

Disciplines merge at Coventry

An intensive effort to raze the barriers that compartmentalize science has begun in the School of Molecular Sciences at the University of Warwick in Coventry, England. There, Malcolm Clark heads a department of about 20 instructors engaged in teaching and study of phenomena at the molecular level. Clark conceives this field as a single broad discipline lying between physics and biology. "The present divisions," he says "such as chemical physics and theoretical, physical inorganic, organic chemistry and biochemistry, are rapidly losing their relevance. Moreover in their continuance lies the danger that mere differences of emphasis may harden into sharp distinctions bearing no relation to the natural world."

Most of Clark's students have studied physics, chemistry and mathematics in school. In their first year at Warwick they continue to receive instruction in these subjects. Their physics course deals with the behavior of matter in the extended state, the properties of matter being considered at the submolecular level. Chemistry pays particular emphasis to atomic structure, thermodynamics, kinetics and general physical chemistry. Mathematics is concerned with differential equations, partial differentiation and complex numbers. In the second year, instruction in physics will be replaced partly by crystallography and biochemistry while chemistry and math will continue. During the third year the student will choose from a wide variety of options.

"Our primary aim," says Clark "is to produce in students an attitude of mind leading to a confident, critical appraisal of chemical and biochemical situations. Instead of cramming more and more into the syllabus, we intend to make sure that what is taught forms a coherent picture and is really absorbed by the student [until] he can apply it creatively."

Despite its auspicious start, Clark has some reservations concerning the

school's future. "Some of those engaged in giving courses," he says "have been brought up in the classical modes from which we ourselves have to escape. . . . Though I am trying hard to live up to [the ideals of the school] I suspect that the centralized system of research administration in the United Kingdom, together with the weight of tradition, will prevent my realizing my aims."

Prize for new physics course

E. F. Beall of the University of Maryland has won a thousand-dollar regents' prize from his state for "building up a new introductory course in physics."

With the help of other faculty, particularly G. B. Yodh, Beall has tried to develop a one-semester course that presents an integrated view of physics to the general student. The only course prerequisite is algebra and the only requirement that the student not be majoring in any science. Kinematics, dynamics, energy, waves and quantum mechanics are treated sequentially without calculus or trigonometry. "I go to great lengths," says Beall "to put the material within the grasp of the students, but I insist that they understand it in a real sense, and not just be able to plug in numbers to equations. On exams I usually ask questions that can be answered concisely in words."

Is he satisfied with the course? Beall observes that he has not been able to capture class interest until the course reaches quantum mechanics, and by that time many students are alienated. Consequently, next term he is going to cover more modern physics at the basic level. This course will include energy and momentum from the two-body collision viewpoint, special relativity, wave-particle duality, quantum mechanics of free particles, and validity ranges for classical, relativistic and quantum physics. "I will attempt," Beall adds, "to convey our understanding of the simplest physical problem: that of a par-

ticle moving in a force-free region. It seems to me that this problem contains most of the interesting results of modern physics. It can also be described without higher mathematics. After that, we will consider the details, that is, what happens when forces are put in and the problem gets complicated. I hope as well to lecture in terms of electrons, mesons, etc., rather than billiard balls, and to discuss some problems in my own field (high energy) as illustrations of the basic force-free problem."

As for the textbook problem, Beall will use a very elementary book, (Beiser, *The Mainstream of Physics*) mainly as a reference volume and encourage the students to take good notes.

Taxing fellowships

The Internal Revenue Service is considering new rules that would define, with greater precision, the difference between nontaxable scholarships and fellowships on the one hand, and taxable gross income from services rendered on the other hand. Section 117 of the Internal Revenue Code provides that scholarship or fellowship awards are at least partly excludable from gross income. In recent years, however, there has been a great increase in the number of ambiguous situations not specifically spelled out under Section 117. The problem in such cases, according to IRS chief counsel Mitchell Rogovin, is to distinguish true scholarships and fellowships from payments that are in fact compensation for services performed.

Although it is not now clear exactly what the proposed amendments will entail, they undoubtedly will require the taxing of certain fellowships and scholarships not currently taxable. The Revenue Service makes it clear, however, that the new rules will apply only to amounts received some time after the regulations are published as a notice of proposed rule-making in the Federal Register. This time-interval will enable interested

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parties to comment to IRS on the proposed rules. "The integrity of the provision which exempts scholarship and fellowship income from taxation," says Rogovin, "can be preserved only if the institutions concerned make a determined effort to observe the spirit underlying the exemption. Institutions have a responsibility to exercise the highest degree of care in properly characterizing payments and subsidies to students as scholarships and fellowships or as compensation."

Summer courses

Brandeis University, University of Miami, UCLA, University of Michigan, MIT, Fisk University, and NATO have announced the following courses to be held this summer:

Statistical physics, phase transitions and superfluidity will be the themes of the ninth Brandeis University summer institute in theoretical physics, to be held 20 June to 29 July in Waltham, Mass. Lecturers will include George B. Benedek, Robert Brout, Freeman J. Dyson, Mark Kac, Leo P. Kadanoff, Melvin Lax, Elliott W. Montroll, and W. F. Vinen. Because of National Science Foundation and NATO support, the institute is tuition free, and predoctoral and postdoctoral fellowships will be awarded to participants from America and Europe. For application forms and further information write to Secretary, Physics Summer Institute, Brandeis University, Waltham, Mass. 02154.

University of Miami announces a program of undergraduate grants for participants in a course on fundamental concepts in environmental and planetary sciences, to be held 17 June to 22 July. Major emphasis will be placed on fluid dynamics in the context of geophysics and planetary physics: flow phenomena, including geostrophic flow, boundary layers, wave propagation, transfer of mass and energy by convection and turbulence and energy transfer by radiation. To be eligible applicants must have a background equivalent to three years college training in mathematics (through advanced calculus) and the physical sciences. Scholarships provide

for tuition and fees, \$60 per week subsistence and all travel expenses. For further information write to S. Fred Singer, dean, School of Environmental and Planetary Sciences, University of Miami, Coral Gables, Fla.

University of California at Los Angeles announces three two-week courses this summer.

Liquid crystals, their physics, chemistry and uses will be conducted by Glenn H. Brown from 20 June to 1 July. Included in the course will be the present state of knowledge of liquid-crystal structure and properties, modern measurement techniques and the role of liquid crystals in living matter and lyotropic systems. Current and potential applications of liquid crystals to specific systems will be stressed.

From 18 to 29 July Max Garbuny will conduct a course in optical physics and its recent applications. The course treats interaction processes involved in generation, propagation and detection of coherent and incoherent light from infrared to ultraviolet. Included will be optical masers, nonlinear optics, holography, high-intensity-light-source technology and systems of detection in the electromagnetic spectrum.

Benjamin Lax will lead a course in modern solid-state physics with applications from 15 to 26 August. Topics to be covered will include crystal physics, vibrations in solids, energy bands, magnetism, superconductivity and its applications, transistor physics and semiconductor devices, electronic applications of magnetic materials, ultrasonic applications, quantum electronics, masers and lasers.

For each of the above courses, the fee will be \$300. Complete information on them can be obtained from R. E. Garrels, Physical Sciences Extension, Rm 6532 Boelter Hall, University of California, Los Angeles, Calif. 90024.

The University of Michigan College of Engineering will hold a series of intensive noncredit courses this summer for practicing scientists and engineers in rapidly developing fields of technology. From 6 to 10 June a course in semiconductor circuits will

present tools for analysis and design of modern electronic circuits using some of the latest semiconductor devices. Fee is \$175 for this course. A communications-theory course (11 to 22 July, fee \$300) will include modulation theory, statistical decision theory, information theory and coding. Applications to modern pulse-code-modulation and frequency-modulation systems will also be treated. From 8 to 19 August a course in laser theory, technology and applications will be held. Topics include fundamentals of gas lasers, impurity lasers, semiconductor lasers, coherent optics and holography followed by detailed consideration of specific lasers and their applications. Course fee is \$300.

For complete information on the above courses write to Engineering Summer Conferences, West Engineering Building, University of Michigan, Ann Arbor, Mich. 48104.

Massachusetts Institute of Technology is offering an experimental solid-state physics program from 20 June to 22 July for faculty members and representatives from government and industry. Under the program participants will work on experimental projects dealing with x-ray diffraction, crystal growth, infrared spectroscopy, magnetic resonance, galvanomagnetic effects, excess carriers in semiconductors, ferroelectricity, superconductivity, Mössbauer effect, advanced x-ray diffraction, dielectric constant, ultrasonic measurements, crystal optics and metallography. In addition, background lectures, notes, references to selected literature and tours of several MIT solid-state experimental facilities will be provided. It is expected that funds will be available for faculty participants. Further information and applications (deadline 15 April) can be obtained from Solid-State Physics Program, Rm 24-417, Center for Advanced Engineering Study, MIT, Cambridge, Mass. 02139.

Fisk University announced its 17th annual infrared-spectroscopy and gas-chromatography institute. The program includes two infrared sessions and one gas-chromatography session.

The first IR session is scheduled for 23 to 27 Aug. and is designed to