

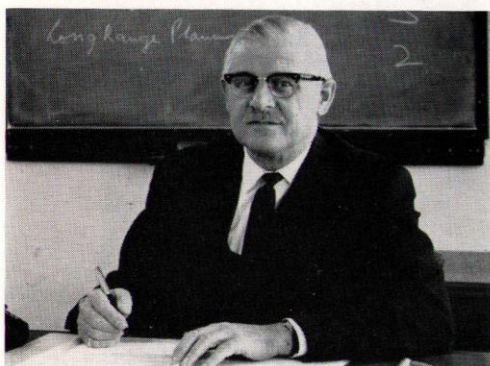


HARWELL

Education and Training



MR. J. F. HILL
Head of Education and Training Centre



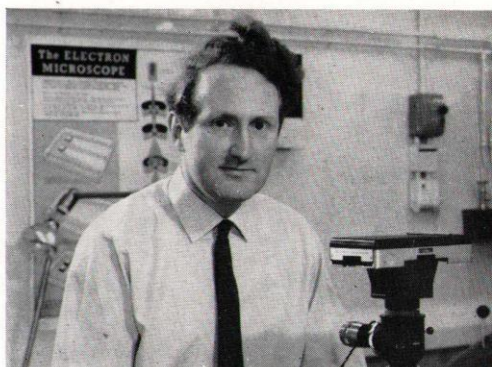
MR. G. P. B. SMITH
Management Training and Administration



MR. J. N. HULL
Manager and Technological Courses



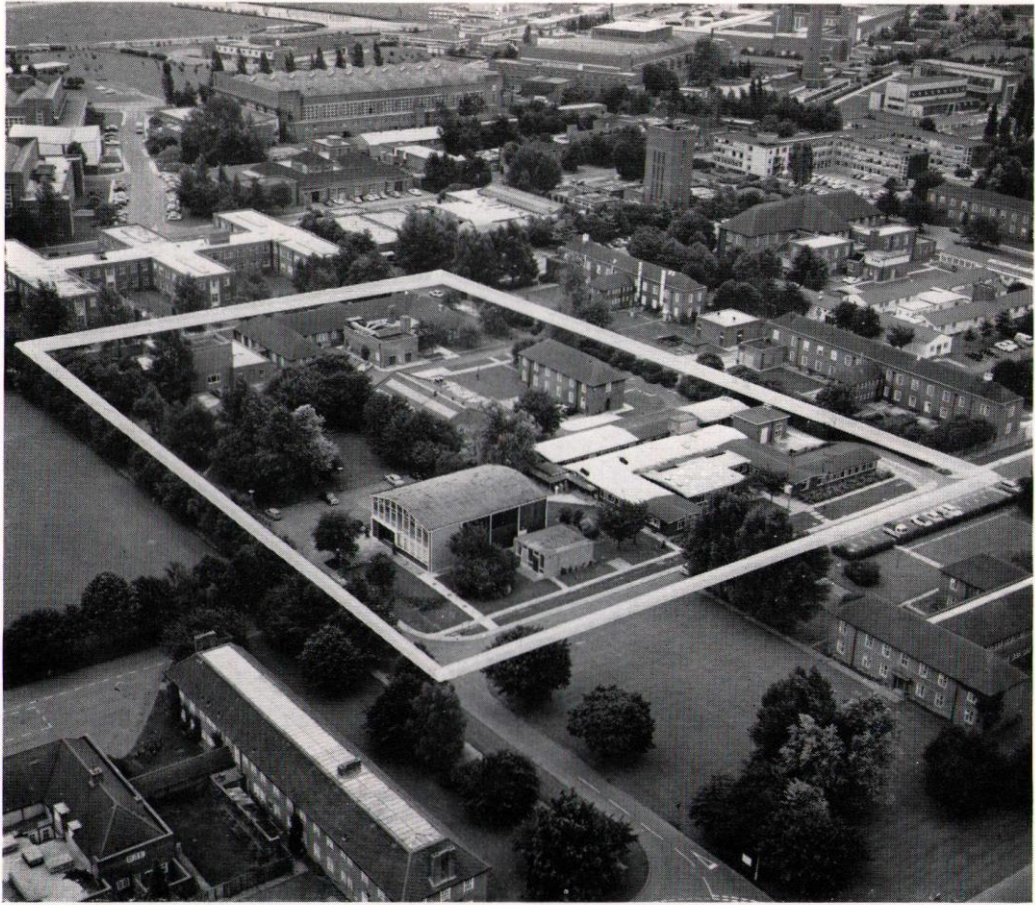
MR. R. A. FAIRES
Radioisotope and Allied Courses



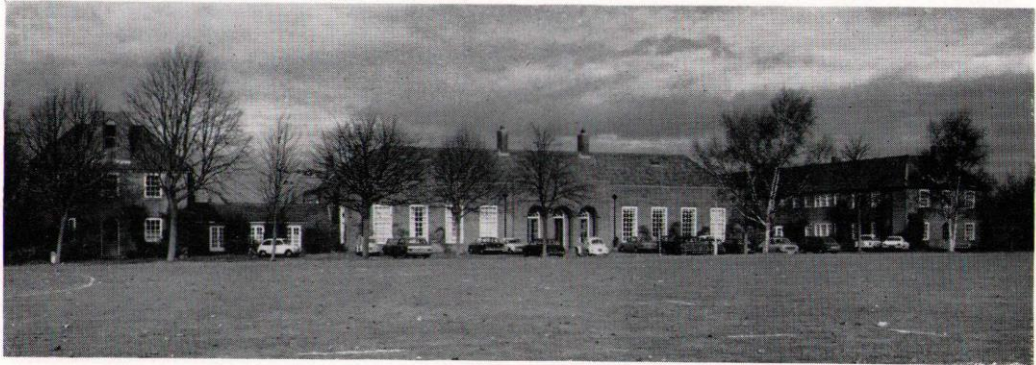
DR. F. J. WEBB
Experimental Techniques Courses

The Harwell Education and Training Centre

The Harwell Education and Training Centre, in addition to its responsibilities for education and training in the Research Group of the United Kingdom Atomic Energy Authority, arranges for people from outside the Authority a number of courses in subjects in which the Authority has particular expertise. This type of activity started as long ago as 1951 when the Isotope School was set up at Harwell to run training courses in the use of radioisotopes and was continued when the Reactor School, in 1954, began to train teams from the industrial consortia which had been set up to design and build Britain's nuclear power stations. In 1963 the Reactor School was given wider terms of reference in relation to providing courses for Authority and non-Authority staff and was renamed The Post-Graduate Education Centre. Because it now incorporates most forms of training and also includes the Isotope School it is called The Education and Training Centre though the Post-Graduate Education Centre name is still often used to indicate the range of its courses which are of particular interest outside the Authority.



The Education and Training Centre (outlined) with part of Ridgeway House (bottom left)



Ridgeway House

Lecture Rooms

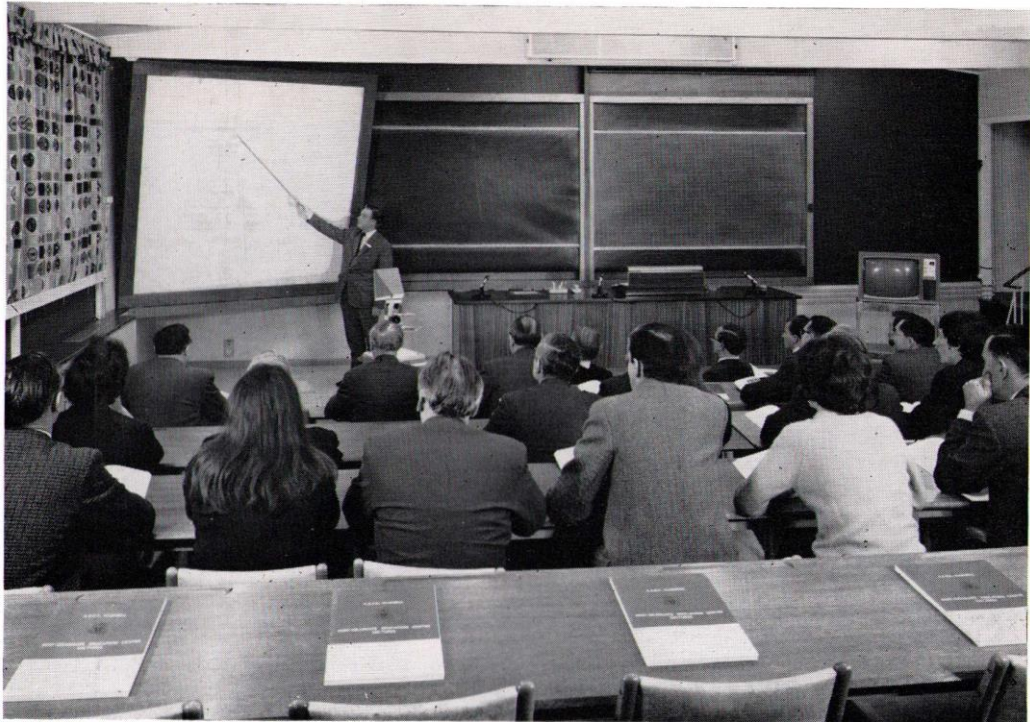
The lecture rooms are well equipped with teaching aids. All have overhead, automatic slide and film projectors, closed circuit T.V. and video-tape recording available and a number have direct teletype access to the main Harwell IBM 360/75 computer.

Accommodation

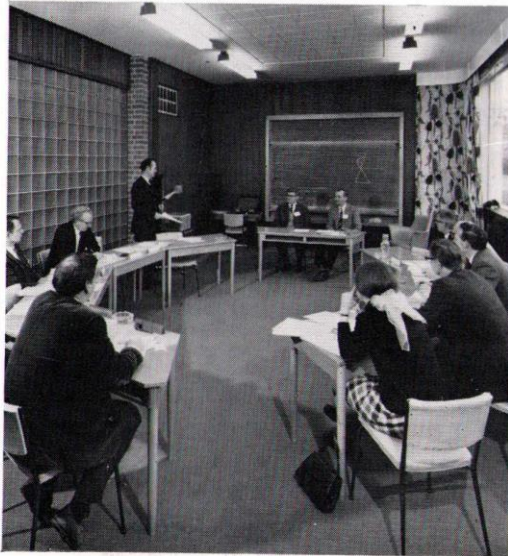
Where possible students stay in Ridgeway House which is adjacent to the Centre. Whilst the courses are not residential in the normal sense it is beneficial for the students to be together as much as possible. Also adjacent to the Centre is the Social Club run by the Recreational Association of the Establishment. All students are made members and are therefore able to use it whilst attending courses.

COURSES

The courses vary in length from two or three days up to four weeks. Some consist entirely of lectures but others contain substantial amounts of experimental work carried out in the Centre's special teaching laboratories and all allow time in the programme for discussion. Lectures, generally, are given by experts in their subjects. Experience has shewn that the advantage to be gained from students meeting the expert in this way and having the opportunity of question and discussion with him far outweigh any defects of presentation he may have because he is not a professional lecturer.



A typical lecture room

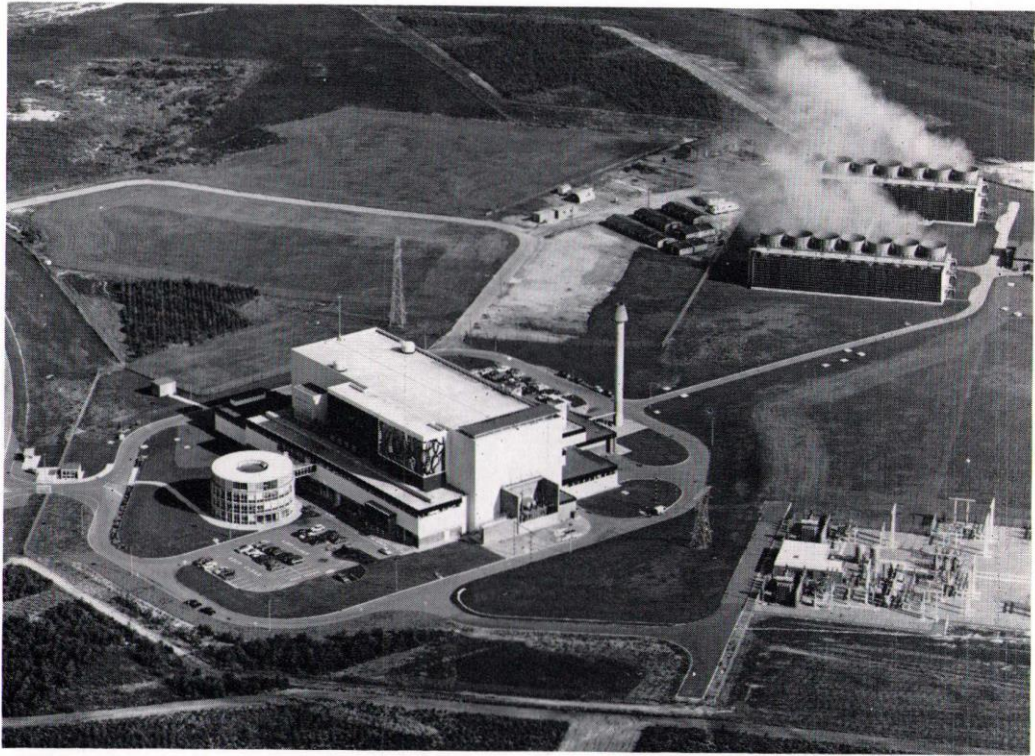


Management training (above and right)

Reactor Technology

The four-week Advanced Reactor Technology Course is for experienced physicists and engineers and is concerned with reactor systems which have been or are now being developed for commercial exploitation. Because the Authority's expertise is dispersed so widely the course is held in three places. The first week is at Harwell, the second at the Reactor Operation School at Windscale and the last two weeks are at the Atomic Energy Establishment, Winfrith. This enables the students to meet a large number of the Authority's experts in reactor technology. The course consists mainly of lectures but there are visits to C.E.G.B. nuclear power stations and U.K.A.E.A. reactors and laboratories.

A different aspect of reactors, namely reactor safety, is also dealt with in a four-week course which is sponsored by the Authority Health and Safety Branch. Again the course is for experienced engineers and scientists but in this case for those who are or will be engaged on the safety assessment, regulatory control or inspection of reactors. Special attention is given to the needs of students from overseas for whom about two-thirds of the places on the course are reserved. The lectures in the main are given by staff of the A.H.S.B. but there are also lectures from specialists in the C.E.G.B. The lectures are backed up by visits as in the Advanced Reactor Technology Course.



SGHW Reactor at AEE Winfrith



SGHW Reactor at AEE Winfrith



Prototype fast Reactor at Dounreay

Instrumentation

The Authority's expertise on reactor control and instrumentation is centred on the Control and Instrumentation Division of the Winfrith Atomic Energy Establishment. From time to time courses are held in conjunction with this Division on the control and instrumentation of reactors and on the commissioning, use and maintenance of reactor instrumentation. The latter course which is the one currently in the programme is for engineers and technicians who have the problems of bringing into operation instrumentation and control systems associated with nuclear reactors and nuclear power stations and their continued operation and maintenance. The course is held at the Authority's hotel, Durley Hall Bournemouth, with visits to A.E.E. Winfrith and a C.E.G.B. power station. The lecturers are drawn from the U.K.A.E.A., the C.E.G.B. and the nuclear industry.

A different type of instrumentation course deals with process instrumentation and is arranged in collaboration with the Authority's instrumentation design organisation at Risley which provides most of the lecturers. The course is for those at graduate level working on the instrumentation of process plant, nuclear reactors and scientific apparatus and includes visits to process plants.



Demonstrations for Process Instrumentation Course

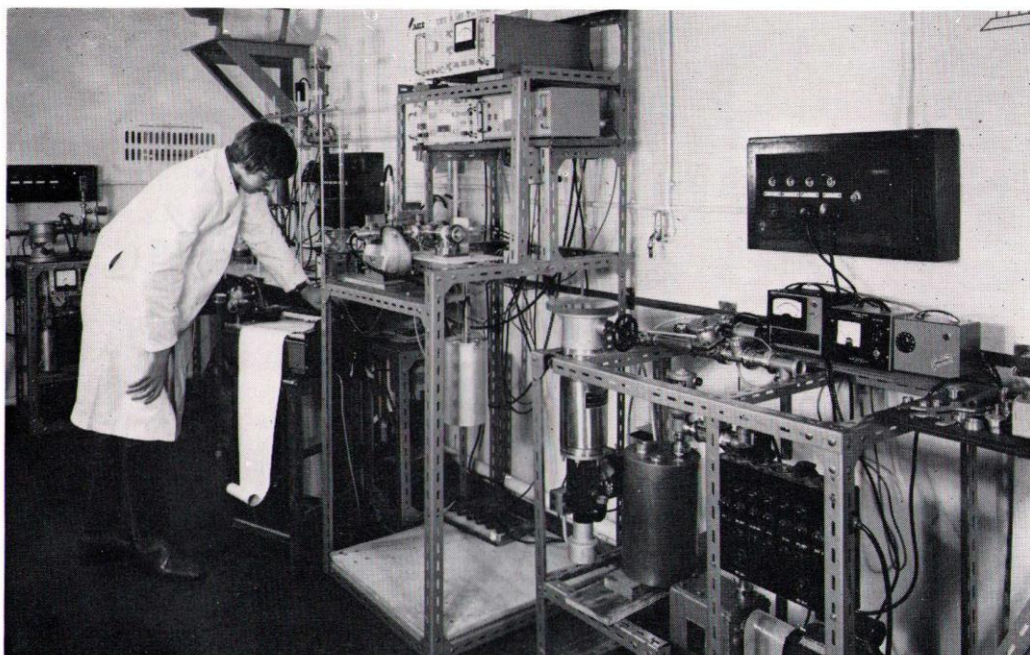


Advanced Reactor Technology Course at the Calder Operation School

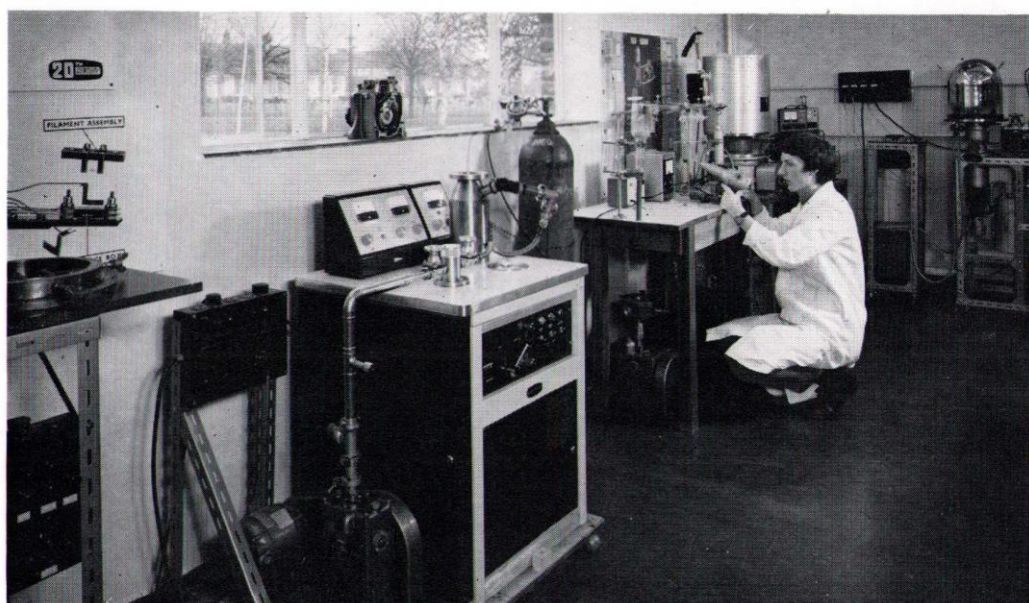
Technology

Also partly in the reactor technology field is the two-phase heat transfer course, run jointly with the respective sections at Harwell and A.E.E. Winfrith engaged on this work. The subject matter is approached in a fundamental way and deals with the problems inherent in two-phase heat transfer and of current solutions, theories and developments with the minimum emphasis on reactor applications. The course is held alternately at Harwell and Winfrith.

Other technological courses deal with pressurised equipment, magnet design, high voltage technology and low temperature technology. These are lecture courses at graduate level for engineers or scientists and the lecturers are all engaged in work in these fields in the Authority, the Universities or industry.



Ultra High Vacuum Techniques using a mass Spectrometer Partial Pressure Analyzer



High Vacuum and Leak Detection Techniques

Radiological Protection

In the radiological protection field there are three courses. Two of these each of four weeks duration are run in conjunction with the Radiological Protection Division of the Authority Health and Safety Branch with co-operation from the health physics organisations throughout the Authority. The first called Post-Graduate Radiological Protection, is intended to meet the initial and early training requirements of full-time operational health physics staff of graduate level or equivalent. In addition to the lectures there is also some practical work. The second called Advanced Radiological Protection is for experienced health physicists to extend their understanding of the underlying philosophy and scientific basis of their profession. The lectures are backed up by some syndicate exercises.

The third radiological protection course lasts one week and gives some experience in the safe handling of radioisotopes and is intended to be of use to 'competent persons'.



Radiation Measurements Laboratory

Radioisotopes

In the more formal treatment of the use of radioisotopes there is a number of courses. Formerly these were run in the Isotope School at the Wantage Research Laboratory, but the School transferred to the Education and Training Department at Harwell in 1967. The Introduction to Radioisotopes Course of two weeks' duration is a general theoretical and practical introduction to the principal techniques used in tracer applications of radioisotopes in research and technology. Two longer courses deal with more specialised applications. Radioisotope Methods in Biochemistry gives qualified biologists sufficient background theory and practice in radioactivity and radioisotope techniques to enable them to use radioisotope methods in their work whilst Radioisotope Methods in Chemistry which is for chemists employed in pure or applied research, gives a basic introduction to radioisotope methods coupled with specialised information in particular chemical fields. A particular feature of the radioisotope courses is the large amount of time devoted to practical work coupled with an attempt to satisfy particular requirements of individual students.



Students working in Radiochemical Laboratory



Counting Room

Experimental Techniques

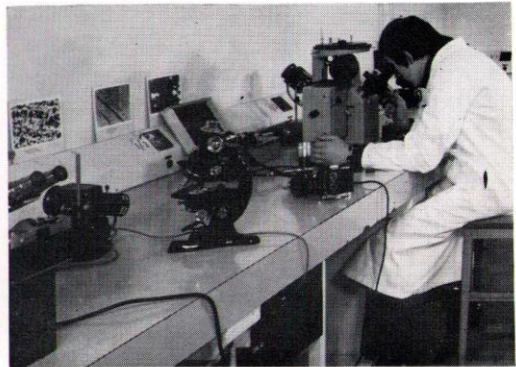
Another general area of courses is that of experimental techniques. Many of these courses were started originally for the benefit of Harwell staff but because of their wider appeal have been made available to others. Typical of these is Modern Physical Techniques in Materials Technology (one week of lectures and visits to Harwell laboratories) and two special more practical courses run in conjunction with and held at the University of Aston, on electron microscopy and on x-ray diffraction and electron probe analysis. Others are Advanced Optical Microscopy run in conjunction with the Royal Microscopical Society and Electronics for Nuclear Particle Analysis. CAMAC Instrumentation is concerned with the subject of real-time operations with computers and other processing devices for measurement and control.



Photography and the Electron Microscope



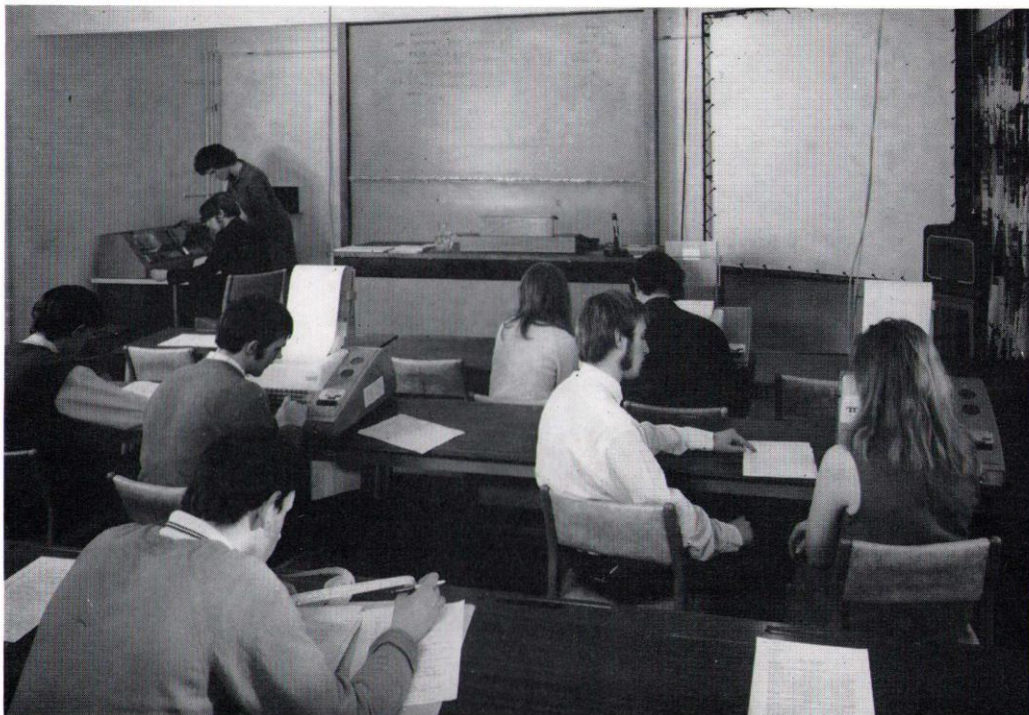
The Electronics Laboratory



Microscopy and Photomicrography

Computers

More directly in the computer field is an introduction to the use of small computers for on-line data processing. Two other special courses deal with computer programmes developed at Harwell. Critical Path Methods is a largely non-mathematical course for management staff based on the CAPSTAN programme, available at data centres, whose main advantage is simplicity in use and its range of optional outputs. Computer Aided Production Control is primarily for industrial managers who are directly concerned with economic planning or similar workshop problems and is run by the team which developed Harwell's system of computerised workshop job control. There is also a number of more formal computer programming courses arranged for Harwell staff which are available if they suit the needs of particular individuals.



Computer Programming Course using teletypes and card punch



Remote teletype to IBM 360/75 computer



IBM 360/75 computer

Courses for Teachers

The Centre runs three courses for teachers each of one-week duration during school and college holidays. Two of them, one for science teachers and the other for mathematics teachers, aim to give a background knowledge of current developments in some of the subjects being investigated at Harwell. There is some practical work in both courses. The other, on the use of radioisotopes in schools, is essentially practical and is suitable for physics, chemistry and biology teachers.



Videotape recording of a radioisotope technique

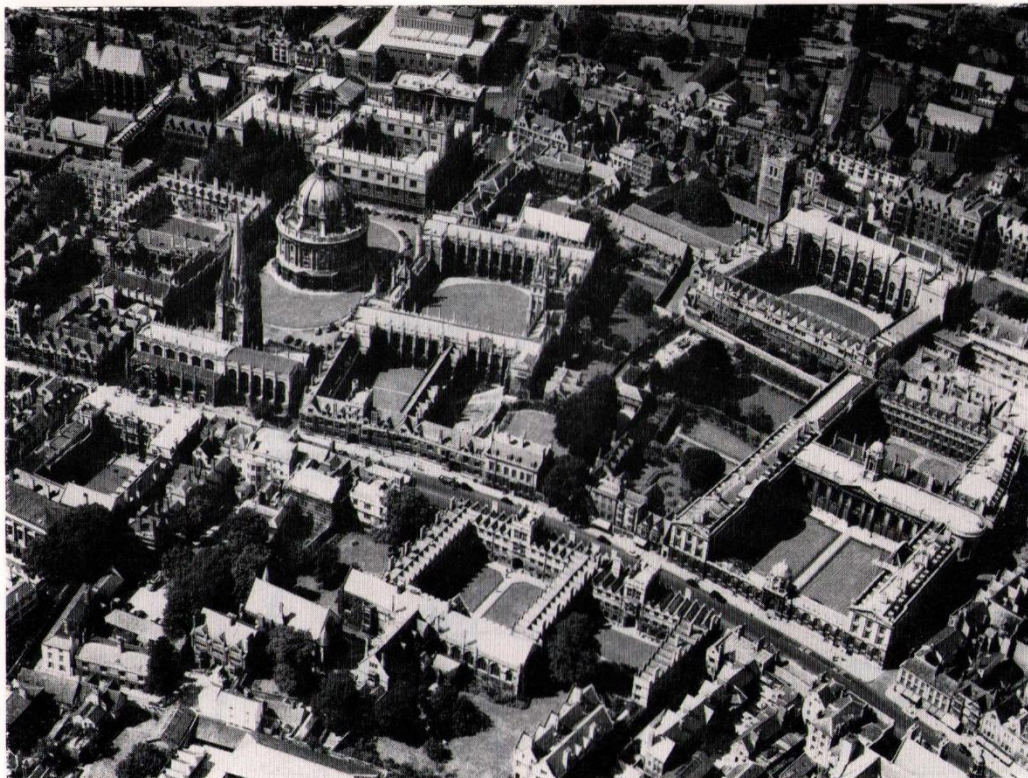


Recording experimental technique on Videotape

Summer Schools

A further activity is the running of Summer Schools usually of one-week duration. Recent topics have been neutron diffraction, point defect clusters and in conjunction with the Royal Institute of Chemistry, modern methods of trace element analysis.

All the courses described are at present in the programme, but this is under constant review and changes frequently. This means that courses drop out, others have their content revised and new ones are added. Further details of the courses in the current list, including dates, are given in the booklet to be found in the pocket in the back cover.



Photograph by Aerofilm Ltd.

Aerial view of the centre of Oxford.
Summer Schools and Teachers courses.
Students are usually accommodated in an Oxford College.

