

CPT Newsletter

Spring 1997

Biochemistry Requirement for Approval and Certification

In a previous newsletter the chemistry community was informed that CPT was considering requiring some exposure to biochemistry in all approved chemistry programs. A brief summary of the many comments that were received appears in a separate article in this newsletter. Overall, there was substantial support for requiring biochemistry in ACS-approved curricula, as long as the total number of requirements does not increase.

Although discussion of this issue continues, CPT has now taken initial steps to implement such a requirement. Specifically, CPT decided that at some time in the near future: "ACS-approved curricula shall include the equivalent of three credit hours of biochemistry, which shall be required for student certification". Fundamentally, CPT decided that future professional chemists would be at a disadvantage if they knew no biochemistry.

How this requirement would be implemented in ACS-approved curricula, whether as part of the core or as an advanced course, is a topic still under consideration by CPT. However, there is no intent to increase the total number of credit hours required for graduation. As we proceed to finalize policies on implementation of this biochemistry requirement, we would appreciate receiving any comments that you might have. Please direct your comments to the CPT office (e-mail: can98@acs.org). The new biochemistry requirement is on the agenda for the CPT open meeting to be held Noon-1:00PM on September 7 at the ACS National Meeting in Las Vegas. We encourage you to take this opportunity to discuss this issue directly with CPT members. Check the final Las Vegas program for the location of the CPT open meeting.

New Reporting Schedule for Five-Year Reevaluations

Five-year report distribution will be separated from the annual report mailing in the future. For those programs with a five-year review scheduled for 1997, forms will be mailed October 1, 1997, and be due December 1, 1997. Annual reports will continue to be distributed in late spring. The new schedule will allow CPT to review five-year reports closer to the time of their submission. If you have any questions or comments about the new schedule, please contact the Secretary of the Committee on Professional Training by e-mail at can98@acs.org or by phone at (202) 872-4589.

Scientific Ethics in Chemical Education

The issue of scientific integrity is of increasing concern both within the scientific community and among the general public. Well publicized cases of alleged scientific misconduct have built on the fear of the potentially harmful effects of science and technology to erode the public trust of science. Since trust is the foundation of the research enterprise, scientists are also becoming concerned with issues of scientific ethics. The recent report by the National Academy of Sciences, *Responsible Science*, recommends that educational programs concerned with scientific integrity be integrated into the curriculum.

The practical question for chemical educators is how to implement this recommendation within an already crowded curriculum. One possibility, of course, is the creation of a separate course on scientific ethics. This strategy has been successfully implemented at a number of institutions. There is a large body of opinion, however, that suggests that a better strategy is to integrate ethical concerns throughout the curriculum. There are several relatively simple ways to do this.

First is the so-called "ethics moment," introducing ethical concerns as part of the day-to-day material in a course. For example, proper use of significant figures is not just a question of measurement, it is also an ethical issue of truth telling. Students can be introduced to the ethical issue along with the technical questions of determining the proper number of significant figures.

Ethical issues can also be introduced in regular homework assignments. As part of a problem in organic synthesis students could be asked to write briefly about the health and safety issues raised by the synthetic route either as a laboratory synthesis or as an industrial process. In an analytical chemistry laboratory students can be asked to discuss the ethical issues in certifying their results for the EPA or the FDA.

The best method, however, is the use of ethical case studies. Case studies are hypothetical, but realistic, scenarios that raise ethical questions for class discussion. In the discussion, the ethical issues can be identified and possible courses of action evaluated. The different moral values and ideals that often come into conflict in a real-life ethical question can be articulated. Students will learn that an ethical problem is like a design problem, the solution will depend on the precise circumstances and on the values that the individual brings to the situation.

There are a number of benefits to the teaching of scientific ethics in chemistry. The first is moral sensitivity; students will learn to identify important ethical issues. The second is increased knowledge of relevant standards. We hope that our students will come to understand the standards of conduct expected of a professional chemist by example. Proper professional conduct is too important to be left to chance. Third, students will gain skill in ethical decision making. Having good moral values is one thing, being able to make good decisions is another. We spend a lot of time in our curriculum helping our students learn how to solve chemical problems, but almost no time helping them learn to solve problems in professional ethics. No wonder some of them make serious mistakes when confronted with ethical questions later in their careers. The last, and hardly least, is improved will-power. Often the path of integrity is difficult. If scientific ethics becomes a central theme in our curricula, students will learn that the profession takes it seriously and that it is important to the profession that they make the right decision, not always the easy one.

Prepared by Jeff Kovac, University of Tennessee, Knoxville

Planning for a Career in Industry Brochure

The ACS Committee on Professional Training (CPT) is pleased to announce that the "Planning for a Career in Industry" brochure has been reprinted with an updated bibliography and is now available. Prepared by CPT with the ACS Committee on Corporation Associates, this brochure is designed to provide advice for undergraduate chemistry students who plan to enter the work force upon graduation. It includes suggestions about curriculum planning as well as a broader discussion about career options and opportunities. The brochure concludes with a bibliography of resources on career planning available to undergraduates and their advisors.

Single or multiple copies may be obtained free of charge by letter to the Office of Professional Training, 1155 Sixteenth St., N.W., Washington, D.C. 20036, by e-mail to can98@acs.org, or by phone to (202) 872-4589. The brochure is also accessible via the World Wide Web: <http://www.acs.org/cpt/hp.htm>.

For more information on career services see the ACS Career Services article below.

Faculty Comments on a Biochemistry Requirement for All Chemistry Majors

In an article in a previous CPT newsletter, we requested input from newsletter readers regarding the possibility of requiring some exposure to biochemistry in all ACS-approved chemistry programs. We asked whether it is a good idea or not, how much required exposure to biochemistry would be appropriate, how it might be incorporated into the core curriculum, and what problems it might cause to current programs. We received about 50 responses.

Half of the respondents enthusiastically supported requiring some biochemistry for the chemistry degree, while about a third were opposed and the others were somewhat equivocal. This latter group recognized the positives for requiring biochemistry, but cited problems that would result if such a requirement were established. Over 10% of the respondents indicated that their institutions either already had a biochemistry requirement for the chemistry degree or were currently implementing it.

A large number of those supporting the requirement emphasized the point that many of the more important and interesting new findings in the chemical sciences (broadly defined) are currently occurring in either biochemistry or in one of the other biological sciences, and that these findings are often heavily based on the application of chemical principles. Furthermore, they point out that a large percentage of chemistry graduates eventually end up working in a biological science field, either in industry or academia. Thus, they felt that having biochemistry as an undergraduate would make chemistry graduates more competitive in the job market.

Several respondents commented that, in talks with recent graduates, many had said that they wished they had taken biochemistry while an undergraduate. Of those opposed to the requirement, some pointed out that biochemistry is unlike the other core areas because it depends on the core subjects and builds on them, rather than being a core topic that other areas build on. Among other reasons cited by those opposed to the requirement were that the program is already too crowded and that it is wrong to single out biochemistry (i.e., why not require a course in polymers or materials or environmental chemistry, for example?).

There was widespread agreement among the respondents that the chemistry program is already very crowded; thus, a biochemistry requirement would mean that amount of time allotted to some of the other areas of chemistry needs to be decreased. Otherwise, much of the flexibility in the current program would be lost. As one might expect, there was not agreement on what parts might be altered. In those programs that currently have a biochemistry requirement, there do not seem to be severe problems incorporating a biochemistry course into the regular chemistry program. However, these tend to be the relatively large programs, and there was some concern that smaller liberal arts colleges would have more difficulty with a biochemistry requirement.

There was fairly general agreement that the equivalent of a three-credit survey course in biochemistry would be appropriate. That is frequently the case in those programs that currently have a biochemistry requirement. There was not general agreement on whether this should be accompanied by the equivalent of a one-credit laboratory course; some argued that laboratory experience should be required, while others felt it should not.

We appreciate the thoughtful comments that many of you submitted. They provided a broader perspective for our discussions of this important issue.

Guidelines for a Minor in Chemistry

A draft recommendation for a minor concentration in chemistry was published in the Fall 1995 edition of the CPT Newsletter. After a review of the comments received on the newsletter item and discussion at a CPT open meeting, the Committee voted to adopt the following statement as the ACS recommendation for a chemistry minor:

A minor should include a minimum of 20 semester credit hours (or equivalent). Two or more areas of chemistry should be chosen beyond general chemistry from the following: analytical, biochemistry, inorganic, organic, and physical. This should include laboratory experiences in at least two different areas beyond general chemistry.

The statement was also reviewed and endorsed by the Society Committee on Education (SOCED). The recommendation will be published in the next edition of the ACS guidelines booklet, although the Committee will not evaluate minor programs in chemistry.

ACS Presidential Symposium on Doctoral Education

At the Orlando ACS Meeting, President Ronald Breslow hosted a symposium to discuss whether changes are needed in doctoral education in the United States and to present the findings of a CPT survey of Ph.D. programs. The three members of the 1996 ACS presidential succession participated in the discussions: Brian Rushton, Immediate Past President; Ronald Breslow, President; and Paul Anderson, President-Elect. Other members of the panel were Stanley Pine, Chair of the Society Committee on Education, and Jeanne Pemberton and Dennis Evans, both members of CPT.

Brian Rushton started the evening with the observation that not too much is wrong. As evidence, he cited the positive balance of trade of the U.S. chemical industry and the international attractiveness of U.S. universities for graduate and postdoctoral studies. He acknowledged real problems brought about by the rapid globalization of industry with international competition, causing ever greater focus on immediate earnings. But he warned that graduate schools should respond to these pressures with only the greatest of care. As an industrial VP, what more would he have wanted from his graduate years? Flexibility! He recommended that graduate programs emphasize group interactions, explore better cooperation with industry, and encourage their students to study some economics. But he warned against going overboard with course requirements to address all perceived needs. Stanley Pine, Chair of SOCED, focused on the resources which ACS has to offer, especially in the area of career guidance. He invited the audience to consider others ways in which ACS might contribute.

Ronald Breslow summarized the findings of the November 1995 meeting at Columbia University, where a strong consensus of participants was that research must remain the cornerstone of the Ph.D. degree, but that efforts must be made to ensure that all students obtain breadth as well as depth in their training. Paul Anderson offered some insights about the differences between research in the academic world, where the principal goal is discovery, and the industrial world, where the principal goal is development. He described the huge acceleration which has occurred in the industrial setting, putting tremendous pressure on the scientists there to produce in a shorter and shorter time frame. He emphasized the importance of a really secure chemical base to this development process.

Jeanne Pemberton described some of the CPT's recent activities concerning doctoral education. The Committee is interested in monitoring trends and working to identify and encourage good practices. However, there is no desire to establish an ACS approval program for graduate programs similar to that for undergraduate programs. Dennis Evans presented the survey data collected by CPT, which appears as an insert to this newsletter as a Special Report.

Discussion from the floor was lively and varied. One speaker argued that the best students emerging from Ph.D. programs today are as good or better than ever. However, he observed that the quality (including the breadth) of training is sometimes quite dependent on the selection of the research advisor, and that this is true, irrespective of the prestige or reputation of the department. Replying to the assertion that the best universities produce the best graduates, another speaker articulated a value-added approach to graduate education, arguing that departments at less prestigious schools accept students who might not be admitted to the top universities, yet they

produce graduates who are competitive with the best in the marketplace.

Concern for breadth often results in calls for more requirements, which in turn produces worry about fitting everything into a crowded curriculum. What should be taken out? A graduate student made a compelling and impassioned argument that nothing should be taken out. She expressed concern that flexibility in some graduate programs may cheapen the degree, by allowing some students to complete the program without great effort.

Another speaker focused his remarks on training for industrial positions. He encouraged departments to develop industrial internships and to encourage their students to learn something about business. He emphasized the importance of being able to talk to other scientists, having the language and skills to contribute to multidisciplinary team efforts involving the life sciences, engineering, and pharmacology. A manager from the chemical industry who had tried to establish industrial internships expressed concern and some surprise at the reluctance of faculty members to participate.

A younger faculty member at a university described some of the challenges and frustrations in her position. She observed that there are many aspects of her job for which Ph.D. training did not prepare her. She expressed concern that her colleagues discouraged her from devoting much time to improving the quality of her teaching, arguing that adequate competence was sufficient.

A short article cannot do each speaker justice, nor can it include all points of view. There is, and always will be, a wide range of opinion on graduate education. A few call for radical systemic reform. Others call for more variety and experimentation. Many see the current system as strong, but open to improvement. Almost everyone supported increased attention to issues in graduate education both locally and nationally.

CPT continues to work on these issues and welcomes comments on what the Committee should be doing to foster higher quality doctoral education. We hope to continue a useful and informative dialogue.

ACS Career Services, an Important Resource for Your Students

The ACS Department of Career Services offers a broad spectrum of programs in six categories: employment services, career assistance, publications, workforce analysis, workshops and presentations, and videos. These are addressed to both undergraduate and graduate students.

The program most familiar to members is the Employment Clearing House, offering opportunities at ACS National and Regional meetings to interview on-site with employers who have immediate job openings.

Another direct avenue to employers is the year-round Professional Data Bank, which puts job seekers and employers in touch with one another. This computerized registry matches members' qualifications to specific job requirements. The newest employment service is the ACS Job Bank on the Web. This service puts over 200 weekly postings at your fingertips, including the previous and current weeks postings from C&EN plus the ads from ChemPloyMent. ChemPloyMent posts ads for chemists, chemical engineers, biochemists, chemical technicians, and material scientists from over 45 newspapers. Supplement these services with the Employer Mailing List, and members have direct access to hundreds of employers nationwide, year-round. Career information is also available in four videotapes: Career Transitions: Catalyst for Change; Formula for Success: Turning Job Leads into Gold; Developing the Right Picture: Resume Preparation; and The Essence of a Winning Interview. All of these are available for purchase. Career Services is also producing a new video for the Younger Chemists Committee. The video is intended to explore career options open to new and young chemical professionals and to highlight the skills that viewers should develop to prepare themselves to start and maintain their careers.

The Local Section Career Program (LSCP) is a newly funded Board of Directors program. LSCP provides ACS members with employment and career assistance in their geographic regions. The program emphasizes creating networking opportunities with other professionals and employers on the local section level.

Personal assistance with professional and career development for chemical professionals is available via numerous programs and services. Through the Career Consultant Program, volunteer consultants (all ACS members) provide advice on resume preparation, job searches, interview strategies, and career transitioning, as well as on-the-job employment issues. At national meetings, mock interview sessions give members an opportunity to practice interviewing skills and receive immediate feedback from chemical professionals. A full list and description of services is available in the ACS Career Services Catalog. For more information, or to request a copy of the catalog:

Phone: (800)227-5558 Fax: (202)872-4529

E-mail: career@acs.org WWW: <http://www.acs.org> Job Bank Web URL: <http://pubs.acs.org>

Mail: Department of Career Services

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Certificates for Graduates

Those chemistry majors receiving a baccalaureate degree and having completed a curriculum described in the ACS Guidelines may be certified to the Society for membership purposes by the head or chair of the chemistry department at the approved institution. We will be happy to send certificates to certified graduates. When you request that we send certificates, please include the student's current mailing address. If you would like to have certificates available for presentation to your certified graduates, please let us know the number of certificates you would like and the date you need them. Send all requests to the Office of Professional Training, American Chemical Society, 1155 Sixteenth Street, N.W., Washington, D.C. 20036.