



## PhD-Granting Departments Weigh In on the ACS Guidelines

The Committee on Professional Training held networking luncheons for department chairs at the two ACS National Meetings held in 2010. Invitations to participate in these luncheons were sent to the chairs of all PhD-granting departments and a combined total of 52 departments were represented.

The decision to hold these luncheons followed from an understanding of the need for department chairs to come together to discuss issues of shared interest and concern and the desire of the Committee to learn how the changes introduced in the 2008 ACS Guidelines are impacting chemistry programs at these institutions. We were interested to learn about the challenges and benefits that PhD-granting departments find in the approval process in general and, more specifically, from the revisions to the guidelines. We also discussed the logistics and implications of extending the ACS approval program to departments outside the United States and its territories.

Many of the challenges that PhD-granting departments noted about the approval process are not unique to these institutions. Completion of the paperwork required to maintain ACS approval can be a challenge, especially in light of the increasing demands on chairs and the decreasing levels of staff support. Challenges in maintaining the standards can emerge when courses required for certification of chemistry majors (e.g., biochemistry) are taught outside of the chemistry department. Participants also indicated challenges in engaging their

department in discussions of curricular reform or garnering university support for the type of curricular flexibility encouraged by the guidelines. These challenges may be more profound for the PhD-granting departments given their larger faculty size, dual mission in graduate and undergraduate education, and research focus.

Some of the advantages of the approval program reported by the participants parallel those realized by most chemistry departments. The best example is the use of the approval program to leverage resources and argue against actions suggested by the higher administration that the department

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does not feel are educationally sound. In a time of tighter budgets, both of these aspects are becoming increasingly important. Specific examples included obtaining equipment for undergraduate laboratories and obtaining the funds to maintain SciFinder Scholar licenses. Many departments are feeling the push to introduce online or virtual laboratory and lecture courses as long-term, cost-saving, and possibly revenue-generating mechanisms. One participant observed that, at least in the short term, these classes may be more expensive to run than traditional classes.

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### Celebration

Join CPT as they celebrate 75 years of excellence with a symposium and an open reception at the ACS National Meeting in Anaheim in the afternoon on March 27.

Location to be announced.

A number of department representatives indicated they are finding an increasing number of college-bound students and their parents looking for outside certification of their degree, such as that provided through the ACS approval process. Interestingly, though, when it comes time for students to apply for graduate school, the faculty present observed that most students do not mention the fact they will have a certified degree in their application materials. This makes it hard to assess the connection between fulfilling the requirements for a certified major and success in graduate work.

In addition to questions focused on issues related to the undergraduate curriculum and the ACS approval program, the Committee sought feedback from the participants on the appropriateness of and possible mechanisms for the ACS to become involved in approving undergraduate programs outside of the United States. Several such requests come to the attention of CPT each year, and the Committee is developing a policy on this topic. Participants mentioned that such a process could make it easier to assess the quality of international students applying to graduate programs in the United States. Differences in educational practices and the fact that students often prepare heavily for standardized exams can make it difficult for admissions committees to determine whether an international student is prepared to pursue graduate work in their programs. An international approval program could provide a mechanism by which such information could be standardized. With the increasing globalization of the chemical workforce, such global standards could benefit multinational corporations.

As the discussion moved to ways to implement such a program, several challenges were quickly identified. These included differences in safety standards, culture, and in the overall philosophy on the range of experiences students should be exposed to in their postsecondary education. On these issues, the expectations in the United States differ from those in many other countries. With that in mind, there is a danger that by having an American organization set standards for approval of chemistry programs it could appear as if ACS was imposing itself on others. There are also more subtle issues at play. For example, one participant pointed out that in some countries the curriculum is set by the nation's leaders and regime change can bring with it dramatic changes in the educational system. Finally, there is the issue of the cost of the process in terms of both direct monetary expenses and the amount of time that would be required of ACS staff and committee members to establish and implement such a program. In the end, a consensus emerged that the best solution

would be for ACS to interact with its counterpart organizations on the development of their own national or regional approval program.

The Committee on Professional Training thanks everyone who participated in the networking lunches in San Francisco and in Boston. A number of interesting ideas and insights emerged from these discussions that will help to guide the Committee's work in several important areas. We look forward to hosting similar networking luncheons for department chairs at future ACS National Meetings.

## Announcements

### *ACS Directory of Graduate Research*

Get the most comprehensive compilation of information on chemical research at graduate programs across North America! Search DGRweb at [www.acs.org/dgrweb](http://www.acs.org/dgrweb)



### **“Planning for Graduate Work in Chemistry” Now Available**

Do you have students interested in graduate study in chemistry? CPT recently revised its step-by-step guide which is now available for download at [www.acs.org/cpt](http://www.acs.org/cpt).

### **Congratulations!**

The Committee congratulates the following schools on their newly ACS-approved bachelor's degree program in chemistry:

- Lake Superior State University
- North Georgia College and State University

The current number of ACS-approved programs is 663.

### **Upcoming CPT Symposium 75th Anniversary Symposium**

Celebrate the 75th anniversary of CPT at a symposium examining the present and future of undergraduate education at the ACS National Meeting in Anaheim on March 27. An open reception will follow the presentations.

# Fostering Excellence in the First Two Years

On August 3, 2010, at the Biennial Conference on Chemical Education (BCCE) held at the University of North Texas, the Committee on Professional Training (CPT) and Society Committee on Education (SOCED) co-sponsored a symposium entitled “Practices and Policies that Foster Excellence in the First Two Years”. The goal of the symposium was to underscore areas of shared interest highlighted in the recently published guidelines from the two committees: *ACS Guidelines and Evaluation Procedures for Bachelor’s Degree Programs* (2008, CPT) and the new *ACS Guidelines for Chemistry in Two-Year College Programs* (2009, SOCED). Both sets of guidelines emphasize the perspective that education in chemistry involves much more than learning a detailed list of facts. Students also need to gain intellectual, experimental, and professional skills while developing the ability to apply their knowledge and skills in new situations. The symposium explored a variety of departmental and institutional practices and policies used to advance a chemistry program toward the next level of excellence.

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Presentations in the symposium covered a number of pedagogical aspects of curriculum development ranging from specific suggestions for engaging students in introductory chemistry courses by creating more relevant content to strategies designed to promote more active engagement of students in the learning process (lecture-based peer-led team learning and various laboratory-based approaches). Other sessions focused on identifying crucial student skills (higher-order learning, integration of concepts, communication skills, etc.) and methods for enhancing and developing those types of skills.

Other talks during the symposium focused on institutional and departmental practices critical to the continuous improvement of a curriculum and maintaining a vibrant and productive faculty. These included presentations covering the wealth and value of faculty development opportunities that can be used to reinvigorate any faculty member’s research and teaching, mechanisms and methods of programmatic self-

evaluation and assessment, and strategies for increasing participation in chemistry by underrepresented minority groups.

The symposium featured many opportunities for audience contribution and interaction and resulted in a number of useful discussions and suggestions. Slides from all of the presentations are available at the CPT webpage, [www.acs.org/cpt](http://www.acs.org/cpt), under “Symposia and Events”.



## Preparing for Life After Graduate School

*A career development workshop from ACS*

This two-day workshop is designed to inform chemistry graduate students and postdocs about their career options and how to prepare for them:

- Examining careers for PhD chemists
- Describing careers in business and industry
- Knowing critical non-technical skills
- Finding employment opportunities

To bring this workshop to your department, see [www.acs.org/gradworkshop](http://www.acs.org/gradworkshop) or contact [GradEd@acs.org](mailto:GradEd@acs.org); 202-872-4588.

This program is supported by the Graduate Education Advisory Board, with members appointed by CPT, SOCED, and YCC.

# Excellence in Undergraduate Education: A Global Perspective

At the ACS National Meeting in Boston, the Committee on Professional Training organized a presidential symposium to provide a global perspective on achieving excellence in the undergraduate education of chemists. The goals of this session were to examine the hallmarks of excellence in U.S. chemistry programs, explore ways in which practices in the United States are similar to and different from programs in other countries, and identify strategies and best practices in the preparation of chemistry graduates equipped to compete in an increasingly global marketplace. Presentation abstracts and slides from this symposium are available on the CPT webpage, [www.acs.org/cpt](http://www.acs.org/cpt), under “Symposia & Events”.

As summarized by Will Polik, Hope College, the 2008 *ACS Guidelines for Bachelor's Degree Programs* offer increased flexibility to promote curricular innovation, support development of the skills students need to be successful in their professional lives, and expect regular departmental self-evaluation for the purpose of continual improvement. Many of the hallmarks of strong chemistry programs are also detailed in the guidelines' supplements on Excellent and Rigorous Undergraduate Chemistry Programs. Undergraduate research is often used in the chemistry curriculum to impart problem-solving and professional skills. In his presentation “Excellent Chemistry Students Require Excellent Chemistry Programs”, Carlos Gutierrez, California State University-Los Angeles, noted that research should not be merely a capstone course at the end of the curriculum where students may be expected to pick up the technical skills they missed during their undergraduate program. Instead, he urged educators to embed research-like experiences throughout their curricula to help students build a problem-solving approach to life. This theme was also addressed by Jim Gentile, Research Corporation, who challenged the audience to adopt teaching practices that not only mirror science at its best – experimental, rigorous, and based on evidence – but also integrate real science, and the expectation of discovery, into classrooms and laboratories.

Providing global perspectives on the education of chemists were Anthony Smith, Ecole Supérieure de Chimie Physique Electronique de Lyon (CPE Lyon), and Scott Kable, University of Sydney. Dr. Smith described the Bologna Process to transform undergraduate education in Europe and the changes that have resulted in the chemistry curriculum. Dr. Kable's presentation “Improving Student Engagement in the Laboratory: An

Initiative across all Australian Universities” described an innovative program called Advancing Science by Enhancing Learning in the Laboratory (ASELL) which aims to improve the quality of undergraduate laboratory curricula in Australia. It became clear during the discussions that followed these presentations, that the challenges faced by chemistry programs in the US, Europe, and Australia are similar, and that much can be gained through the sharing of ideas, curricular resources, and pedagogical approaches.

Diversity is an important hallmark of excellent programs, and two presentations focused on this aspect of undergraduate chemistry education. The presentation “Diversity Equity is a Figure of Merit” by Rigoberto Hernandez, Georgia Tech, challenged the audience to include diversity equity as a metric of program excellence. Dr. Hernandez highlighted the need to build a globally competitive workforce through the graduate training of domestic students who are underrepresented minorities. John Clevenger, Truckee Meadows Community College, further highlighted the unique role of community colleges in increasing the diversity of the U.S. scientific workforce.

Finally, the value of an international experience in the undergraduate preparation of chemistry students was highlighted through presentations describing three unique exchange programs. Susan Lunte, University of Kansas (KU), described the Atlantis Program, which facilitates exchange of undergraduates between the United States (KU and University of Arkansas), Dublin City University in Ireland, and Regensburg University in Germany. The presentation “Think Globally: Study Abroad Opportunities for Science Undergraduates” by Morton Hoffman, Boston University (BU), described how their program addresses many of the challenges faced by American science students who seek an international experience but want to complete their course of study in four years. By replicating BU science courses at universities in Dresden and Grenoble, sophomore science students can complete the courses required for their major, taught in English, while also learning the local language and culture. Another opportunity for chemistry students to gain an international experience is through a summer research experience. Lourdes Echegoyen, ACS, described the unique role that international research experiences for undergraduates (REU) programs can play in the training of chemistry students by providing a first-rate research experience as well as a chance to live and work for a summer at a university abroad.

# Who is Teaching Whom?

## Fall 2009 CPT Survey of Chemistry Faculty Status

Department chairs from 354 ACS-approved and 68 non-approved programs responded to a CPT survey to assess the role of different categories of faculty in delivering the undergraduate chemistry curriculum. Faculty categories were defined in the survey as tenured/tenure-track, long-term full-time non-tenure-track (LT/FT), long-term part-time (LT/PT), and temporary. The survey did not include teaching assistants. Although this article highlights several key findings, additional survey results and discussion can be found in the summary and extended reports available at [www.acs.org/cptfacultystatusreport](http://www.acs.org/cptfacultystatusreport). Most of the results are categorized in the reports by responses from types of institution (public or private) and highest degree granted (BS/BA, MS, and PhD). The data for BS/BA-granting departments are further broken down based on whether or not the program is ACS-approved.

Table 1 shows the total number of faculty and instructional staff and the gender distribution in each category at all 422 responding departments. While the 4,542 tenure-track faculty represent 68.5% of the instructional staff in these departments, women account for only slightly over 20% of the tenure-track faculty. When broken down by institution type, women account for a higher percentage of tenure-track faculty at BS/BA-granting institutions.

**Table 1. Number and Gender Distribution of Faculty and Instructional Staff in Each Category at All 422 Institutions<sup>a</sup>**

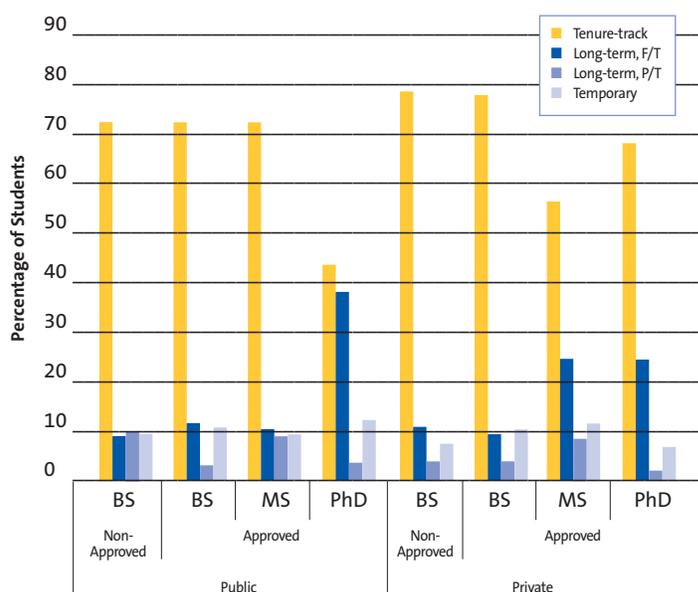
Faculty Category	Total Number of Faculty and Instructional Staff	Percentage Male Faculty and Instructional Staff	Percentage Female Faculty and Instructional Staff
Tenure-track	4542	79.5%	22.4%
Long-term, F/T	712	52.7%	48.3%
Long-term, P/T	505	57.6%	39.6%
Temporary	867	58.0%	41.3%

<sup>a</sup> Inconsistencies in responses from some departments prevent percentages from totaling 100%.

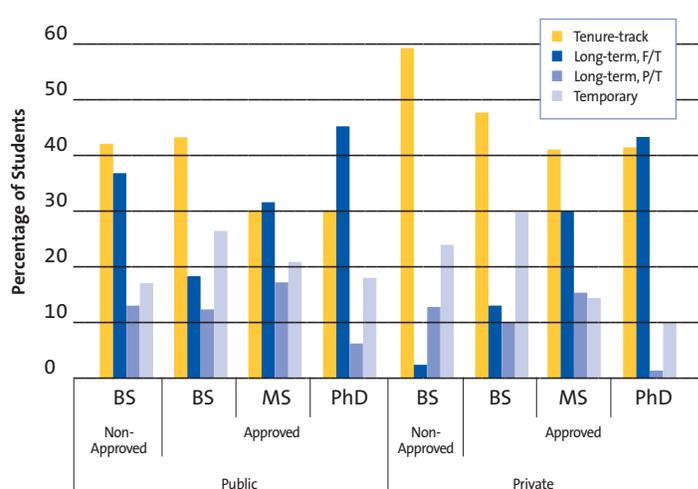
The survey gathered data on introductory chemistry courses, the first dedicated organic courses, and the associated lab courses. The percentage of students who see tenure-track faculty, particularly in lecture, is significantly greater in courses that are suitable for chemistry majors. This is illustrated in Figures 1a and 1b for introductory chemistry courses.

The percentages of students seeing faculty in each category in the classroom suggests that a student is more likely to see a LT/FT faculty member in the classroom at a PhD-granting institution than at either a BS- or an MS-granting institution.

**Figure 1a. Introductory Courses in Which a Chemistry Major Could Enroll: Percentage of Students at All Institutions Who See Faculty in Each Category in Lecture**



**Figure 1b. Introductory Courses Not Suitable for a Chemistry Major: Percentage of Students at All Institutions Who See Faculty in Each Category in Lecture**



The survey results offer a number of insights into the makeup of chemistry faculties, who students are seeing in both the classroom and laboratory, and the benefits offered to different categories of faculty.

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