



ACS  
Chemistry for Life™

CPT

Committee on  
Professional  
Training

American Chemical Society

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# Evolution of the ACS Guidelines for Approval of Bachelor's Degree Programs in Chemistry

## CPT Open Meeting

We invite you to attend the CPT open meeting at the ACS National Meeting in Philadelphia on Sunday, August 19, from 12:30pm to 1:30pm in the Washington A Room in the Loews Philadelphia Hotel.

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In 2005, the ACS Committee on Professional Training (CPT) began reenvisioning the ACS Guidelines for approval of undergraduate chemistry programs. The process of substantially rethinking the Guidelines was carried out over a three-year period, and in January 2008, CPT formally adopted the 2008 Guidelines. The 2008 Guidelines represent a significant departure from previous versions, particularly in the area of increased curricular flexibility, and with changes in staffing and course offering requirements. The 2008 Guidelines also placed a larger emphasis on student skills than had been evidenced in earlier versions. In the area of curricular changes, the Guidelines require a minimum of one semester of course work in each of the five major areas of chemistry (Analytical, Biochemistry, Inorganic, Organic, and Physical) and laboratory exposure in at least four of these five areas. The Guidelines further require a minimum of 400 hours of laboratory experience exclusive of general chemistry. Students are required to take and departments are required to teach, on an annual basis, four in-depth courses that build on the five foundation courses. In contrast to earlier versions, departments have considerable flexibility in determining what courses will be offered to fulfill this in-depth course work requirement.

As we passed the fourth anniversary of the adoption of the 2008 Guidelines in January 2012, CPT is beginning the process of developing the next revision of the Guidelines, which we expect will be adopted in 2014. The Committee began the process with a Comment Column in the January 2, 2012, issue of *Chemical & Engineering News* and through discussions

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in our meetings in January and March of this year. Our work on the revisions will continue with a retreat in June 2012. Over the next 18 months, we plan to hold a series of meetings open to the community that will focus on topics related to the Guidelines revisions. We are also planning symposia at the Biennial Conference on Chemical Education (to be held at Pennsylvania State University in late July 2012) and at the Spring ACS National Meeting (in New Orleans in April 2013). We hope to provide plenty of time for



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# News from CPT Meeting with the Chairs of PhD-granting Chemistry Departments

During the ACS National Meeting in San Diego (March 2012), the ACS Committee on Professional Training (CPT) met with chairs from PhD-granting departments to discuss topics of interest related to undergraduate chemistry education as well as other ongoing activities of CPT. Representatives from 24 departments participated, and the topics of discussion focused on four themes:

- What are the undergraduate skills that are essential for success in the PhD, and how can they be developed and assessed? Should undergraduate research be required for student certification?
- What threats are on the horizon for chemistry education? Will general chemistry and general chemistry labs continue to exist in their current structure? What concerns arise with increased use of virtual labs and simulations? Should online courses be excluded from ACS approval? Will off-campus distance learning in chemistry increase? What are the impacts?
- Do the ACS Guidelines stifle or promote innovative undergraduate curricula?
- In addition to developing and administering the ACS Guidelines for Undergraduate Professional Education in Chemistry, the CPT produces the *ACS Directory of Graduate Research* (DGR). With the release of the 2013 edition, this will become an online only resource, and we sought to gain input on what this resource should look like and what information should be included.

The first three topics were selected as part of our efforts to obtain community input as we begin the process of revising the ACS Guidelines, while the final topic was chosen to obtain feedback as we develop the next edition of the *ACS Directory of Graduate Research*. Both of these activities are discussed elsewhere in this newsletter.

The DGR has been published semi-annually since 1953, and has been published in an online format since 1999. In our discussion with department chairs, we asked for their thoughts about the DGR and how we could ensure that it provides a unique resource moving forward. One suggestion that arose was to introduce the ability to search the database simultaneously for research and geography, as these are two typical categories that students use to design their search for a graduate program. A second suggestion was to provide a means to

search departments for clusters of expertise in addition to key word searches for individual faculty members. Departments also were interested in obtaining information about the frequency of 'hits' to their listing and the amount of time users spent on their listing.

The question of virtual laboratories and distance learning elicited considerable discussion. There are situations where such opportunities enable students to gain exposure to chemistry instruction that is not available locally. This is particularly valuable in rural regions of the country. Such approaches can be effectively realized by coupling a lecture component that is delivered online, while the laboratories are performed in a common location with a condensed schedule. For example, some institutions bring all the students together for a week during the term to complete all of the laboratory experiences. With the exception of the above example, the discussion generally distinguished between first-year courses that would not have chemistry majors in the classes and advanced classes where no laboratory is involved as opposed to courses with laboratory components that chemistry majors might take. Several examples were given where distance-learning opportunities were effectively realized in classes that do not include laboratory components. This is an area where advances in technology and student expectations are leading to a rapidly evolving landscape. It is a topic of great interest to CPT, and we hope to solicit more information on current practices and pressures faced by departments and students in this regard.

Another area of discussion involved the desirability of and challenges to the possibility of requiring a research experience for all certified majors. There is a general consensus that such experiences are desirable and provide opportunities for students to reinforce and further develop a variety of professional skills. On the other hand, requiring such an experience of all certified majors introduces a number of challenges. These range from ensuring there is a safe environment for the large number of students who would be required to participate in research projects and other logistical issues related to placement of the students. From the student's side, many students will find it hard to fit additional requirements into the major. As an alternative, it was suggested that departments could be encouraged to explore the inclusion of open-ended laboratories that are non-prescriptive throughout the undergraduate experience. From these

experiences, students would gain many of the benefits of undergraduate research in their regular course work.

As we discussed these topics, other areas of interest surfaced. Two of them were the possible impacts of the 2009 report, "Scientific Foundations for Future Physicians," issued by the Association of American Medical Colleges-Howard Hughes Medical Institute, and the upcoming changes to the MCAT (see symposia information on page 4) as well as the safety culture report from ACS (see page 5). The increasing number of PhD-granting institutions with parallel teaching track faculty (generally non-tenure eligible and non-research active) also emerged as a topic of

interest, with a focus on how best to integrate those faculty into regular departmental culture and to support their professional development. This is a topic we discussed at the lunches with chairs of PhD-granting departments in 2010 and anticipate continuing the dialog around this issue in the future.

We will continue to invite department chairs to engage in discussions with CPT at future ACS meetings.

If you have additional thoughts or suggestions with respect to any of the topics discussed in this article, please send them to [cpt@acs.org](mailto:cpt@acs.org).

#### Evolution of the ACS Guidelines *continued from page 1*

discussion and feedback through formal panels and through small group discussions of the participants.

There are two overarching sets of questions that The Committee wishes to address as we begin the process of the Guidelines revision. First, we are interested to learn how well we achieved the goals we put forward during the previous revision. The goals that we articulated at that time were to:<sup>1</sup>

- Simplify the ACS guidelines and procedures for approval of chemistry programs.
- Provide greater flexibility to approved departments for designing certified degrees.
- Encourage innovation and improvement in curriculum and pedagogy by approved programs.
- Define faculty and infrastructure attributes that support excellent undergraduate chemistry programs.

The second set of questions reflect the fact that in the four years since the 2008 Guidelines were adopted, there have been a number of developments that have impacted chemistry education broadly, and how the proposed Guidelines revisions should reflect these changes. The changes include the financial stress felt

by many colleges and universities and the resulting pressures to lower expenses. Some institutions are feeling increased pressure to develop and/or accept transfer credit for courses or laboratories that are taught online or in formats that would not be recognized as laboratory or classroom experiences appropriate for the education of professional chemists. Further, the importance of chemistry in the studies involving energy, environment, health, and material development (among other areas) has increased and continues to grow. The landscape of information resources, accessibility, and relevant training has also been shifting dramatically and rapidly in recent years. The experiences, skills, and knowledge that a chemistry graduate will need to have 15 years from now will likely be even broader than what is needed today.

As we consider revisions to the Guidelines, we want to be responsive to all of these issues and others that are of importance to the community. Most importantly, we want to develop Guidelines that will ensure that the chemistry undergraduates of 2025 are appropriately trained as chemists for the future. To this end, we welcome your comments and suggestions. Comments should be sent to [cpt@acs.org](mailto:cpt@acs.org).

<sup>1</sup> Taken from "Proposed Revisions to the ACS Guidelines," CPT Newsletter Volume 4, Number 5, Spring 2006.

## ANNOUNCEMENTS

### Congratulations to the Class of 2012!

Graduates who receive a baccalaureate degree from an ACS-approved program and complete a curriculum consistent with the ACS Guidelines may be certified to the Society by the head or chair of the approved department. Department chairs may contact the Office of Professional Training by email at [cpt@acs.org](mailto:cpt@acs.org) to request ACS certificates for their qualified graduates.

Change is coming to the *ACS Directory of Graduate Research* (DGR). Since 1953, the Directory has been the most comprehensive source of information for chemical research and researchers in North America. The ubiquitous chemistry “phone book” provides comprehensive listings of faculty and their publications, contact information, and research interests. In addition, statistical summaries are provided across a wide array of chemistry-related disciplines. In 1999 the creation of the internet companion, DGRweb, broadened accessibility to the Directory information and added modern electronic features such as search capabilities. In order to improve the utility and timeliness of Directory information, additional changes in the delivery, content, and breadth of chemistry research will occur over the next few years:

- The print version of the DGR will be discontinued and the information will be offered as the DGRweb resource, only. With the availability of DGR content on the internet, demand for the print version has decreased as requests to the DGRweb site have increased. Elimination of the print version not only decreases costs of publication, it enables content to be updated more frequently than the

biennial schedule of the old print version.

- The CPT has recommended elimination of publications and thesis titles from the DGR. Partly this reflects an effort to reduce the many costs to faculty and departments associated with formatting. As importantly, this move reflects the widespread availability of more current publication information on departmental and research group web sites. The new DGR will include annually updated links to these sites. The CPT will conduct a survey of DGR users and institutions represented in the DGR to determine what content should be included new database. It is anticipated that charges levied on institutions represented in the DGR will be reduced dramatically.
- The DGR may be going “under”. The construction of a parallel database that collects information concerning research at primarily undergraduate institutions is under consideration. The demand for, and possible content of, a directory of research at undergraduate institutions will be assessed by a survey conducted by the CPT in the next year.

## ANNOUNCEMENTS

### CPT Symposium at the Biennial Conference on Chemical Education

You are invited to attend the symposium “Evolution of the ACS Approval Process: Moving Beyond the 2008 Guidelines” at the Biennial Conference on Chemical Education at Pennsylvania State University on Tuesday, July 31 from 9:30am to 12:30pm. Members of the ACS Committee on Professional Training will present background on the approval process and how it has evolved from its inception to where it is today. The talks will focus on opportunities and challenges associated with increased flexibility of the curriculum under the 2008 guidelines, and what the approval process could and should look like as we look ahead to the next version of the ACS Guidelines. An important aspect of this symposium is to provide a forum for ample discussion of many issues including how infrastructure requirements impact approved programs, the role of online courses and distance learning, faculty contact hours, and access to the chemical literature. Ample time will be provided for discussion. The Committee welcomes feedback as we begin the process of revising the 2008 Guidelines.

### Chemistry and the Premedical Curriculum

Symposia providing information on Scientific Foundations for Future Physicians and exploring its implications for undergraduate chemistry education will be held:

- Monday, July 30 at the Biennial Conference on Chemical Education, State College, PA
- Tuesday, August 21 at the 244th ACS National Meeting, Philadelphia, PA

The Division of Chemical Education, the Committee on Professional Training, and the Society Committee on Education invite you to join representatives from the Association of American Medical Colleges, Howard Hughes Medical Institute, and programs implementing curricular innovations.

For more information, visit [www.2012bcce.com](http://www.2012bcce.com) and [www.acs.org/meetings](http://www.acs.org/meetings), or e-mail [sffp@acs.org](mailto:sffp@acs.org).

# Revised Laboratory Safety Supplement Emphasizes Safety Culture

In response to increasingly vocal concerns about laboratory safety from both within and outside the academic community, the ACS Committee on Chemical Safety (CCS) Subcommittee on Partnerships established at the ACS National Meeting in Anaheim (Spring 2011) a Safety Culture Task Force (SCTF). This group consisted of representatives from CCS, the Society Committee on Education (SOCED), the Younger Chemists Committee (YCC), the Committee on Professional Training (CPT), and the Division of Chemical Health and Safety (CHAS).

The goal of the SCTF was to develop suggestions for building and strengthening safety cultures within academic institutions. These efforts focused on leadership and laboratory safety education to build safety knowledge, promote safety awareness, and to identify tools and resources that can be used for such efforts. This is especially relevant to undergraduate education where good safety habits are born. The work of the SCTF has resulted in a revised Laboratory Safety Supplement to the ACS Guidelines, which can be found at the CPT website ([www.acs.org/cpt](http://www.acs.org/cpt)). The purpose of supplements, which cover chemistry subdisciplines and a range of professional skills, is to provide suggestions for content, leaving it up to individual departments to determine how that content might be delivered. In many institutions, undergraduate safety instruction consists of a series of experiences dealing with specific skills necessary for the performance of experiments, but this does not necessarily lead to coherent understanding of safety. Thus, the supplement proposes four elements that can serve as a unifying approach: Recognize Hazards, Assess the Risk of Hazards, Minimize the Risk of Hazards, and Prepare for Emergencies. Hazards need to be identified. The risk of hazards needs to be evaluated (assessed), and



then procedures adopted to minimize those risks. Preparing for emergencies is also part of this process. The creation of a safety culture involves not only understanding the hazards associated with laboratory work in chemistry but also creating awareness and responsibility. Thus the safety ethic involves a personal commitment to valuing safety, working safely, promoting safety, and accepting responsibility for safety. This means not only a personal commitment but also a commitment to the safety of everyone concerned.

Clearly, the creation of a safety culture involves students, faculty, and administrators and thus the process extends well beyond undergraduate education. The SCTF has identified the essential elements needed to strengthen and enhance an institutional safety culture. These issues are discussed in an extended document entitled *Creating Safety Cultures in Academic Institutions: A Report of the Safety Culture Task Force* that can be found on the ACS website [www.acs.org/safety](http://www.acs.org/safety). The link is also noted in the Laboratory Safety Supplement.

## ANNOUNCEMENTS

### Changes in CPT Membership

In 2012, three new members were appointed to CPT: Dr. Edgar A. Arriaga, Dr. Joseph S. Francisco, and Dr. Richard W. Schwenz. Dr. Arriaga is a Professor in the Department of Chemistry at University of Minnesota-Twin Cities. Dr. Francisco is a Professor in the Department of Chemistry at Purdue University and a former ACS President. Dr. Schwenz is a Professor in the Department of Chemistry and Biochemistry at the University of Northern Colorado.

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ACTIVX BIOSCIENCES

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UNIVERSITY OF KANSAS

## COMMITTEE SECRETARY

**Cathy A. Nelson**  
AMERICAN CHEMICAL SOCIETY  
1155 – 16th Street, N.W.  
Washington, DC 20036  
Telephone: (202) 872-4589  
Fax: (202) 872-6066  
Email: [cpt@acs.org](mailto:cpt@acs.org)

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