CPT
Committee on Professional Training

American Chemical Society
1155 Sixteenth Street, N.W.
Washington, D.C.

Volume 6, No.1 Spring 2008

New ACS Guidelines Approved

Inside This Issue...

Attend the following event during the upcoming 2008 ACS National Meeting:

Academic Employment Initiative AEI Poster Session

See page 5 for details.

At its winter 2008 meeting, the Committee for Professional Training (CPT) unanimously approved new ACS Guidelines for undergraduate chemistry programs. This concluded a three-year process that involved extensive input from the entire chemistry community. The new ACS Guidelines are available on the CPT Web site at http://www.acs.org/cpt.

Goals of the New Guidelines. The new ACS Guidelines have been updated to reflect changes in the chemistry profession and chemistry education. In particular, the ACS Guidelines are designed to:

- Promote the development of modern and innovative curricula by chemistry departments
- Encourage innovations in pedagogy that promote student learning and success
- Define faculty and infrastructure attributes of excellent undergraduate programs
- Streamline program review procedures and the program approval process

Guidelines Changes. Few changes have been made regarding institutional, faculty, and infrastructure requirements. ACS-approved chemistry programs must have at least four full-time permanent faculty members. Teaching contact hours are limited to 15 per week, although some additional flexibility is provided in this regard. Physical plant, instrumentation, and safety requirements are similar to the previous guidelines.

Under the new ACS Guidelines, the curriculum for an ACS-certified degree consists of introductory, foundation, and in-depth course work. Beyond introductory chemistry, ACS-certified graduates must receive instruction equivalent to a one-semester course in each of the five major areas of chemistry: analytical, inorganic, organic, physical, and biochemistry. They must also have the equivalent of four one-semester in-depth courses that build on prerequisite foundation course work. A total of 400 hours of laboratory work beyond introductory chemistry, covering at least four of the five foundation areas, is also required for certification. The ACS Guidelines place increased emphasis on the development of

Upcoming Guidelines Symposia

The Committee on Professional Training (CPT) invites you to discuss the opportunities for curricular innovation offered by the new ACS Guidelines and learn about the new requirements and procedures for ACS approval at two upcoming symposia. The first symposium will be held at the **Biennial Conference on Chemical Education in Bloomington, Indiana, on July 28**. Among the topics covered in the presentations will be approaches to developing one-semester foundation courses and conducting program self-evaluations. At the fall **ACS National Meeting in Philadelphia on August 18**, the CPT symposium will address curricular innovation and the promotion of excellence. This symposium will include a panel discussion where the new ACS Guidelines will be applied to real-world situations encountered in various chemistry curricula. For more information about these upcoming events, please check the CPT Web site at www.acs.org/cpt.

student skills that promote professional success. Please consult the full ACS Guidelines document for additional details on curriculum requirements.

Degree Tracks. The new ACS Guidelines encourage chemistry departments to develop degree tracks that meet the certification requirements. Degree tracks could cover chemistry broadly, focus on a chemistry subdiscipline such as biochemistry or polymer chemistry, or address a multidisciplinary area such as forensic chemistry or materials science. Degree tracks permit departments to develop modern, innovative curricula that reflect the overlap between chemistry and other disciplines. These department-defined degree tracks replace the ACS-defined options in the previous guidelines.

Initial Program Approval Procedure. The procedure for initial approval of a chemistry program has been revised to begin with a short pre-application that covers minimum infrastructure, faculty, and curriculum requirements. Pre-applications are accepted twice a year, and the outcome will be either an invitation to submit a full application or identification of specific deficiencies relative to the ACS requirements. The submission of a full application is followed by a conference with CPT at an ACS National Meeting and a site visit by a Visiting Associate. After completing these steps, applicants will have one opportunity to resolve specific issues via correspondence, or approval will be withheld due to noncompliance with the guidelines. Please consult the ACS Guidelines document for a complete description and flowchart of the process.

Institutions with applications for program approval currently in process must successfully meet all the requirements by December 2010 or restart the process with a new pre-application, as outlined above.

Changes in CPT Membership

In 2008, three new members were appointed to CPT: Dr. Robert A. Copeland, Dr. Scott C. Hartsel, and Dr. Ann B. McCoy. Dr. Copeland is Vice President of Enzymology & Mechanistic Pharmacology at GlaxoSmithKline Pharmaceutical Company. Dr. Hartsel is a Professor in the Department of Chemistry at the University of Wisconsin-Eau Claire. Dr. McCoy is a Professor in the Department of Chemistry at The Ohio State University.

The Committee would like to express its very special appreciation for the many contributions of the following members, who concluded their terms of service on CPT at the end of 2007: Dr. F. Fleming Crim, Dr. Edward N. Kresge, Dr. Margaret V. Merritt, Dr. Eric J. Sorensen, and Dr. Diane M. Bunce.

Streamlined Five-Year Report Procedure. ACS-approved programs are typically reviewed every five years. After a five-year report is screened by ACS staff, the full Committee reviews the report at one of CPT's three yearly meetings. CPT either continues approval of the program or identifies areas of noncompliance with the ACS Guidelines. One round of correspondence is available to resolve the identified issues, after which CPT either continues approval or places the program on probation. One more round of correspondence is available to resolve the remaining issues, after which CPT either continues approval or withdraws approval of the program.

By limiting the rounds of correspondence, CPT hopes to eliminate cases in which programs seem to be in continual correspondence with the Committee. Furthermore, when requesting additional information from programs, CPT intends to identify only those areas of noncompliance that could lead to withdrawal of approval. Recommendations for program improvement will be reported in the final letter that continues approval of the program. This procedural streamlining should result in faster turnaround times to report the outcomes of periodic reviews and more directed comments by CPT.

Implementation Schedule. To provide currently approved programs time to accommodate the new guidelines, CPT has temporarily deferred the collection of five-year reports. Also, the due dates for five-year reports will be moved from December to June, so that reports may be evaluated by the Committee closer to the time period for which the data apply. Consequently, no requests for five-year reports were sent out in 2007. Instead, programs will receive notification in December 2008 that their 2009 report will be due in June 2009. All subsequent reports will be deferred correspondingly.

During the deferral period, and until chemistry programs are evaluated under the new guidelines, departments that are currently ACS-approved remain approved and can continue certifying chemistry graduates who meet ACS curriculum requirements. The department chairs of ACS-approved programs may certify students under the previous or new guidelines during this interim period. After programs are reviewed by CPT under the new guidelines, certified students must meet the new requirements.

Promoting Excellence. CPT recognizes that the new ACS Guidelines will not, in itself, lead to program excellence. Improvements in chemistry education will be the result of hard work by chemistry educators committed to improving student learning. These new guidelines are designed to provide faculty and departments with encouragement and opportunities to develop innovative chemistry curricula, focus on student learning of chemistry content and development of professional skills, and build infrastructure that supports program excellence. The Committee always welcomes input from interested constituencies and looks forward to the continued involvement of the entire chemistry community in promoting excellence in chemistry education. ■

Annual Data Trends in Earned Chemistry Degrees

Four years ago, the ACS Committee on Professional Training (CPT) modified its annual information request for chemistry degree recipients at ACS-approved departments to collect and verify additional data, including student ethnicity and international scholar status. CPT initiated these changes to fulfill its charge of examining trends of interest to chemical education and training. The Committee seeks to provide ACS and its members with current and reliable data on the state of chemistry education at academic institutions in the United States. *Chemical & Engineering News (C&EN)* released a preliminary summary of this information in its September 17, 2007 issue. Here, we discuss the reasons for implementing the modified information request and present an overview of the preliminary results obtained.

Why collect ethnic and gender data on chemistry graduates? Statistics on scientific education, ethnic and gender inclusiveness, and the training of international scholars are increasingly important to the national conversation on how the United States will remain competitive in the global economy. Recent studies, such as *Rising above the Gathering Storm* from the National Academies Press (2007), demonstrate that the United States may not be well equipped to fulfill the demand for technically trained personnel for tomorrow's global economy. Tomorrow's economy will increasingly rely on highly trained scientists and technicians, and competition with emerging nations for technical talent will likely reduce the availability of skilled chemical professionals from abroad. To maintain its leadership position on the scientific and technological world stage, the United States needs to find better ways of developing its own talent. The three years of data accumulated thus far through the modified CPT information request are too sparse a foundation on which to identify definitive trends; however, they do provide a preview of what we should be looking for in future cycles of data collection and analysis.

The U.S. scientific community reached a consensus some time ago that traditionally underutilized groups such as women and minorities hold promise for educational pipeline expansion. Over time, the CPT-derived data will allow the chemistry community to understand its educational pipeline and devise strategies to increase productivity. The modification of the CPT information request is also relevant to the changes to the guidelines for ACS approval, particularly the curriculum section www.acs.org/cpt. The Committee promotes curriculum changes designed to provide students with a solid chemistry foundation upon which expertise can be developed through advanced and specialized course work in diverse areas. Our challenge is to transform chemistry instruction in ways that enhance its relevance to fields that employ a molecular scientific approach. The revised curriculum requirements, which encourage innovations that build on local strengths, are intended to increase student enthusiasm for chemistry degrees and professions. As with any experimental endeavor, the Committee—and all other stakeholders in the chemical education enterprise—will seek to assess the impact of curriculum changes using the best quantitative and qualitative approaches. Our data collection is meant to establish the baseline boundaries for such assessments.

The Committee is particularly interested in the current state of chemistry education, including:

- The number of chemistry baccalaureate degree recipients and an indication of whether that number is increasing, stable, or declining relative to the total number of degreed graduates in the United States
- Participation by underrepresented minority and female students in the chemical sciences, including degree attainment at the baccalaureate, master's, and doctoral levels
- The extent to which international scholars are participating in chemistry degree attainment at all postsecondary levels
- Contributions made by different types of academic institutions in serving the various demographics of the chemistry community

Revisions to the Two-Year College Guidelines Are Under Way

Input is needed from the entire chemistry community on the proposed revisions to the *ACS Guidelines for Chemistry Programs in Two-Year Colleges*. The goals of the revisions are to:

- Reflect changes in pedagogy, technology, and accountability
- Facilitate student transfer
- Strengthen two-year college programs

Send your thoughts to commcollchem@acs.org.

The current guidelines, proposed revisions, and information about the revision process can be obtained at www.acs.org/education (follow the navigational path Educational Resources > Undergraduate > Two-Year/Community Colleges > ACS Guidelines for Chemistry Programs in Two-Year Colleges).

Table 1. Degrees (total for ACS-certified and non-certified) awarded in chemistry by ethnicity and degree level.

Bachelor's Total

	Total	African American	Asian American	Native American	Hispanic	White, non-Hispanic	International	Unknown	Not Reported
2003–04	10,151	653	1,277	42	531	6,509	367	364	408
2004–05	10,923	680	1,334	56	546	7,368	416	523	0
2005–06	12,120	766	1,657	62	597	7,808	507	723	0

Master's Total

	Total	African American	Asian American	Native American	Hispanic	White, non-Hispanic	International	Unknown	Not Reported
2003–04	1,818	77	156	3	66	898	536	24	58
2004–05	1,731	59	137	5	80	824	533	93	0
2005–06	1,976	76	138	10	112	973	612	55	0

Doctoral Total

	Total	African American	Asian American	Native American	Hispanic	White, non-Hispanic	International	Unknown	Not Reported
2003–04	1,953	48	149	6	55	975	685	26	9
2004–05	2,054	49	118	7	56	1,020	740	64	0
2005–06	2,303	45	137	6	68	1,052	931	64	0

Chemical degree attainment results. The current data offer ample reasons for both satisfaction and concern. As noted in the September 17 *C&EN* article, the data is somewhat limited in its scope. Nevertheless, the data collected during the past three years provide a snapshot of chemical scientist production in the United States and warrant further analysis.

The data compiled in Table 1 demonstrate that the number of bachelor's degrees earned has increased by approximately 8% per year for each of the past three academic years (2003–04 to 2005–06), when including both ACS-certified and non-certified degrees. However, from 1993 to 2003, the number of total bachelor's degrees in chemistry grew from 9,443 to 10,068, only a 0.7% increase (*Chemical & Engineering News*, February 2005) compared with a 1.5% increase in **total** undergraduate degree attainment (http://www.nsf.gov/statistics/nsf07307/pdf/nsf07307.pdf). The next round of National Science Foundation data (collected within a ten-year period) should allow us to understand better the recent apparent 8% growth in chemistry degree attainment shown in Table 1. This trend may simply be a consequence of a growing undergraduate population, and only additional time will provide us with a firmer grasp of this issue.

Ethnicity and nationality trends. The data compiled in Table 2 indicate that for bachelor's recipients, Asian American degree attainment (an average of 13.4% over the past three years) continues to strongly outpace the national population proportion (3.7%), exceeding those of all other demographic elements. White, non-Hispanic bachelor's recipients earn their degrees in near similar proportions to their national composition (68% vs. 75%), while African American and Hispanic chemistry degree attainment is roughly half of both groups' national demographic percentiles (12.3% and 12.6%, respectively). The proportion of international scholars earning bachelor's degrees exhibited a slight rise (not shown in Table 1), which will be monitored in future cycles

Table 2. Chemistry graduate ethnicity percentages compared with U.S. census data.

	Percentages of Baccalaureate Chemistry Graduates[1, 2]	Census Percentages of U.S. Population[3]
African American	6.6	12.3
Asian American	13.4	3.6
Native American	0.5	0.9
Hispanic American	5.3	12.6
White, non-Hispanic	68.0	75.1
Unknown/not Reported	6.3	-

1) The percentages are the average of the three years reported for 2003–04, 2004–05, and 2005–06.

2) The total number of graduates was normalized by removing the international graduates (to make the data consistent with U.S. census data).

3) The census percentages were found using Table DP-1 from the 2000 census report *Profiles of General Demographic Characteristics* (http://www.census.gov/prod/cen2000/dp1/2kh00.pdf). Because multiple ethnicities can be chosen on the census, the percentages do not add up to 100.

Table 3. Production of African American graduates by HBCUs. 2005–06

	Historically Black Colleges and Universities (HBCUs)[1]			All ACS-Approved Programs		
	Total Graduates	African American Graduates	% African American Graduates	Total Graduates	African American Graduates	% African American Graduates
Bachelor's	254	208	81.89	12,120	766	6.32
Master's	22	11	50.00	1,976	76	3.85
Doctoral	17	3	17.65	2,303	45	1.95
Total	293	222	75.77	16,399	887	5.41

1) Of the 70 HBCUs that award bachelor's degrees in chemistry, 23 programs were approved by ACS at the time of the 2005–06 annual report.

to establish the presence of a trend. Although these data are limited in scope, over the three-year window presented in Table 2, the data suggest modest gains in the numbers of African American, Native American, and Hispanic chemistry baccalaureate graduates. If future data firmly establish this trend, it would be cause for optimism regarding efforts to expand and diversify the chemistry pipeline.

International scholars earned 30% of all master's degrees conferred annually in the United States and nearly 40% of doctorates. Although the data provide a sampling over only a three-year period, the fraction of doctorates obtained by international students appears to be on the rise. White, non-Hispanic Americans comprise the largest advanced-degree-attaining group. Although gaining in actual numbers and percentages, Hispanic chemistry graduate numbers still fall well short of their national representation. Except for Hispanic Americans, the numbers of master's and doctoral degrees attained by traditionally underrepresented groups (African Americans and Native Americans) appear stagnant over the time window of the survey data. The small number of U.S. minority students obtaining advanced chemistry degrees is cause for concern.

Chemistry graduates at Historically Black Colleges and Universities (HBCUs) with ACS-approved chemistry programs were tallied for the first time in 2005–06 by the CPT. According to the data compiled in Table 3, these HBCUs granted significant proportions of the U.S. bachelor's, master's, and doctoral degrees conferred annually to African Americans (27%, 14%, and 7%, respectively) during the 2005–06 academic year. These numbers are indicative of the continuing importance of HBCU contributions to the chemistry pipeline and their critical role in supporting ACS initiatives to increase the diversity of the chemistry workforce.

The CPT will continue to monitor the demographic trends in earned chemistry degrees and modify our queries as needed. We welcome comments and suggestions, and thank all participating chemistry departments for their efforts and cooperation. ■

PHILADELPHIA, PA

ACS NATIONAL MEETING

MONDAY, AUGUST 18, 8:00 TO 10:00 P.M.

SCI-MIX

AEI Poster Session

If you are planning to hire new faculty for your department, you are invited to attend the Academic Employment Initiative (AEI) Poster Session at Sci-Mix, where academic recruiters will meet with academic candidates.

At Sci-Mix, the popular interdisciplinary poster session, approximately 90 candidates seeking faculty positions will present posters about their research or expand on their research interests, teaching philosophy, and experience. Faculty recruiters will have the opportunity to meet as many candidates as reasonably possible. Candidates will also have the opportunity to network among themselves and to meet faculty from many more institutions than would normally be possible.

If you have any questions regarding AEI, please write to the ACS Office of Graduate Education at GradEd@acs.org or visit our Web site at http://portal.acs.org/portal/PublicWebSite/education/students/graduate/gettingready/academiccareers/initiative/index.htm. Biographical sketches of the candidates will be available at the AEI Web site in July.

Congratulations!

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

Lock Haven University of Pennsylvania
Winston-Salem State University

The current number of ACS-approved programs is 645.

ACS Committee on Professional Training 2008

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