit, to design a control system to meet given requirements. Three units' worth of work are allocated to this project.

#### NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [T391].

**Recommended prerequisites** T292, or [T232]/T235, or [T283]/T202 and TM282, or MST204. No knowledge of control theory or practice is assumed and any mathematical topics used to support the material that are not in the recommended prerequisite courses are taught as part of the course. The course assumes familiarity with and the ability to manipulate the form of solution of first- and second-order differential equations, a knowledge of Newton's Laws of Motion, an understanding of electricity and terms such as current, voltage, resistance, capacitance, and an elementary understanding of binary numbers.

**Complementary and related courses** T394 is considered to be an integral part of a degree profile in engineering mechanics or electronics. It can also form part of a degree profile in systems, computing and computers, engineering science or technological systems.

**Assessment** Four components, (i) three TMAs (20%); (ii) project report (10%); (iii) four CMAs (20%); (iv) the examination (50%). Substitution will be allowed for up to one CMA and one TMA in component (i) but not for the project component (ii). There is also one formative CMA at the beginning of the course.

**Cassettes** There is one audio cassette and units and assessment will assume that you have access to an audio cassette player.

**Home experiment kit** This includes a chart recorder and a mini-process involving pumps, beakers and water, and makes use of a microcomputer. The kit, which is an important part of the course, may not be taken or sent outside the United Kingdom. You will need access to a television set for use with the kit.

**Students with disabilities** If you have a severe visual handicap you will find it difficult to cope with the many and sometimes complex figures in texts, and to gain much from the kit. Those with impaired manual dexterity may have difficulty in using the kit and in drawing the several types of graph. Course and supplementary materials are not available on tape.

**Preparatory reading** You may find it helpful to look at [T291] Units 8/9/10, which deal with second-order systems.

## T401 TECHNOLOGY PROJECT

### Fourth level: full credit

Only limited numbers can be accepted for T401. Please pay particular attention to the section on

Conditional Registration below and be prepared to plan well in advance of your application.

The technology project offers you the opportunity of gaining a credit through carrying out a supervised project in any area or combination of areas covered by the Technology Faculty. Projects have been successfully introduced in a number of OU courses, but in T401 you work solely on one project chosen to reflect your own interests.

The aims of the course are to give you an opportunity to:

- Use the knowledge you have gained and skills you have developed in other technology courses.
- Study independently and develop the ability to organize yourself and your work in order to achieve a specified goal within a strict time limit.

**Types of project** The projects in T401 usually have a practical aim in view. They may result in design proposals or specifications for a system or artefact, in policy proposals, or in studies relevant to such practical ends. It is not expected, however, that T401 projects should be research projects with the pursuit of knowledge as the main aim, in the way that postgraduate research for a higher degree would be.

The breadth of subjects covered in completed projects is very wide and spans the academic discipline interests of the faculty. These include electronics, materials, engineering mechanics, design and systems. It should be emphasized that several kinds of activity can form the basis of a suitable project, whether it is concerned with an investigation of an organization or system or a design specification for a mechanical or electrical component. The important element in all projects is that you are looking at a particular problem using the knowledge gained from previous technology courses coupled with your own experience and suggesting how the problem can be tackled. In other words, the project is an exercise in creative skills. It is no accident that the term 'design' is frequently used in project proposals.

No single subject or discipline has a monopoly of the type of T401 project that can be done, and there are no imposed academic prerequisites such as a guided course of study unless these are felt to be in your best interest. As long as the project is academically acceptable, the only constraints are practical ones such as, is there a suitable local tutor? Are expensive laboratory facilities required (which cannot be provided through the co-operation of your employer or tutor)? Is there a suitable internal examiner?

**Choosing a project** There are two ways of doing this. Usually, you suggest your own project topic or area. If you have no topic in mind, you should consult the technology staff tutor at your Regional Centre or the T401 course manager at Walton Hall; it may be possible to offer suggestions for a project based on areas of interest to you. Either way, the project proposal is then developed, in consultation with a prospective tutor, into a feasible project proposal to be forwarded to the course team for approval.

All project proposals must have a technological content and must lie within the field of topics covered by the Faculty of Technology. They must also be consistent with honours degree work at fourth level. In practice these stipulations have not proved to be too inhibiting, although it may not be possible to proceed to a formal project proposal if your academic background is judged to be inappropriate for the suggested area of study.

In order to get the most out of doing the project, it must be compatible with your previous studies or experience. If a proposal does not show this compatibility it is unlikely that a suitable tutor or internal examiner will be found.

If you wish to use T401 as part of a submission to the Engineering Council for professional recognition and status as a chartered engineer you are advised to ask for a copy of Recognition Information Leaflet 3.3 (see Section 1) and seek additional advice from the relevant engineering institution.



## NOTES FOR PROSPECTIVE STUDENTS

**Level and prerequisites** Before conditionally registering for T401 you must already have obtained credits entitling you to the award of the BA degree, but must not have exceeded the honours credit maximum or be put into a position to do so by taking T401.

The recommended prerequisite for T401 is at least two credits in courses supervised by the Faculty of Technology. In order to obtain the maximum benefit from the technology project, you are strongly advised to take at least one third-level technology course during the year in which you are registering for T401 (that is, in the year before doing a project). For systems projects this would be T301. All T401 projects are at fourth level. This has a number of implications:

- The degree of independence and initiative expected of you will be consistent with a course taken at fourth level in an honours degree programme.

- Projects will be expected to use knowledge and skills gained in other technology courses (or from previous educational or work experience), including courses at third level.

- You may be advised to pursue a specified course of study before starting a T401 project. This may happen if it is considered that you are inadequately prepared to embark on the proposed topic to the depth and breadth consistent with a fourth-level honours degree project.

**Conditional registration** There are only about 100 places on this course. Students will be selected according to the academic acceptability and feasibility of their project proposals. If there are more acceptable proposals than places, those who have been in the University longest will be offered places first.

Application for T401 takes place from 1 January to 31 March in the year before study. If you wish to be considered for T401 (for 1992) you should write, during this period, to the Undergraduate Student Office, The Open University, PO Box 72, Milton Keynes MK7 6AQ asking for an application form, which you must complete and return to the T401 course manager before 31 March 1991. In May 1991 you must also conditionally register for T401, and you are advised to give alternative choices in case your application is not successful. Please remember to return your conditional registration form to the Undergraduate Student Office, not to the Faculty. At this stage your project proposal need only be in outline form, as a tutor will be appointed to help you produce a formal proposal. This appointment is not a guarantee of acceptance; your project must meet the criteria explained in 'Choosing a project'.

**Tuition** You will have a personal tutor, who will already have helped in preparing your formal proposal. You will hear by October whether your proposal has been accepted, so that you can meet your tutor in November for your first project tutorial. We have planned for each student to have at least ten hours of tutorial time during the year.

About £20 is available for each project to pay for essential items, including library searches.

**Assessment** There are no TMA or CMA but you will be required to present three reports during the year:

- 1 An initial report investigating the project background and giving a critical appraisal of the literature, defining the project proposal and setting out a detailed project plan (submitted in February).
- 2 An interim report outlining progress made, elaborating on the project plan, and including a draft chapter on the methods of investigation used as well as chapter headings for the final report (submitted in June).
- 3 A final written report submitted in September.

The final project report will be assessed by both the tutor and the internal examiner (a full-time member of the Open University's academic staff). You will meet the examiners at a compulsory oral examination. Oral examinations are held in October, usually in your Regional Centre.

**Resits and repeats** You will not normally be allowed to:

- Resubmit a final report or have another oral examination (i.e. resit T401) if you fail to obtain a credit.
  - Attempt the same project topic in a subsequent year if you withdraw before completing the course.
- If exceptional circumstances arise each case will be considered individually, but you should not include T401 as a repeat or resit option on your conditional registration form.

**Course materials** There are no course units but you will be sent material including Study Guidelines and an Information Search Guide to help you in the conduct of your project and in writing your project reports.

**Summer school** You may be advised by your tutor to attend a technology course summer school if its academic facilities are relevant to your project.

**Students with disabilities** Because of the wide variety of projects and the emphasis on individual choice, you should have no particular problems with T401 if you have been able to take third-level technology courses. Course and supplementary materials are not available on tape.

**Set books** There are no set books for T401, but you may need to buy books for your own project.

## TM222 THE DIGITAL COMPUTER

### Second level: half credit

Last presentation in 1991

This course will be of interest to all those who need to work with computers and to whom computer skills and understanding are necessary.

Although the course does not assume any knowledge of computers or computing, it is not a computer awareness course. It is fairly fast moving and intensive and goes beyond the introductory level.

The computer has an ever-increasing range of applications. The course reflects this in its choice of illustrative examples and by not demanding a specialized background of its students (but see Recommended Prerequisites below).

The course provides an understanding of the principles of operation and organization of a small digital computer through first-hand experience with a home computer which is lent to you. In particular, the course explores the allocation of roles to the hardware and software (that is the components and the programs) of a computer. It will also enable you to read critically the specialist computer literature, including manufacturers' specifications, accounts of computer applications and claims of new developments. In terms of practical skills, the course introduces a general approach to program preparation, and two programming languages. It also explains how to link computers to other devices, for data input and output.

**Content** Seven units are related to the home computer and include a substantial amount of practical work. The other units deal with digital computers in a general way, but describe particular machines as examples of the application of general principles. The units are as follows:

- 1 Presents the computer as a general purpose data-processing tool capable of being adapted to particular tasks, and examines how data is represented in a digital computer.
- 2 Describes the basic structure of the computer's processor and main memory.
- 3/4 Introduce the Intel 8085 microprocessor and HEKTOR (the home experiment kit microcomputer), and include the first practical work.
- 5 Consists of practical programming work in assembler language.
- 6 Explains some principles of program construction and describes the facilities offered by system software such as the editor and assembler for developing programs.
- 7/8 Input and output of data.
- 9/10 Home-kit related units on input/output operations, with a significant practical content.
- 11 Introduces some high-level languages.
- 12 A practical unit which develops skills of programming in BASIC.
- 13 A practical project which requires you to create a program to perform a defined function, and which forms part of the continuous assessment for the course.
- 14 Describes a family of minicomputers (the PDP-11 series) and the peripheral devices commonly encountered in computer systems.
- 15 Operating systems - how system software is used for controlling and communicating with computers.

16 A file containing a collection of articles and reviews in the field of interest of the course.

## NOTES FOR PROSPECTIVE STUDENTS

**Excluded combination** [TM221].

**Recommended prerequisites** A knowledge of the concepts of current, voltage and resistance. Although the following topics will be reviewed in the course material, prior knowledge of them would be an advantage: the binary number system; logic gates and truth tables.

The depth of knowledge recommended can be obtained from the suggested preparatory reading.

**Complementary courses** M205, T202 and [T283].

**Assessment** Three components: (i) TMAs 01-04 (37.5%); (ii) project 05 (12.5%); (iii) the examination (50%). Substitution will apply for up to one TMA but not to the project.

**Broadcasts** There are no broadcasts, but you will need a television set for use with your home kit.

**Home experiment kit** A small microcomputer to be used in conjunction with your television set. It is used extensively throughout the course, and practical work will culminate in a project to be assessed as a TMA. This kit may not be taken or sent outside the United Kingdom.

**Students with disabilities** If you have a severe visual disability or very limited manual dexterity you may have difficulty with the practical work. All practical work is carried out at home.

**Preparatory reading** Sections 1-3 of M. E. Sloan *Introduction to Minicomputers and Microcomputers*, Addison-Wesley; or Sections 8, 9 and 10 of H. Jacobowitz and L. Basford *Electronic Computers Made Simple*, W. H. Allen; or the Computer Library of [T101] *Living with technology*.

## TM282 MODELLING WITH MATHEMATICS: AN INTRODUCTION

### Second level: half credit

Modelling with mathematics is a process by which a problem is simplified so that it can be expressed in mathematical terms: a solution can then be obtained using mathematical techniques and interpreted in the light of the simplifications made. TM282 is an introductory course about this process. It is designed for students who, while not wishing to pursue the full range of mathematical ideas covered in M101, nevertheless need a basic understanding of some mathematical methods, and of how to apply them, for other post-foundation courses in technology or science. The course teaches a number of mathematical skills and illustrates their use in a modelling context. It also teaches the process of formulation of models and the interpretation of the solutions.

The aims of the course are:

- To explain the process of mathematical modelling.
- To introduce a number of standard mathematical models.
- To teach some of the mathematical skills including calculus needed in the handling of mathematical models and in higher level technology courses.

**Content** Units 1 and 2 introduce the 'modelling cycle' and show how it can be applied to systems resulting in both linear and non-linear models. Units 3 and 4 tackle basic ideas in trigonometry and the use and manipulation of vectors. Units 5 to 8 cover methods of differential calculus. They show how dynamic systems, populations and economic situations can be modelled using differentiation to handle rates of change. Units 9 to 12 cover methods of integration, discussing applications including areas and volumes. Part of Unit 11 and Units 13 to 15 are on the important topic of differential equations which occur in many models in science and technology. Unit 16 is a revision unit in which many of the topics of the course are brought together and used in a case study on modelling heat flows.

Though a high proportion of study time is

necessarily devoted to acquiring mathematical skills, there is throughout the course an emphasis on the modelling process itself, which is as intellectually demanding as the mathematical techniques. A booklet of modelling themes is provided which discusses some general areas in which mathematical modelling is useful, e.g. population modelling and financial modelling, and reference is made to these themes at various points in the course units.

## NOTES FOR PROSPECTIVE STUDENTS

**Excluded combinations** [M100]/M101; [MST281]/M283; [TM281]. Please read the Advice to Science and Technology Students in the Mathematics Overview.

**Recommended prerequisites** You are expected to be familiar with the basic mathematical ideas which are taught in both [T101]/T102 and [S101]/S102. If you have not taken one of these courses, you can still take TM282 if you have a basic knowledge of arithmetic, elementary algebra and some geometry and trigonometry. A diagnostic quiz will be sent to you before the course begins to help you to decide whether your present level of mathematics is sufficient. For those who feel that they need to brush up their elementary mathematics we recommend *Countdown to Mathematics* by Graham and Sargent (Addison-Wesley) Volumes 1 and 2.

**Related courses** TM282 is a useful introduction to the mathematics needed in several second-level technology and science courses such as T202, T235, [T252], T292. It should not, however, be regarded as a substitute for M101 if you intend to take further mathematics courses. However, a good pass in TM282 is a sufficient prerequisite for MST204, which is a course strongly recommended for students who wish to follow more mathematical technology and science courses (e.g. T326, T331, T394).

**Assessment** Three components: (i) seven TMAs (30%), each  $\frac{1}{7}$  of a standard TMA in length; (ii) two CMAs (20%); (iii) the examination (50%). Substitution will apply for up to two TMAs and one CMA.

**Broadcasts and cassettes** Eight TV programmes closely integrated with the written material. The aim is to reinforce the modelling aspect of the course, and to use animation techniques to illustrate the mathematical ideas involved in the models introduced. Detailed broadcast notes work through all the mathematical manipulation so that you can become familiar with this before watching, and revise it afterwards.

Audio cassettes are also an integral part of the course. They are used to teach many of the mathematical skills in the course.

**Summer school** Course based, giving you considerable practice in both mathematical techniques and mathematical modelling of real problems. Lectures followed by example sessions, modelling projects and an extensive tutorial programme make up most of the week. A mock exam is provided to give you practice in answering questions under examination conditions. You are not assessed on your work at the summer school.

**Students with disabilities** Like many mathematical courses which use a lot of diagrams, the course may be very difficult if you have a visual handicap.

**Calculator** You will need a hand-held battery-operated calculator. No particular calculator is recommended but it must perform the operations of +, -, ×, and ÷ to six-figure accuracy and have the following keys:  $\sqrt{\quad}$ ,  $x^2$ ,  $\sqrt[n]{\quad}$ ,  $\ln$ ,  $\pi$ ,  $y^x$ , and brackets. You will need the sine, cosine and tangent functions and their inverses (in both degrees and radians) together with logarithms to the base ten and natural logarithms with their inverses  $10^x$  and  $e^x$ . A memory function is very useful. Calculators which can plot graphs on their displays will not be permitted in the TM282 exam so you are advised not to buy this type of calculator.

## TM361 GRAPHS, NETWORKS AND DESIGN

### Third level: half credit

What type of code was used by Mariner 9 in communicating with Earth? Where do you brace a framework to make it rigid? How many colours are needed to colour a map so that neighbouring countries are differently



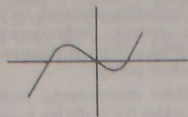
coloured? Can you tile a floor with twelve-, six- and four-sided shapes? How can you assign people to jobs for which they are qualified? How can a manufacturer send his product from his factories to a number of warehouses so that the total transport cost is a minimum?

These are some of the many questions which will be answered in this problem-based course. The problems studied range widely from real ones arising in present-day technology, operational research and the physical and social sciences, to puzzles of a more recreational nature. Throughout the course we try to show the connection between seemingly different problems in widely different areas, and to describe common methods for their solution.

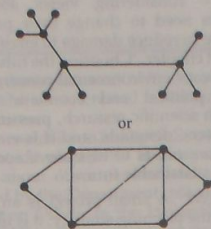
This interfaculty course is intended for a wide audience and should appeal to students with a variety of backgrounds (see Prerequisites below). Those who are more mathematically inclined will see how their mathematics can be used to solve real problems, whereas students with a technological background will come to appreciate the use of a mathematical framework to relate different ideas.

**Content** The material is presented in a down-to-earth manner, with an emphasis on solving problems and applying algorithms rather than on abstract ideas and formal proofs. Throughout the course considerable

emphasis is given to the modelling of problems using mathematical ideas, and the representation of these ideas by means of diagrams. In this context, note that the word *graphs* in the course title does not refer to a picture like this:



but to a diagram consisting of points joined by lines, like this:



These points correspond to chemical atoms, towns on a map, electrical terminals, or anything else that can be connected up in pairs.

Some areas covered are:

**Operational research** Job assignments, bottlenecks, activity networks in project planning, scheduling, design of experiments.

**Transport planning and traffic control** Flows in networks, choice of optimum route, minimizing dangerous crossings at traffic intersections.

**Communications** Synthesis of telecommunication networks, design of codes so as to reduce errors in communication.

**Structures and mechanisms** Degrees of freedom in a structural system, synthesis of mechanisms, bracing a frame structure.

**Electrical and related networks** Analysis of RCL networks, Kirchhoff's laws, multipoint networks and control systems.

The main areas of mathematical interest are:

**Linear graphs and digraphs** Trees, Eulerian and Hamiltonian graphs, shortest path problems and critical path analysis, planar graphs and maps, the four-colour map problem.

**Network flows** Flows in capacitated networks, max-flow min-cut theorem, transversal theory, assignment problems.

**Enumeration** Binomial theorem, various methods of counting including the use of generating functions, recurrence relations and the inclusion-exclusion principle.

**Block designs** Design of experiments, coding

theory, triple systems and the 'schoolgirls problem'.

**Geometry** Tessellations, polyhedra, polyominoes and tilings.

## NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** The recommended prerequisites have been kept as broad as possible. The course should be equally accessible to students who have previously taken mathematics courses and those who have taken courses in technology or science, since the main prerequisite is 'experience'. However, it is strongly recommended that you should have had some experience in mathematics (as given by, for example, M101, M5283, TM282, or an A level course) and the equivalent of a full credit at second level in mathematics and/or technology and/or science. Whatever your previous courses, you should find plenty to interest you, as long as you are willing to go along with the interdisciplinary nature of the course.

**Assessment** Four TMAs and six CMAAs (50%) and the examination (50%). Substitution will apply for up to one TMA and one CMAA.

**Broadcasts and cassettes** Sixteen TV programmes. Four audio cassettes covering thirteen units.

**Students with disabilities** The text could cause difficulty if you have impaired sight, since there is a large number of diagrams. Substantial use of audio cassettes could cause problems for those with impaired hearing.

## U AREA

### OVERVIEW

'U' or 'University' courses are interdisciplinary or multidisciplinary. They deal with subjects of broad and general interest and include a wide range of contributory disciplines. This enables common themes or topics to be examined from various points of view, using skills and knowledge derived from a number of different academic areas, both arts-based and science-based. The subjects tackled by U-courses are often related closely to everyday experience.

Two of the U-courses are full credits and two are half credits: all are at second level. They have no prerequisites (other than a pass in any foundation course) and they do not assume knowledge of any one discipline. Indeed, they are specially designed to interest students with widely different backgrounds, experiences and academic interests and to fit into the degree profiles of a very wide range of students. If you wish to follow broadly based courses, U-courses will appeal as intrinsically interesting areas of study in their own right. If you have already completed a number of specialist courses, U-courses may give you new perspectives on your previous studies or help to place them in a wider context. If you have just completed a foundation course, on the other hand, U-courses may offer the opportunity of gaining some understanding of unfamiliar disciplines before deciding what further courses to take at the post-foundation level. Although U-courses are not designed as part of any particular academic programme, they could have a place in a number of coherent degree profiles. These are outlined in Table II.

As well as the U-courses themselves, some faculty-based courses have also been designated as 'U-type' courses. These are produced by faculties or groups of faculties in the usual way, and some have a particular foundation course (or choice of foundation courses) as a recommended prerequisite. But, like U-courses proper, they are wide-ranging, deal with subjects of general interest, and will be accessible and suited to students who have taken courses from a number of faculties. U-type courses are identified by a footnote in Table I.

When reading the following course descriptions do not forget to refer back to Sections 1-3 and Tables I, II and III at the beginning of this publication.

Under 'Notes for Prospective Students' discontinued courses are identified by square brackets; their titles and presentation dates are listed in Table III.

### U204 THIRD WORLD STUDIES

Second level: full credit

Last presentation in 1991

Famine, poverty, under-development, population growth and environmental deterioration are matters which arouse our concern about the 'Third World'. In order to understand them, it is necessary to acquire knowledge about the 'Third World' and frameworks for analysing what happens there. Relatively little information about the Third World is presented to people living in Britain in the normal course of their lives. What there is commonly presents oversimplified, stereotyped or ethnocentric views of the 'Third World' and the concept of 'development'.

U204 is an interdisciplinary course which tells you what you need to know. It is essential for those who want to understand the important issues in the modern world. Nevertheless, no previous specialist knowledge is required. The course will be particularly useful to those teaching or writing about Third World countries, and to those who may be working there. A textbook on the subject calls the course 'far and away the best integrated materials on development... every school and college should have a set' (Foster-Carter, 1985).

Using a wide variety of learning materials, from poetry and fiction to maps and statistics, from writings by development theorists and politicians to first hand accounts of 'lives of struggle', the course examines four main areas:

- The history of colonialism
- Production in the Third World
- The international economy
- Alternative development strategies.

The course is organized in two parallel strands: there are five blocks of material covering the main themes (the four above plus an introductory block). The blocks use as

examples the second 'resource' strand which consists of nine multi-media case studies, plus the *Third World Atlas*, literature and course reader. The case studies are:

- 1 Caribbean sampler and picture pack
- 2 The origins of the Nigerian civil war
- 3 Health policies in Mozambique
- 4 Pastoralism in the Sahel
- 5 The green revolution in India
- 6 Industrialization and energy in Brazil
- 7 Clothing the world: First World markets, Third World labour
- 8 Migration: the Turkish case (TV only)
- 9 Banking on the Fund: the IMF

Block 1 'Third World' and 'development' examines alternative conceptions of the Third World and introduces concepts for analysing development. The set book by Gavin Kitching, *Development and Underdevelopment in Historical Perspective*, is used to set up the 'orthodox', 'unorthodox' and 'populist' views of development and examples are drawn from the course anthology, *An Anthology of African and Caribbean Writing in English* and the course reader *Third World Lives of Struggle*.

Block 2 *The making of the Third World* traces the historical and cultural factors which have influenced the development of the Third World, notably the rise of capitalism and the expansion of European control. The *Third World Atlas* developed by the course team provides historical maps for this section and a series of short case studies on African fiction and film is also used.

Block 3 *Production and producers in the Third World* examines the diverse industrial and agricultural production systems found in the Third World. The first part on production on the land uses the case studies on the Sahel and India to investigate why agriculture remains predominant in the Third World. The second describes the industrial development which is taking place in the Third World, using the case studies on the Brazilian car industry and its development and on the growth of the textile industry in the export processing zones of South East Asia.

Block 4 *The international setting* examines the Third World in its global context: the economic and political relations between it and the major economic powers. The block considers how the international system limits Third World countries' choice of national development strategy.

Block 5 *Developing or being developed?* looks in detail at the organization and practice of state- and non-state-led development using examples from China, India and Mozambique. This block was brought up to date for 1989.

**Project** During the study of Blocks 4 and 5 you will carry out a project selected from:  
Small-scale technology  
Media monitoring  
Literature in education  
Describing conceptions of the Third World and possibly  
Trade and employment in Britain and the Third World.

## NOTES FOR PROSPECTIVE STUDENTS

**Assessment** Three components: (i) TMAs 01-04 and 08 (37.5%); (ii) project 06-07 (12.5%); and (iii) the examination (50%). TMAs 01-04 and TMA 08 will each carry 7.5%. Substitution will apply for one TMA from TMAs 01-04 but not to the project or TMA 08. TMA 05 is formative.

**Broadcasts and cassettes** Eighteen TV programmes are mostly part of the case studies. Five 90-minute audio cassettes are used to reinforce basic concepts, recall television material and present cultural items.

**Summer school** Course based, at the University of East Anglia, Norwich. Specialist tutors will help with project work and there will be performances by poets, theatre groups and bands, and also films from the Third World.

**Students with disabilities** Although unable to benefit from all aspects, students with severe visual handicaps could still follow the course.

**Set books** H. Johnson and H. Bernstein (eds.) *Third World Lives of Struggle*, Heinemann Education Books. John Figueroa (ed.) *An Anthology of African and Caribbean Writing in English*, Heinemann Education Books. Gavin Kitching (ed.) *Development and Underdevelopment in Historical Perspective: Populism, Nationalism and Industrialization*, Routledge. Sembène Ousmane (1972) *The Money Order, with White Genesis* (translation C. Wake), Heinemann Education Books.



## U205 HEALTH AND DISEASE

### Second level: full credit

The course should appeal to anyone who has a broad interest in some of the important contemporary issues in the UK and the rest of the world. It draws on current research in social sciences, medicine, history and biology and fosters a critical awareness of the many different approaches to health matters, from the personal, subjective experience of being ill, to the biological and medical view of illness and the economic and political aspects of health and disease.

**Content** The course is presented in eight books, each centred on a particular area of study. The books vary in length from three to six weeks of work.

**Book I** *Studying health and disease* introduces research methods in medicine, biology and the social sciences. You will not be expected to become a competent user of these methods, but you should be able to understand their scope and limits. Topics include clinical diagnosis, basic methods in demography and epidemiology, surveys, clinical trials and experimental design.

**Book II** *Medical knowledge: doubt and certainty* traces the development of scientific medicine since the sixteenth century and questions the supremacy of medical knowledge through three case studies – plague, hysterectomy and hysteria – which illustrate the effect of society on health and, conversely, the effect of disease on society.

**Book III** *The health of nations* describes the predominant patterns of health and disease around the world both now and in the past, looking at geographical differences as well as ethnic, gender and class variation. It then examines patterns of mortality and morbidity in the United Kingdom and how these might be explained in terms of social and economic structures.

**Book IV** *The biology of health and disease* describes the chemistry of living cells and progresses to human anatomy and physiology. No knowledge of biology is assumed, and basic terminology and concepts are introduced carefully. The second part discusses biological aspects of disease: genetic disorders, degeneration, infections and trauma and psychological concomitants of disease.

**Book V** *Birth to old age: health in transition* traces factors affecting health from birth to old age. Emphasis is placed on the transitional points such as birth, puberty, the menopause, and death. The book points out the interaction of social, economic, biological and personal history factors in shaping the health of different age groups.

**Book VI** *Experiencing and explaining disease* relates the subjective experience of disease to the biological and social explanations that have been offered for it, using case studies – a 'minor' disorder: headache; an acute emergency: appendicitis; a serious 'physical' disease of contemporary industrialized countries: cancer; psychiatric disorder and addiction, particularly to opiates.

**Book VII** *Caring for health: history and diversity* considers the development of services, institutions and occupations within health care and wider public policies relevant to health; an international comparison of contemporary health care systems; and the role of the state in the provision of health care. The relationship between formal and lay health care is considered, particularly the role of women as health care providers.

**Book VIII** *Caring for health: dilemmas and prospects* considers the organization and management of the NHS; decision-making at national, local and individual levels; how innovation and change come about; and how they must be evaluated. The focus then widens from health care to public policy and strategies for prevention. Coronary heart disease and AIDS are a point of discussion. The course ends with speculation about the future.

### NOTES FOR PROSPECTIVE STUDENTS

**Complementary and related courses** U205 complements many other courses in the undergraduate programme and it would be misleading to single out any in particular. The Tables of Related Courses indicate appropriate course combinations with U205, ranging from biology to economics, the history of ideas, social studies and statistics.

**Assessment** Seven TMAs (50%) and the examination (50%). Substitution will apply for up to two TMAs.

**Broadcasts and cassettes** Eleven TV programmes and eight hours of audio cassettes. The TV programmes are an important part of the course, and about half the audio cassette time is spent on further analysis and discussion of these programmes.

**Set book** A specially prepared reader is an essential part of the course: N. Black, D. Boswell, A. Gray, S. Murphy and J. Popay (eds.) *Health and Disease: a Reader*, Open University Press.

## U206 ENVIRONMENT

### Second level: full credit

U206 is an inter-faculty course which introduces basic concepts, processes and problems relating to environment. It spans scientific, technological, social scientific and philosophical approaches. Students may enter the course after doing any of the five foundation courses, so we make minimal assumptions about knowledge of particular content areas, disciplines or study skills.

The course considers current environmental matters in the UK such as nuclear dumping, acid rain, changes in rural and urban areas. However, it is not confined to the UK or to obvious issues: one of our aims is to widen awareness of environmental concerns by identifying less obvious problems in the UK and problems in other parts of the world and at other times. Much emphasis is put on analysis of the causes and ramifications of problems and the complex interactions between ecological, chemical, and other natural processes and economic and political processes. You are encouraged to evaluate the advantages and disadvantages of policy proposals to ameliorate or solve environmental problems.

**Content** The course is designed to show both the variety and the interconnections of the environment and is presented in four books. It ranges over a variety of environmental issues at different times and in different places, and stresses the relationship between the local and the global, the natural and the social and the individual and society. In this way you will be able to relate your own experience and local environment to the wider context.

**Book 1** *The biosphere and society* First a case study of Cumbria is used to illustrate the environmental issues to be considered by the course and to show the need for a deeper understanding of natural and social processes. The main one considered in this book is the evolution of the biosphere, as physical processes and living things interacted over geological time. Human societies have had considerable effects on the environment over many centuries, though modern technology is rapidly increasing them. Finally, it is shown that societies have had a variety of attitudes to the environment in the past and that self-consciously environmentalist positions are relatively recent.

**Book 2** *Rural and urban environments: awareness and evaluation* The introductory chapter analyses human population growth and economic growth as a prelude to consideration of rural and urban environments in First and Third Worlds. The next three chapters consider agricultural systems in terms of sustainability and productivity, with more detailed consideration of temperate agribusiness and tropical systems, including paddy rice. Then agriculture is related to other uses of the British countryside. The last two chapters analyse the environmental problems of First- and Third-World cities.

**Book 3** *Energy and mineral resources: environmental impacts and policy options* The seven units in this book analyse supply and demand for energy and mineral resources, ranging from availability of resources, methods of extraction and consequences of processing to consideration of alternative methods including mineral recycling and renewable energy technologies. Finally environmental politics is discussed in relation to nuclear policy.

**Book 4** *Global environmental problems* The last book tackles the really big issues of today and tomorrow – the atmosphere and climatic change (including the ozone hole and greenhouse effect), the oceans and global development – considering views about how societies need to change their priorities if they are to reduce damage to environments. The last chapter, 'Choosing the future', looks at the ways environmental concerns are fed in to political and economic decisions through scientific research, pressure groups and voters' demands, and it is emphasized that more needs to be done if society is to have a sustainable future.

**The project** A small project is an essential part of the teaching strategy: it is introduced early in the course and developed in parallel with the course texts and assignments. Three weeks have been allocated for writing it up between Books 3 and 4.

### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** Any foundation course.

**Complementary and related courses** [D202], D205, [D208], S236, S238, S330, S326, T234, [T241], T274, T334, U204.

**Assessment** Two components: (i) eight TMAs and four CMAs. (50%); (ii) the examination (50%). Two TMAs and two CMAs are formative (unassessed). One formative and two summative TMAs will be used for the project.

**Broadcasts and cassettes** Eight TV programmes and two audio cassettes working through some basic skills of literacy, numeracy and scientific terminology.

**Students with disabilities** Course and supplementary materials are not available on tape.

## U221 THE CHANGING EXPERIENCE OF WOMEN

### Second level: half credit

Last presentation in 1991

U221 is an interdisciplinary course which concentrates mainly on women in British society. It encourages you to reflect on the changing experience of women, informs you about the position of women in Britain both contemporarily and historically, and engages you in analysing the situation of women and in thinking about the possibilities for change.

**Content** The course starts with a general introductory unit which examines women's experience, looking at autobiography, the press and advertisements. After this it considers biological arguments about women and women's sexuality. The next cluster of units is concerned with cultural analyses, in particular women's writing and representations of women in women's magazines. Then we move to an analysis of how the position of women has changed historically, and of women in the family and in paid work. The last part of the course looks at women and various aspects of state policy – economic dependence, education and health – and at violence against women. A concluding unit draws together some of the main themes of the course. It considers aspects of the women's liberation movements and reflects on the possibilities for change. Within the limits of a half-credit course we have tried to give as wide a coverage to as many themes and approaches as possible, but throughout we have tried to balance the need for thorough enquiry against a realistic assessment of your work-load.

### NOTES FOR PROSPECTIVE STUDENTS

**Complementary courses** U221 is designed to fit into the patterns of study of students taking courses from any faculty, but it can be seen as having particular relevance to A102, [A203], A312, [D102], D103, [D207], D209, [D233], [D355], E333, S2286, T102, [TAD292], [U203], U204, U205.

**Assessment** TMAs 01-04 (50%) and the examination (50%). Substitution will apply for up to one TMA.

**Broadcasts and cassettes** There are eight TV programmes and four audio cassettes which support and develop the textual content of the course.

**Summer school** Course based, at which you work in groups on three modules based on film study, legal processes and sexuality. The school also provides an opportunity for you to meet and discuss other aspects of the course and its relationship to your own experience. In 1991 the summer school will be held at the University of East Anglia at Norwich.

**Preparatory reading** You will find it helpful to begin reading *Daughter of Earth* before the course starts. The following would also offer a useful introduction to the themes of the course: A. Oakley *Subject Women*, Pluto; S. Rowbotham *Hidden from History*, Penguin; S. Rowbotham *Woman's Consciousness, Man's World*, Penguin; E. Wilson *Only Half Way to Paradise*, Tavistock.

**Set books** The course reader, E. L. Whitelegg, et al. (eds.) *The Changing Experience of Women*, Basil Blackwell, is required from the beginning of the course. There is also a set book for use with the unit on *Women Writing*: A. Smedley *Daughter of Earth*, Virago; and a pamphlet for use with Unit 13 on Education, M. Stanworth *Gender and Schooling*, Hutchinson.

**Study groups** We hope that active local study groups will develop and will provide opportunities for students to discuss issues raised in the course.

## U235 NUCLEAR WEAPONS: INQUIRY, ANALYSIS AND DEBATE

### Second level: half credit

In an era in which both superpowers seem committed to furthering the process of nuclear disarmament (as signalled by the signing of the INF treaty in Washington in December 1987), the whole question of defence and security in the nuclear age has acquired renewed importance for us all.

This course puts contemporary developments into their historical context, cutting through the superficial headlines and reports which fill our newspapers and television screens to offer a systematic and rigorous analysis of the nuclear dilemma which confronts the policy makers of the 1990s. Through an interdisciplinary approach, the course examines the technological, historical political and strategic forces which shape the prospects for global security in our 'nuclear age'.

The course is intended for any student who has an interest in the subject and a willingness to look at as much of the available evidence as possible and give serious consideration to a wide range of views on what should be done about this dangerous situation. The intention is not to teach you what to think but rather to help you reach your own reasoned judgements in the light of the available information. It is an interdisciplinary course, providing information and skills from such diverse areas as history, international relations, philosophy, physics and technology.

**Content** The course culminates in an analysis of policy prescriptions for what can or should be done about nuclear weapons. The teaching strategy is to provide you with analytical skills and objective evidence so that you evaluate different types of policy prescriptions; these, representing a variety of political points of view, are to be found in the course reader. A central objective of the course is that, by its conclusion, you should be able to compare and analyse diverse



prescriptions in an objective and reasoned fashion, in order to arrive at considered judgements about their relative merits.

The course is in three parts. The first, two units, sets the scene and then introduces some logical principles which will underlie much of the later discussion. The second part, ten units, provides a selection of scientific, technological, historical and political information which is useful for analysing the

prescriptions. It includes, for example, some scientific quantification of the destructive power of nuclear weapons; a technological view of nuclear weapons systems; a historical study of the nuclear relations between the two superpowers; and a political discussion of the problem of nuclear proliferation. The third part is devoted to the analysis of prescriptions from the reader: unravelling the sources of their disagreements and working

towards a reasoned judgement, based on your own value system, about what should be done.

#### NOTES FOR PROSPECTIVE STUDENTS

**Complementary and related courses** [A309], [A381], [D102]/[D103], [D233], D308, D312, [D334], T241, T244, T301, [T361], A281, A317, D209, D308, S271, [S101], T102.

**Assessment** Three components: (i) TMAs 01-03 (37.5%); (ii) TMA 04 (12.5%); (iii) the examination (50%). Substitution will apply for one TMA in component (i), but not for TMA 04.

**Broadcasts and cassettes** Eight television, eight radio programmes and two audio cassettes.

**Set books** F. Holroyd (ed.) *Thinking about Nuclear Weapons: Analyses and Prescriptions*, Croom Helm (course reader).

## HEALTH AND SOCIAL WELFARE

### OVERVIEW

The University has made an increasing contribution in the health and social welfare field since 1973 and the Health and Social Welfare Department is one of its fastest growing areas. The Department is part of the Institute for Health, Welfare and Community Education which was established in September 1988, and now offers courses and free-standing study materials in four broad areas of health and personal social services: ageing, disability, health studies and nursing, children and young people and the family.

The courses are developed from a strong base of multidisciplinary research and academic knowledge and are suitable both for students who have a purely academic interest in the area and for those with professional interests, whether they work in the statutory, voluntary or private sectors.

The Department's academic plan has been designed to provide a series of learning ladders ranging from introductory study packs and short courses, available in the associate student programme (see Section 5), to undergraduate courses, diploma programmes, taught master's and research degrees.

In June 1989 plans were approved for a new Diploma in Health and Social Welfare. Although you cannot register for the diploma until 1992, you can begin taking courses which will eventually count towards it. The first of the new courses offered by the Department, K254 *Working with children and young people*, is presented for the first time in 1990. As well as being one of the first courses in the forthcoming diploma, it is also part of the Advanced Diploma in Special Needs in Education produced by the School of Education (see page 33).

The Diploma in Health and Social Welfare will consist of a compulsory core of courses and project work constituting one full-credit equivalent, and another full credit selected from relevant courses elsewhere in the University, including the undergraduate programme. Although the list of acceptable courses has not been decided, it has already been agreed that D211 *Social problems and social welfare* and U205 *Health and disease* will both count towards the diploma.

As well as the Diploma in Health and Social Welfare, current plans in the Department include the development of selected specialist routes which may become diplomas in their own right. This programme will offer a variety of qualifications to meet the

needs of those who work in health and social care or who are interested in the subject for other reasons.

If you would like to be kept informed about the latest developments in this area, and indeed, about other courses and materials produced by the Department, please ask the Information Officer in the Department (tel. 0908 653743) to put your name on our mailing list.

**When reading the following course description do not forget to refer back to Sections 1-3 and Tables I, II and III at the beginning of this publication.**

### K254 WORKING WITH CHILDREN AND YOUNG PEOPLE

#### Second level: half credit

This course is designed to increase your understanding of children and young people, of their experiences as they grow up and the difficulties many of them face in a society characterized by conflicting values and an unequal distribution of power and resources. The course is primarily for those actively involved in care work with children and young people, such as residential care staff, social workers and foster-parents, but it will be suitable for people interested in exploring the important issues and current practice in this field.

K254 is a Part A course in the Advanced Diploma in Special Needs in Education.

#### Content

Prologue *Orienting ourselves* introduces the main themes of the course: social and personal construction of reality; power and power relationships; internal and external resources; a model for describing and analysing social work and social care practice in relation to children and young people.

Workbook One *Identity and role* Part one examines the importance of identity and theories of identity development. Part two looks at problems that can arise when identity is spoiled by stigmatization, disrupted by role confusion and conflict, or is not satisfactorily achieved. The relationship between identity problems and low self-

esteem is explored and implications for work with children and young people are drawn out.

Workbook Two *Growth points* Part one examines the nature and importance of transitions in the process of development and considers the different views of development offered by psychoanalysis, cognitive developmental theory and systems theory before looking at the life-cycle transitions common to all, such as early separation experiences, starting school and leaving home. Part two turns to consideration of life crises, their potential for stress and their effect on individuals. It provides models of coping and intervening in crisis situations and relates these to work with children and young people.

Workbook Three *Social deprivation* Part one begins by exploring the meaning of poverty and what it feels like to be poor in an affluent society like Britain. Different explanations of the existence of poverty are then contrasted. Part two relates poverty to the social and personal problems that bring people into contact with social work agencies and explores the implications for practice in relation to children and young people, using family centre work as an example.

Workbook Four *Children with special needs* starts from the premise that disabled or handicapped children are children first and have the right to as normal a life as possible. Models of disability are discussed and different types of mental and physical impairment are described together with the implications for services and support. The workbook is illustrated with short case studies which are used to challenge attitudes and practice in relation to children with special needs and their families.

Workbook Five *Deviance: rule breaking and law breaking* Part one considers theories of deviance and how it is socially constructed and looks at some examples of young people's rule-breaking behaviour. It then considers how adults, particularly those in caring roles, can best respond to the challenges such behaviour presents. Part two looks at juvenile crime and explores the juvenile justice system in some detail, with special consideration given to ways of working with young offenders.

Workbook Six *Prejudice and abuse* Part one examines the prevalence and effects of racism and sexism in our society and considers how social workers and others can help combat these effects and help children and young

people develop positive images of themselves. Part two is about child abuse, its definition and competing explanations; and the professional roles of care-workers in recognizing and reporting suspicions or allegations, and in caring for children and young people who have been abused or working with their families.

Workbook Seven *Partnership* explores what is meant by partnership and the extent to which it is possible for adults in general, and social workers in particular, to work in partnership with children and clients. The implications of the 'empowerment' of children are drawn out.

#### NOTES FOR PROSPECTIVE STUDENTS

**Recommended prerequisites** None.

**Complementary and related courses** This course extends the work of D102 (which provides a general social science background to K254). K254 is also complementary to D211 in that it follows up some of the child-care issues raised, and E206 in that it explores in depth related aspects of child development.

**Broadcast and cassettes** There are no broadcast TV or radio programmes. Instead there are six thirty-minute returnable video cassettes and six hours of audio cassettes. The audio visual materials work with the course texts to stimulate discussion of practical matters by illustrating skills and methods used in work with children and young people. The video settings include a children's resource centre, a family centre, a special school, an intermediate treatment centre and a children's home.

**Assessment** Three components: (i) TMAs 01, 03 (30%); (ii) TMA 04, a project (20%); (iii) the examination (50%). TMA 02 is not used for assessment. Alternative TMAs will be available to meet the needs of students with disabilities or studying in restricted conditions.

**Set books** There are two set books, provided with the course units: S. Morgan and P. Righton (1989) *Child Care: Concerns and Conflicts*, Hodder and Stoughton; B. Kahan (1989) *Child Care, Research Policy and Practice*, Hodder and Stoughton. You will also receive a law handbook setting out the law relating to children and young people, and an 'Aids to Practice' folder describing methods and skills used in social work and social care.

**Preparatory work** If you have no previous experience of child development work we recommend as preparatory reading K. Sylvia and I. Lunt (1982) *Child Development: a First Course*.



## SECTION 4: DESCRIPTIONS OF 1992 UNDERGRADUATE COURSES

In this section are descriptions of the undergraduate courses which we hope will be available for the first time in 1992. This section should be used only as a guide, as the detailed programme for 1992 has not yet been finally decided. The University reserves the right to withdraw or defer courses and more courses may be added. Similarly, there may be some alterations to the details.

From 1992 some course codes will include a double letter, e.g. AA301. The second letter still represents the same faculty; we have to adopt this coding when all a faculty's single-letter alphanumeric combinations have been used.

### 1992 courses

AA301	EH266	SD206
AS283	EM236	T223
D212	M372	T236
D213	M431	T264
E242	S365	U207
ED356		U208

### AA301 PHILOSOPHY OF THE ARTS

#### Third level: full credit

This is a course about the philosophy of the 'creative arts', such as music, painting, poetry and drama, and examples will be drawn from these and other arts as appropriate. You need no special knowledge or expertise in the arts in order to take this course.

The main aims of the course are:

- To introduce fundamental problems in the philosophy of the arts: the nature of works of art, the appreciation and evaluation of them, and their function at both the personal and social levels.
- To equip you with the skills you need for a philosophical understanding of these problems, and for discussion of them in a philosophical way.
- To acquaint you with contributions made to this subject by great thinkers of the past as well as the recent literature, including such writers as Plato, Aristotle, Hume, Kant, Schopenhauer, Tolstoy, Collingwood, Wittgenstein, Gombrich and Derrida.

#### Content

**1 What is art?** The first part of the course will look at the history of the concept and recent attempts to define it. If no definitions can be found, are there any limits to what may count as a work of art? The 'ontology' (mode of existence) of art will be discussed. For example, does a musical composition exist in the form of a manuscript, a set of performances or something else? What are the problems of 'authentic' performance of old music? How should we evaluate fakes and forgeries of paintings? This part of the course will end with an examination of the concepts of beauty, form and other qualities that are characteristic of art.

**2 Art and feeling** Some thinkers have defined art in terms of a special 'aesthetic experience' or 'aesthetic attitude' on the part of the listener/viewer/reader. Can such an experience or attitude be described or defined? According to another influential theory, art is essentially an expression of the emotional state of its creator. Should music, in particular, be regarded as a kind of 'language of the emotions'?

**3 Art and the external world** Does art 'imitate nature'? How would this apply to the different arts? Can we appeal to an 'innocent eye' to set the standard for visual arts? Can literature educate us about the human condition? Are sex and violence justified on television if that is how things really are? What is or should be the function of art in society? What are the justifications for subsidizing some art with public money while preventing other

art, for example pornography, by censorship?

**4 Interpretation and evaluation** Are there any general criteria for the evaluation of works of art and, if not, is it purely a matter of personal taste beyond the scope of reason? Should works of art be interpreted and evaluated solely by reference to what is there in the work? Or is it up to the author to decide what the work means? Continental aesthetics: structuralism, post-structuralism and Marxism. Differences between French and Anglo-American aesthetics, with Saussurian linguistics as a common starting point. The Marxist tradition, both Western and Soviet. Is it justifiable to reduce aesthetics to a subdivision of politics?

**Recommended prerequisite** A102.

**Complementary and related courses** A310, A311, A319, A403.

**Assessment** Eight TMAs and the examination. One TMA will be formative and one substitutable.

**Cassettes** Five 1½-hour audio cassettes.

**Residential school** Course based

**Set books** There will be two course readers, one of which will be provided as part of the course material.

### AS283 THE RISE OF SCIENTIFIC EUROPE 1500-1800

#### Second level: half credit

This course has been designed to interest students from all types of background. Its aim is to tackle a fundamental problem of the modern world: why did modern science develop only in Europe? And why in some parts of Europe rather than in others? It is well established that Europe experienced a scientific revolution in the seventeenth century but the wider questions of why this happened, when, and where it did, have generally been swept under the carpet. You will have an opportunity to look at these questions.

You will not need a knowledge of science: the 'S' in the course code simply means that we believe it will also be of interest to students taking science courses. Similarly, the 'A' in the title indicates that those who follow arts courses will find this course complementary to their studies and will have no difficulty in coping with the material. Any technicalities will be fully explained.

Comparison and contrast will be important features of the course. There will be some comparisons between Europe, China and the lands of Islam, to consider what was common and what was peculiar in the prevailing conditions in these very different societies, and to judge whether this led to differences in scientific development. However, most of the course will investigate similarities and differences among the countries of Europe.

After a broad introductory survey of Chinese science, Arabic science and the roots of European science, the course will concentrate on Copernicus in Poland and the spread of his challenging astronomical theory through Europe; on the conditions in Italy which stimulated Galileo's work and also led to his arrest and trial by the Inquisition; the distinctive environment of Portuguese and Spanish science at this time; the developments in the German states; the surge of French science and the explosion of seventeenth-century English science; the reasons for the spread of Newtonianism; and the Scottish enlightenment. We will also look at the peripheral zones rarely discussed in this context: Sweden, Russia and the Balkans. Finally, conclusions based on these analytical studies will be drawn.

Teaching will be through a course book of sixteen chapters and a closely associated study guide. This will be supplemented by

two readers, one of contemporary documents, the other consisting of interpretative essays by historians. We hope to provide both of these as part of the course material.

**Recommended prerequisites** Although there will be no formal prerequisites, either A102, S102 or T102 would be a good approach to the course. If you have studied A204 or A205 you should find that they complement AS283. If you have been studying mainly scientific courses, you should also find AS283 a very useful course.

**Excluded combination** [AMST283].

**Broadcasts and cassettes** Eight television programmes are planned, to provide evocative visual evidence for important centres of scientific development in various European settings. Two audio cassettes are planned to explain aspects of some of the more difficult material.

### D212 RUNNING THE COUNTRY

#### Second level: full credit

This course will examine the British institutions and organizations through which collective social activity is co-ordinated and implemented. It will also consider the increasing importance of Europe and the world for British institutions and organizations as the year 2000 approaches.

The course will draw heavily on the government, economics and sociology disciplines, although other disciplines within the social sciences will also make an important contribution. It is designed for students who have recently completed a foundation course and will therefore place a considerable emphasis on the progressive development of study skills throughout the year. *Running the country* could profitably be combined with many other courses at second and third level. Other interdisciplinary courses and courses in the government, economics, sociology and geography disciplines would be particularly appropriate.

Broadly, the course will help you to understand how some important British industries, services and institutions, both public and private, are organized and run. Using a number of case studies, such as the health service, the motor industry and the provision of financial services, the course will examine their structure, how they are organized and how much they have changed in recent decades. There will also be a survey of British political, economic and social history since the end of the Second World War which will establish the broad context for the industries and institutions to be examined in some detail in the course. Theoretical material, particularly on the nature of markets and on bureaucratic and managerial hierarchies, will also be introduced.

**Recommended prerequisite** A102 or D102.

**Complementary and related courses** D205, [D207], [D208], D209, D210, D211, D213, D308, D312, D314, D345.

**Assessment** Eight TMAs (50%) and the examination (50%). There will also be six formative CMAs.

**Broadcasts and cassettes** Television programmes, radio programmes and audio cassettes.

**Set books** There will be one reader and one set book.

### D213 UNDERSTANDING MODERN SOCIETIES

#### Second level: full credit

D213 is a wide-ranging introduction to sociology which analyses the historical formation, contemporary character and future trends of modern industrial society. It is interdisciplinary

nary, going beyond the traditional boundaries of sociology and using insights from politics, geography and economics to give a comprehensive picture of the institutions and processes of contemporary social life. It is historical: it traces the origins of capitalism, individualism, the nation-state and the global market, and it assesses the continuing relevance of the classic nineteenth-century theorists who can be said to have founded 'the science of society'. And it is comparative, examining liberal democracy and socialist states and assessing the influence of the West on the Third World. There will be units on everyday social life and institutions – the family, education, religion, health, the workplace, consumerism, modern cities, the media – and others on the forces now changing contemporary society: the globalization of production, deindustrialization and the growth of the service classes, information technology, and new political and social movements such as feminism and the 'greens'.

D213 develops many of the themes, ideas and skills of D103, the social sciences foundation course. It introduces much original material in the shape of classic texts and articles, and makes imaginative use of television, radio and video. There will be eight TMAs; there are no special problems for disabled students. It is suitable for students who have already taken one or more social science courses, or who have some background in history; and it is essential if you wish to take further courses in sociology and related areas. If you are studying science, technology or mathematics and are considering taking a social science course to broaden your degree, you will enjoy D213 and will gain from it a better understanding of yourself and society.

**Excluded combination** D207.

**Complementary and related courses** D208, D209, D211, D212, D308, D312, D314, DE325, DE354, U204, U205, U221.

### E242 LEARNING FOR ALL

#### Second level: half credit

The aim of the course is to increase your knowledge and understanding of the education, lives and perspectives of pupils and students who experience difficulties in learning or have disabilities, and of those who care for and educate them. Included in this are the pupils' families, communities, teachers and other related professionals. The course will look at the nature and origins of the systems of education concerned with failure, disaffection and disability and the roles they play within mainstream education. It will consider the means by which pupils with difficulties can participate more fully in primary and secondary schools. You will be asked to evaluate policies, teaching approaches, your own understanding of education and the difficulties pupils encounter as well as the different means of supporting pupils in schools.

The course will be divided into three main sections. The first will help you to understand how pupils and teachers see things by looking at education from the insider's point of view. The second section will be about teaching and learning. It will examine the origins of learning difficulties, the nature and causes of disaffection and disruption, the effect of disability on pupils' learning experiences and the nature, justification and effects of responses to learning difficulties, disaffection and disability in mainstream and special schools. The third section will examine current policy towards the education of pupils who have learning difficulties and its links to mainstream education policy. The power of various groups, including people with dis-



abilities, parents, professionals and politicians, will be an important theme.

Excluded combination E241.

**Assessment** Three assessment components: (i) TMA 01, a formative half TMA, not assessed; (ii) TMAs 02 and 04 (15% each); (iii) TMAs 03 and 05, mini-projects (15% each); and (iv) the examination (40%) with a threshold of 40%.

**Broadcasts and cassettes** Eight TV programmes and four one-hour audio cassettes.

## ED356 RACE, EDUCATION AND SOCIETY

Third level: half credit

ED356 attempts to balance the broad intellectual demands of a third-level course with the particular needs of professionals in the field of education. It will draw out underlying theoretical and contextual themes and relate them to policy and practice. It will analyse the relationship between racial inequalities and other types of social division in education, such as those based on class and gender, and the relationship between racial inequalities in education and in other areas of social life, especially employment and social welfare.

**Content** The course will be in three parts, in the form of guided readings. There will also be a course introduction and conclusion.

The course introduction will provide a critical survey of notions of race and racism. It will also discuss questions of racism and education in relation to wider debates about the political, economic and cultural context of education.

**Part 1 Racism in education** will analyse national, local, and school-level policies and processes of change in the area of multicultural and anti-racist education. It will discuss the assumptions and approaches of different agents in the policy process; accounts of community involvement; assessments of what has been achieved; and the scope of personal, professional and institutional change.

**Part 2 Culture, identity and difference** will look at questions about the content of schooling in the light of the presence of black minorities, and the changing forms of majority and minority cultural identities.

**Part 3 Racism, inequality and education** will give an introduction to the issue of racial inequality in British society. It will identify the main forms of racial inequality in education and set them in the context of racial inequalities in other types of institution, especially in the spheres of employment, youth training, welfare and the law.

The course conclusion will review the main themes of the course and draw out their significance for an assessment of the possibilities and limits of educational attempts to challenge racism.

Although Asian and Afro-Caribbean minority communities will be the main point of reference, comparisons will be made to the position of other ethnic minorities. The course will also discuss the formation of the dominant white culture, and the values and assumptions which have informed important educational developments.

Excluded combination [E354].

**Complementary and related courses** A228, [D202], [D207], D211, D314, DE354, E208, E241, E271, U204, U221.

**Assessment** Four TMAs.

**Broadcasts and cassettes** Eight television programmes and four audio cassettes.

**Set books** There will be three course readers, one of which we intend to provide as part of the course material. There will also be a set book, B. Troyna (ed.) (1987) *Racial Inequality in Education*; Routledge.

## EH266 LEARNING THROUGH LIFE: EDUCATION AND TRAINING BEYOND SCHOOL

Second level: half credit

This course will be available to both undergraduate and associate students. There are no recommended prerequisites. Some of the assignments (likely to include a project designed by you) will enable you, if you are a practitioner in the field, to make use of work experience. But experience is not required and the course will be accessible to anyone. Your own approach to learning will be given priority in the course materials and study time. There will be activities, supported by cassette and television interviews, designed to increase awareness of learning styles and behaviours, how these differ, and whether learners can take action to improve the effectiveness with which they learn.

The course will develop your understanding of the experience of learners over the age of 16, and of the social processes which shape that learning in different contexts. Some of the main developments in this area will be analysed as case studies: the Training and Enterprise Councils, National Vocational Qualifications, Adult Basic Education, Open Learning Centres, credit transfer, access courses, women returning to learning, community schools and selected examples of provision in further education colleges and higher education. There will be comparison between the UK, the EC and other European approaches in this field, reflecting the enormous changes under way in Europe which will influence UK provision during the 1990s.

For those who wish to continue their studies in these areas, EH266 is one of the prerequisite courses in the Diploma in Post-compulsory Education (see page 33) which also counts for one full credit in the MA in Education.

## EM236 TEACHING FOR ATTAINMENT IN MATHEMATICS

Second level: half credit

EM236 is intended for students who are directly concerned with the mathematical education of children between the ages of 5 and 16. It is likely that many will be practising teachers, but others with regular and frequent access to children in that age range will also be able to take the course. The main aim will be to support effective and continuous professional development in mathematics education as national curriculum and assessment requirements are implemented throughout the 1990s.

In more detail, the course should enable you to:

- Explore the characteristics of mathematical thinking.
- Study the development of important mathematical ideas in schoolchildren.
- Support approaches to teaching mathematics which will build on children's existing knowledge and understanding.

The course will provide a variety of study materials through which to examine the processes of teaching and learning mathematics. An important starting point will be your own experience of the classroom. You will be asked to initiate and observe mathematical activities with children and, with the aid of text, video and audio materials, to reflect on and analyse them. From these very practical beginnings the course will identify and consider the issues which are most likely to affect the work of primary and secondary teachers of mathematics in the 1990s.

We will examine those aspects of mathematics which make it distinctive, and which can also make it challenging or frightening to some learners, and go on to look at the variety of roles played by learners and teachers in the classroom. A particular emphasis will be the management of con-

trolled change in the mathematics classroom: we will consider forms of classroom organization and management which enable teachers to offer rich and challenging activities while maintaining awareness of individuals' mathematical progress.

The tension between the problems of maintaining a detailed curriculum and those of adapting the presentation of it in the light of pupils' individual needs will be explored and the course will offer you practical help in this area.

Excluded combinations [EM235].

**Complementary and related courses** EM236 will complement ME234 *Using mathematical thinking* and these two courses together will form the standard version of Part A of the Advanced Diploma in Mathematics Education in the associate student programme.

**Assessment** There will be tutor-marked assignments, based on study of the course materials and on analysis of mathematical activities carried out with children, and an examination.

**Cassettes** There will be returnable video cassettes and you will need access to a VHS machine from time to time. Some tutorials may be based on video excerpts. There are audio tapes associated with each of the main sections of the course.

**Computing** The use of computers and calculators in teaching mathematics will be an important theme of the course and we assume that you will have access to these in your classroom, as is required by the national curriculum.

**Students with disabilities** If you have a visual handicap you may have difficulty with the video material. Please ask the Office for Students with Disabilities for further guidance.

## M372 NUMERICAL METHODS AND APPLICATIONS

Third level: half credit

This course will teach both the theory and the practical application of numerical methods used to solve ordinary and partial differential equations. It will be a sister course to M371 and, like M371, will make extensive use of teaching and applications software on a home computer.

**Content** The course is divided into four blocks with three theoretical units in each block. A quarter of the study time is devoted to practical work on the home computer. Throughout the course the theory will be prompted by practical examples and case studies.

**Block I** outlines numerical methods of linear interpolation, using polynomials and piecewise polynomials, and of integration. These methods are fundamental to those used in the rest of the course.

**Block II** covers some of the methods used in solving initial value problems in ordinary differential equations and in systems of differential equations. The intention is to enable you to use commercial software sensibly and with insight.

**Block III** Boundary value problems in ordinary and partial differential equations are solved using finite difference methods. The emphasis will be on the study of a small number of equations in depth.

**Block IV** The finite element method is introduced and applied to elliptic and parabolic partial differential equations.

**Recommended prerequisite** MST204.

**Complementary and related courses** M371.

**Assessment** Four TMAs (50%) and the examination (50%).

**Cassettes** Four 60-minute audio cassettes.

**Computing** You must have regular and easy access to a computer that meets the University's home computing policy specification (see page 4).

**Students with disabilities** If you have impaired vision or limited manual dexterity you may have difficulty with the computing.

**Special features** You will need a scientific calculator (preferably programmable).

## M431 THE LEBESGUE INTEGRAL

Fourth level: half credit

This course will present the theory of the Lebesgue integral on  $\mathbb{R}$  and  $\mathbb{R}^k$  at a fairly elementary level. The Lebesgue integral is more general than the Riemann integral, discussed in previous mathematics courses such as M203, with which you are assumed to be familiar. It is a basic tool, for example in probability theory (measure theory), applied mathematics (Fourier series) and physics (where a rigorous treatment of quantum mechanics relies heavily on the concepts of Hilbert space and square integrable functions). Some basic ideas of measure (Lebesgue measure, length, area, volume) are discussed in M431, as well as applications to Fourier series and Hilbert spaces.

**Content** The course is based on Alan J. Weir *Lebesgue Integration and Measure* (paperback edition, Cambridge University Press), without which it will not make sense. The units are:

- 1 The Real Numbers
- 2 The Riemann Integral
- 3 Step Functions
- 4 The Lebesgue Integral on  $\mathbb{R}$
- 5 Definite and Indefinite Integrals
- 6 The Lebesgue Integral on  $\mathbb{R}^k$
- 7 Fubini's Theorem
- 8 The Monotone Convergence Theorem
- 9 The Dominated Convergence Theorem
- 10 Lebesgue Measure
- 11 Convergence and Normed Spaces
- 12 Hilbert Space
- 13 Fourier Series

Excluded combination M331.

**Recommended prerequisites** A sound knowledge of differential and integral calculus and some previous experience of the real number system are recommended. Such knowledge is obtainable from, for example, M101 and M203. A certain mathematical maturity would also be useful; the third-level course M332 *Complex analysis* would provide this.

**Complementary and related courses** None.

**Assessment** Four TMAs and the examination. TMA 01 covers Units 1-3, TMA 02 Units 4-6, TMA 03 Units 7-10 and TMA 04 Units 11-13.

**Cassettes** There will be audio and video cassettes, so you will need access to both audio and video cassette players.

**Set book** You will have to buy the set book, A. J. Weir *Lebesgue Integration and Measure*, Cambridge University Press, paperback edition.

## S365 EVOLUTION: AN INTERDISCIPLINARY INTRODUCTION (provisional title)

Third level: half credit

This interdisciplinary course is being written by members of both the Biology and the Earth Sciences Departments. It will provide a good general introduction to both the biological and the palaeontological aspects of evolution, and so will be particularly rewarding to students who have an interest in biology and/or the Earth sciences.

Many of the aims of this course are similar to those of its predecessor, S364, but the contents have been brought up to date and reorganized. More particularly, we intend to show how small genetic changes within populations (microevolution) can occur; how these can lead to genetic differences between populations; how new species can arise; how variation in the rates of speciation and of extinction can lead to the large-scale evolutionary patterns (macroevolution) observed; and how all these help to explain particular episodes of evolutionary history and also to predict certain aspects of future evolution.



The course will also give you some of the skills appropriate to intending students of evolution, including expressing models of evolutionary change in qualitative and, where appropriate, mathematical form, and testing these models with observed data; planning and carrying out practical investigations into the evolution of living and fossil organisms and analysing the significance of the results; and synthesizing and writing up the results of practical studies and studies of the literature of evolutionary phenomena, integrating biological and geological information as appropriate.

#### Content

**Block 1** *Introduction* (1 unit equivalent) is a brief introduction to the subject and the course.

**Block 2** *Microevolution* (4½ unit equivalents) investigates how genetic changes within populations can occur, and some of the material here will provide the basis for a project.

**Block 3** *The origin of species* (2 unit equivalents) looks at biological models of speciation and how these compare with the fossil record of species and speciation. The home experiment kit will include an exercise on speciation using fossil replicas.

**Block 4** *Macroevolution* (4½ unit equivalents) examines the data that can be derived from the fossil record, the patterns these data produce, and how these patterns have been influenced by the changing geography of the Earth and also by differential rates of speciation and extinction.

**Block 5** *Thematic case studies* (3 unit equivalents) asks how material in the earlier blocks can help to explain the origin of life systems, the invasion of the land, human evolution and evolution in the future.

**Recommended prerequisites** S102, although you are strongly advised to have taken at least S203/S202 or S236 since S365 will be considerably more advanced than S102.

**Complementary and related courses** S203/S202 and S236 and most third-level biology and Earth science courses, in particular S298, S326 and S338.

**Assessment** Four TMAs (one based on a project), four CMAs and the examination.

**Cassettes** Ten programmes on two video cassettes and three programmes on two audio cassettes.

**Home experiment kit** This will include a set of plaster fossil casts, a paleontological data book, video cassettes and grass seed for a project option.

**Computing** There will be a computer project option for which you will need easy and regular access to a computer that meets the specification of the University's home computing policy (see page 4).

**Students with disabilities** Substantial difficulties are foreseen for those with a visual or aural handicap, impaired manual dexterity or serious mobility problems.

**Special features** You will need access to a calculator.

## SD206 BIOLOGY: BRAIN AND BEHAVIOUR

### Second level: full credit

Like its predecessor [SD286], SD206 will appeal to students from many backgrounds. It will interest students of biology who want to extend their knowledge of neurobiology and the problems of explaining animal behaviour. It will also be of great value to psychology students, who need an introduction to the brain and its role in controlling behaviour. There will be an emphasis throughout the course on health, which will make the course attractive to nurses, social workers and those in paramedical fields who are interested in behaviour in a biological or medical context. The course is designed so that students with no biological or scientific background will be able to follow it. Anyone

whose interest is primarily scientific should not be discouraged, however, as every attempt will be made to reconcile this potential conflict of interests.

The main aims of the courses are:

- To present an integrated, interdisciplinary approach to the brain and behavioural sciences and the relationships between them.
- To provide a core of basic knowledge about animal behaviour, psychology and neurobiology which will enable you to go on to a detailed interdisciplinary study of important topics in the field.
- To compare the behaviour and nervous systems of human beings and other animals and, at the same time, examine the unique attributes associated with a complex nervous system.
- To emphasize the importance of observational and experimental methods in the brain and behavioural sciences and to introduce experimental design and analysis.
- To consider the implications for human health of the knowledge we have of behaviour and the nervous system, and to show how the study of disease has helped in the study of normal physiology.
- To emphasize the conceptual, historical and social context of the study of the brain and behavioural sciences.

**Content** The course will be divided into six books of varying lengths. The first two will provide basic information about the behavioural and brain sciences respectively. They will be followed by a series of 'topics', each explored in an interdisciplinary way, bringing together knowledge from animal behaviour, psychology and neurobiology.

**Book 1** *Behaviour and evolution* An introduction to animal behaviour, psychology and evolution, looking at adaptation and diversity among living organisms; the genetic basis of behaviour; the causes of behaviour (stimuli, sense organs and motivation); the development of behaviour (altricial and precocial life histories, sensitive periods, imprinting, bird song, nature versus nurture); the functions of behaviour (the empirical approach, hypothesis testing, experiments, alternative strategies, costs and benefits of behaviours); evolution and phylogenetic constraints; laboratory experiments and links between animal behaviour and psychology.

**Book 2** *Neurophysiology* An introduction to neurophysiology, examining the links between the nervous system and hormones; the regulation and control of the nervous system; the gross anatomy of the brain; the fine structure and function of the nerve cell; generating and transmitting signals in the nervous system; the senses; the control by the nervous system of the muscles of the body.

**Book 3** will investigate the senses – vision, touch and pain, hearing and smell, language and communication.

**Book 4** will look at development and flexibility in the nervous system and in behaviour, and at learning and memory.

**Book 5** will look at the control of behaviour, at sleep and biorhythms and at aggression.

**Book 6** will look at what happens when things appear to be 'going wrong': stress and immunology; brain damage and disease; ageing. The last part of the course will consider how we can explain and perhaps change behaviour.

**Excluded combinations** [SD286] and [SD286], which this course replaces

**Recommended prerequisites** S102 or D102.

**Complementary and related courses** [S202], S324, [S364], D307, D309, DSE202, E206, E362, U205.

**Assessment** Three components: (i) eight TMAs (40%); (ii) four CMAs (10%); and (iii) the examination (50%). One TMA will be a project worth 7.5%; six TMAs will be worth 5% each and one will be worth 2.5%. Substitution will apply for up to one TMA and one CMA but not to the project.

**Broadcasts and cassettes** Nine broadcast television programmes related to the course, and two 'magazine'-type radio programmes. There will also

be about three hours of video material and about sixteen audio tutorials spread throughout the course.

**Home experiment kit** You will carry out two home experiments using simple equipment, such as a ruler or dividers, that you can readily obtain for yourself. There will be a home kit containing the video cassettes and a life-sized model of a human half-brain, which can be dismantled to show the internal structure.

**Residential school** Course based, with experimental work and tutorials. The experimental work will be divided into three blocks: (1) neurophysiology; (2) experimental design; and (3) animal behaviour. In Block 1 you will look at some properties of the nervous control of muscle contraction in humans; in Block 2, you will learn how to design an effective experiment to test a particular hypothesis and how to analyse the results you obtain; and in Block 3, you will investigate, for three different species of animal (rats, woodlice and chicks), what causes their behaviour and why it is necessary if they are to survive and reproduce.

**Students with disabilities** If you have impaired vision or limited manual dexterity you may find practical work for the home experiments and at summer school difficult. The extensive use at summer school of monitor screens to display data etc. may cause problems if you have epilepsy.

**Special features** You should have access to a video-cassette player so that you can watch the video material, part of which will be an exercise in the analysis of animal behaviour. A calculator will be useful, though not necessary, at summer school.

## T223 MICROPROCESSOR- BASED COMPUTERS

### Second level: half credit

The course will give an introduction to the components and operation of microprocessor-based computers. The emphasis will be on the hardware, the physical components, although some simple programming will be included. Home computing will be used extensively to give you practical experience, and there will be an introduction to the structure and operation of the computer. The course will be useful to anyone who needs a basic knowledge of the components and operation of small computer systems.

**Content** The course will include a brief history of computers and computing, a survey of applications and an introduction to the basic components of a computer. Methods of representing data and numbers in a suitable form for a computer will be examined and the basic operation of a computer will be studied. The course will use a theme application programme to bring out the principles of the operation and components of computers. This programme will be studied at increasing levels of detail as the course progresses. You will make small changes to its operation at various stages in the course, in order to learn about the principles involved.

A substantial part of the course will be devoted to input and output, often the most complicated part of a computer system, studied in a combination of practical and theoretical work. Some real devices will be introduced to show how the principles apply to them.

Then we will look at computer applications from the small control type to the hardware of the PC itself, and will end with a brief survey of current developments and trends in small computers.

**Excluded combinations** [TM221] and TM222.

**Recommended prerequisites** None, although T102 (or the equivalent of its computing content) would be useful.

**Complementary and related courses** T202, M205, DT200.

**Assessment** TMAs and possibly CMAs, and the examination.

**Broadcasts and cassettes** There may be a few television programmes and audio cassettes.

**Home experiment kit** The theme application programme will use a small home experiment kit connected to the PC through its serial port.

**Computing** It is intended that this course will be included in the home computing policy.

**Students with disabilities** If you have severe visual disability or limited manual dexterity you may have difficulty with the practical work, (about a quarter of the workload) although all of it is carried out at home. The course may not be suitable for blind students. Please ask the Office for Students with Disabilities for advice before registering for the course.

## T236 INTRODUCTION TO THERMOFLUID MECHANICS

### Second level: half credit

T236 replaces and is closely based on T233. It considers how energy conversion takes place; how energy exchange occurs through processes involving working and heating; and how fluids can be used to exert forces and do work. The emphasis is on the few recurring principles and laws of engineering thermodynamics and fluid mechanics in order to show that various processes and systems can be modelled and analysed in a similar manner. A firm understanding of certain basic concepts will provide the knowledge needed to investigate many engineering applications of thermofluid phenomena.

The subject matter is treated in a way which shows how the efficient conversion and use of energy can be achieved, and the course will provide a grounding for those who intend to study the topics to an advanced level.

After completing the course you should be able to:

- Understand the ways in which energy conversion or transformation occurs.
- Understand the fundamental laws of engineering thermodynamics and the mechanics of fluids.
- Model thermodynamic and fluid mechanics processes and systems.

#### Content

**Unit 1** introduces energy and thermodynamics and shows how energy can be transferred by heating and working. The first and second laws of thermodynamics are introduced, and modelling and energy analyses of thermofluid systems are considered.

**Unit 2** The first law of thermodynamics for non-flow processes; thermodynamic properties and state; internal energy and total energy; gas laws and thermodynamic relationships; processes.

**Unit 3** The second law of thermodynamics; availability and irreversibility; heat engines; the Carnot and Stirling cycles; heat pumps; efficiency and coefficient of performance.

**Unit 4** Availability energy and entropy.

**Units 5-6** The first and second laws of thermodynamics for flow processes; control volume analysis; steady-state energy balance; entropy balance; introduction to tables of thermodynamic properties.

**Unit 7** Vapour power cycles (power stations).

**Unit 8** Revision.

**Unit 9** Introduction to fluids; the continuum model; fluid properties and fluid flow phenomena; the mass continuity equation; looking at fluids in motion, and introduction to fluid flow with observation of fluid phenomena; laminar and turbulent flow.

**Unit 10** Similarity analysis and dimensionless groups. This unit introduces a technique which is fundamental to physical modelling, and the analysis of various fluid phenomena.

**Units 11-12** Fluid mechanics; energy analysis; Bernoulli's equation; internal flows; pipe flow.

**Units 13-14** Fluid mechanics; momentum analysis; forces exerted by fluid streams; design of fluids machines.



Unit 15 Fluid systems and using fluids machines.

Unit 16 Revision: structured help with revision and approaches to examination questions.

Excluded combinations [T231] and T233.

**Recommended prerequisites** The strongly recommended prerequisite is either [T232]/T235 or TM282. Students who have passed either [MST282] or MST204 should also be equipped for this course.

**Assessment** Four TMAs (35%), eight CMAs (15%) and the examination (50%).

**Broadcasts and cassettes** The television broadcasts and audio cassettes are part of the course material and you will need to make full use of them.

**Home experiment kit** A home experiment kit will probably be included.

**Students with disabilities** If you cannot make full use of TV and experimental work you will be at a serious disadvantage.

**Set books** E. F. C. Rogers and Y. R. Mayhew *Thermodynamics and Transport Properties of Fluids (SI Units)*, Basil Blackwell (3rd or later edition).

**Special feature** You will need a scientific calculator.

## T264 DESIGN: PRINCIPLES AND PRACTICE

Second level: half credit

This course should make the subject of design relevant, accessible and interesting to technologists and non-technologists alike. People encounter the products of design every day of their lives and yet often have a hazy, partial or haphazard understanding of what goes into the design, development and making of those products. Our intention is not to train you to become a professional designer but, by teaching you something about the design processes that generate particular products and giving you practice in basic design skills, to develop your understanding of what it is like to be a designer. If you have a detailed knowledge of one area of design, or are a designer already, the course should broaden your experience by offering comparisons with other fields of design and showing relationships between design principles and practices.

The course has three main aims:

- To develop your design awareness by investigating how decisions are made about the design of artefacts, the influences that contribute to these decisions and the nature of the design process, so that you are in a position to make analytical and critical judgements about designed objects.
- To develop your understanding of design

principles applicable across a variety of professional practices, e.g. engineering, product design, architecture.

- To develop your design skills by giving examples, instructions and experience in the use of basic techniques of designing, e.g. drawing, modelling.

**Content** After a general introduction which examines the nature of design and the design process, a series of blocks highlights each of the main phases of the product development process – from initial planning through conceptual and layout design to development for manufacture and use. Selected products are used to illustrate the principles and practice of design, including consumer products, bicycles, housing and wind turbines. You will be able to apply what you have learned from the course to a guided design activity which asks you to specify and design a simple product. This activity will run throughout the course, linked to each block and forming a part of each TMA. You will not be left unaided, but provided with information and sample design ideas at each stage.

Excluded combinations T263.

**Recommended prerequisites** There are no formal prerequisites. The course does not assume that you have any design experience or any mathematical or technical knowledge beyond that of [T101]/T102.

**Complementary and related courses** We expect that the course will be of interest to non-technologists as well as to students taking the broader courses in technology. If you are studying materials, mechanics or electronics you will benefit from adding the designer's point of view to your own specialist area.

**Assessment** TMAs and the examination.

**Students with disabilities** If you have a visual handicap or impaired manual dexterity you are likely to find the TMAs difficult.

**Special feature** We recommend that you should have access to a video-cassette player.

## U207 ISSUES IN WOMEN'S STUDIES

Second level: full credit

This is an interdisciplinary course introducing the principal theoretical debates in women's studies and showing its development as a coherent field of enquiry. The course will be of interest to students from all faculties and does not assume any particular previous knowledge.

- How are the categories of women and men distinguished?
- Is there anything distinctive about women's experience?
- How do differences based on gender

relate to differences based on class, race, age, culture and religion?

Drawing on different disciplines, U207 will explore these questions in relation to evidence about women's experience, their social and economic position, the cultural representation of women and how they stand in relation to science and technology. Attention to contemporary Britain will be balanced by examples from other times and other cultures.

The course will be presented in four readers with study guides.

### Content

**Introduction** will give you a view of the course, its aims and materials, explaining how women's studies grew out of modern feminism as a critical examination of academic disciplines and as an attempt to rescue women from obscurity. The three questions will be introduced with a discussion of concepts that will be central to the course such as sexual difference, gender, patriarchy, sexuality, femininity, ideological representation, power and inequality.

**Reader 1 *Knowing women: feminism and knowledge*** will develop the ideas raised in the introduction. It will consider the historical and cultural association between women and notions of nature and 'the natural' and the connections between biological and sociological explanations of a sexual difference. This will lead to an explanation of ideas about identity and subjectivity through an analysis of autobiographical extracts and arguments based on psychoanalysis and language. The question of differences among women – of race and culture, class, age, disability – will be explored.

**Reader 2 *Defining women: social institutions and gender divisions*** The theme of this book is the social construction of gender divisions, in particular the ways in which divisions of gender are connected with divisions of race and class. We will consider how social policy and social institutions like the family, school and employment, affect women's lives, both in contemporary Britain and in other periods and cultures, and see how these effects differ for women of different races and classes.

**Reader 3 *Inventing women: science, technology and gender*** will examine how those areas called 'science' and 'technology' have defined women and helped to construct a gendered world, and will review notions of a feminist science and technology. It will concentrate on areas including sex, gender and reproduction; technological constructs in domestic lives; science and technology in the worlds of work, education and training.

**Reader 4 *Imagining women: cultural representations and gender*** will consider how representations of women have been constructed in cultural terms throughout the world. After an introductory theoretical discussion the book will look at representation in different media and genres including literature, visual arts, music and popular culture. We will consider a number of questions as a means of exploring the area; how are women repre-

sented? Is the language of the medium marked by differences of gender, race or class? Are the processes of production marked in a similar way? What ideology of femininity is presented and how?

**Excluded combinations** U221, which it will replace.

**Complementary and related courses** U221 is designed to fit into patterns of study which include courses from any faculty, but it has particular relevance to A102, [A203], [A312], A319, D103, [D207], [D233], [D355], E333, ED356, SD286, T102, [TAD292], [U203], U204, U205.

**Assessment** TMAs 01–08 (50%) and the examination (50%).

**Broadcasts** There will be a series of TV and radio programmes, and audio cassettes will support and develop the teaching materials of the course.

**Residential school** There will be a course-based summer school which will give you an opportunity for extended study of ideas and topics raised in the course.

## U208 THE END OF THE THIRD WORLD?

Second level: full credit

This course will take a problem-solving approach to issues about development. The central question is *What can be done about Third World development?*

Our aim is to provide analytical tools for understanding the variety and complexity of developing countries and, ultimately, ways to think about solutions to the problems poor people face in those countries. By this means we hope to give substance to your compassionate concerns and enable you to evaluate your moral position with the benefit of more sophisticated analytical ideas and a stronger foundation of knowledge about developing countries and development processes. The course will teach you:

- How to assess answers to the question 'what can be done about Third World development?'
- About the origins of problems such as poverty, famine and disease and, more generally, about the causes of uneven development.
- Critical evaluation of strategies and struggles for overcoming poverty, famine and disease in the Third World.
- Concepts for understanding developing countries and the problems they face.
- How work in the social sciences, arts, technology and sciences (that is, in other parts of the undergraduate programme) can inform understanding of Third World development.

The course will be in four textbooks (each equivalent to about eight units), four accompanying Study Guides, the *Third World Atlas* and supplementary material.



# SECTION 5: OTHER OPEN UNIVERSITY STUDY PROGRAMMES

## ASSOCIATE STUDENT PROGRAMME

As well as the undergraduate programme of courses described in this publication, the University also offers a wide range of single courses and self-contained study packs which vary in length and format. These have been designed to meet the needs of people who do not necessarily wish to study for a BA degree, but who would like to enhance their existing knowledge or to develop an interest; perhaps to further a career, or to bring professional, scientific or technical skills up to date. Many of these courses and study packs can be adapted to suit the requirements of in-house and in-service training programmes. The amount of previous experience or academic knowledge required will vary from course to course; some assume none at all while others require a substantial amount.

### Courses and study packs to help further your career

Many of the BA degree courses described in this publication can also be taken singly, without commitment to further study. It is possible if you take these courses in this way (as an 'associate student') to transfer any credits you gain to the undergraduate programme if you wish once you have successfully completed a foundation course. (For those courses available to associate students in 1991 see Table I. You should note, however, that because of the different funding arrangements for courses in the associate student programme these courses have a higher fee than they have in the undergraduate student programme.)

Other courses and packs of learning materials have been specially prepared for the associate programme. These cover such areas as computing, engineering, management and the professional development of those in education and the health and social services. Some of them lead to an academic qualification, others are intended to bring you up to date in particular areas. All are specialized and suitable for professionals, and have been designed primarily for those who have had practical experience and wish to develop or broaden their skills or understanding to a higher level.

### Courses and study packs to develop personal interests

Single BA degree courses fit into this category. As well as these there are many study packs covering areas such as literature, poetry, music, religion, local and natural history and science.

### Family and community packs and courses

These study packs deal with practical problems that arise when people find themselves needing help with new stages in their lives (having and bringing up children, approaching retirement, looking after elderly relatives or mentally handicapped people, coping with unemployment), or with changes in their environment (increasing concern about health). Some of the packs have an optional assessment element.

### Health and social welfare

This area comprises a range of courses and packs for individual study. Some of the packs include optional assessment and some are linked to additional resources for leaders and tutors organizing group work.

The material is designed for both professionals and voluntary carers and covers working with older people; caring for children and young people; mental handicap; child abuse and neglect; coronary heart disease; mental health problems in old age; drug use and misuse. A new Diploma in Health and Social Welfare will be introduced in 1992. More information is available from the Department of Health and Social Welfare, The Open University, Walton Hall, Milton Keynes MK7 6AA.

### Professional development in education

There are professional development in education (PDE) courses and study packs for teachers and other professionals involved in or entering education. The programme includes both courses for which you register and receive tuition and study packs which are self-contained learning materials. Study packs can be used at any time by individuals or groups. Courses can be taken singly or, in many cases, can be counted towards a certificate, diploma or higher degree. More information can be obtained from the Central Enquiry Service (see panel).

### Advanced diplomas in education

The School of Education offers four advanced diplomas in education and one professional diploma in post-compulsory education. Registration for all these diplomas is in the associate student programme only.

An advanced diploma is gained by successfully completing one credit's worth of undergraduate courses from a prescribed list followed by a further full-credit applied studies course. The structure of these advanced diplomas is explained in the overview to the School of Education courses and the diagram on page 33.

The diplomas are:

- Advanced Diploma in Educational Management (D02)
- Advanced Diploma in Mathematics Education (D04)
- Advanced Diploma in Special Needs in Education (D06)
- Advanced Diploma in Technology in Schools (D07)
- Professional Diploma in Post-compulsory Education (D05)

Full details of all these diplomas are available in *Open Opportunities* (see panel). A Part B credit from any of these diplomas gives you exemption from one module of the MA in Education (see below).

### Other courses in the School of Education

#### EP228 Frameworks for teaching

This course, available only in the associate student programme but counting also as a half credit in the undergraduate programme, provides an understanding of teaching in secondary schools and is primarily designed for those just starting their teacher training. It is equally useful during the induction year and is also of interest to those considering teaching as a career, as long as they have access to a school, and to teachers returning to the classroom after a break and experienced teachers who wish to bring their teaching up to date.

The course does not count towards teacher status, unless taken as part of a part-time PGCE course in a teacher-training institution. More information can be obtained from the Central Enquiry Service (see panel). See also the School of Education overview.

### Management

The Open Business School offers a career-long development programme for practising managers progressing from the Certificate in Management, to the Professional Diploma in Management and on to the MBA. All the courses except MBA modules can be studied singly. The courses available are:

- B782 *Managing health services*
- B783 *Retail management: policy and merchandising*
- B784 *The effective manager*
- B785 *Accounting and the PC for managers*
- P672 *International marketing*
- P673 *Personnel selection and interviewing*
- P675 *Women into management*
- P676 *Managing people*
- P677 *Marketing in action*
- P679 *Planning and managing change*
- P781 *Accounting and finance for managers*
- P790 *Managing in the competitive environment*
- P791 *Managing design*
- P792 *Information systems and IT for managers*
- P799 *The Management Project*

Two study packs are also offered:

The 1992 pack for small and medium-sized enterprises

Towards IPM Stage 2

A Master of Business Administration degree is also available (see Higher Degree Programme).

### Scientific and technological updating

As well as the courses from the undergraduate programme, courses and free-standing learning packages are available in the following areas:

- Computing: industrial applications of computers, data analysis, COBOL, UCSD Pascal, systems analysis, software engineering, software project management, intelligence/knowledge systems, methods of software development.
- Manufacturing.
- Conservation, the changing countryside, land management.
- Science: biotechnology, space technology, chemical nomenclature.
- Electronics: microelectronics for industry, digital electronics.

These courses and packs use a multi-media approach to learning with combinations of printed material, audio and video components, and have experiment kits where appropriate.

The courses in Industrial Applications of Computers and Manufacturing can be counted towards postgraduate diplomas. With the inclusion of projects and dissertations these may lead to the award of Master of Science degrees.

For more information about applications to the associate student programme, see panel.

## HIGHER DEGREE PROGRAMME

### Higher degrees by research

The University offers a wide variety of research topics and awards three degrees by research and the submission of a thesis: Bachelor of Philosophy, Master of Philosophy and Doctor of Philosophy.

Applicants must normally have at least an upper second-class honours degree in a relevant field of study, and may apply for full-time or part-time study. Full-time research studentships are tenable from 1 October and are usually based at Milton Keynes or the Oxford Research Unit. Part-time research degrees are studied over a period of four years for BPhil; six years for MPhil and eight years for PhD. (These are maximum periods; it is possible to study these degrees over a shorter period in each case.) For part-time degrees, applications may be submitted at any time.

### Taught master's degrees

The University offers a programme of taught master's degrees for part-time study, of which the following are currently available:

#### Master of Arts in Education

A modular degree of three courses taken over three to six years. Apply in April/May to begin the following February.

#### Master of Business Administration

A modular MBA taken over two to six years. Apply in April/September to begin the following February.

#### Master of Science in Advanced Educational and Social Research Methods

A two-year degree with course-work and dissertation. Apply in April/May to begin the following February.

#### Master of Arts in Literature

A two-year degree with course-work and dissertation (available in odd-numbered years only). Apply in April/May to begin the following February.

#### Master of Science in Mathematics

A modular degree of six courses taken over two to six years. Apply in April/May to begin the following February.

Master of Science in Industrial Applications of Computers

Master of Science in Manufacturing  
Students who complete the University's postgraduate diplomas in these two subjects may apply to take these MScs.

Applications and enquiries about the higher degree programme should be made to the Central Enquiry Service, see panel.

## PROSPECTIVE APPLICANTS TO THE OPEN UNIVERSITY

### Undergraduate programme

Information and advice to applicants is given in the *Guide to the BA Degree*, which is obtainable from the Central Enquiry Service (address below).

### Associate student programme

Information about application periods and course and study pack descriptions together with general advice is given in *Open Opportunities*, obtainable from the Central Enquiry Service (address below).

### Higher degrees

Information and advice to applicants is given in the *Research Degree Prospectus* and the *Taught Master's Degree Prospectus*, which are obtainable from the Central Enquiry Service (address below).

### General enquiries

Write to:  
The Central Enquiry Service,  
The Open University, PO Box 71,  
Milton Keynes, MK7 6AG  
stating which programme of study you are interested in.

### Sale of undergraduate course material

For general availability of correspondence material for the undergraduate courses described in this publication, please write to: Open University Educational Enterprises Ltd., 12 Cofferidge Close, Stony Stratford, Milton Keynes MK11 1BY.