ACS Chemistry for Life®

CPT Committee on Professional Training

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CPT OPEN MEETING

We invite you to attend the CPT open meeting at the 253rd ACS National Meeting in San Francisco, California, from 4:00pm to 5:00pm on Sunday, April 2, 2017. The location is not yet available. Please check the CPT web page (www.acs.org/cpt) later for details.

Symposium at Spring 2017 ACS National Meeting

The CPT has organized a half-day symposium titled "The Role of Research Experiences in the ACS Certified Degree" for the Spring 2017 ACS National Meeting in San Francisco.

A Fresh Approach to Laboratory Safety Education

The Committee on Chemical Safety (CCS) previously published two reports to assist academic colleagues in strengthening their efforts to promote safety, "Creating Safety Cultures in Academic Institutions" (2012)[1] and "Identifying and Evaluating Hazards in Research Laboratories" (2013)[2]. The reports were in response to numerous reported incidents in academic laboratories and classroom demonstrations that resulted in serious injury or death. Both of these publications emphasize the importance of safety education in building an effective safety culture.

To take these two documents one step further, the CCS formed and charged the Task Force for Safety Education Guidelines (TFSEG) to develop guidelines for laboratory safety education for secondary, undergraduate, and graduate education. The TFSEG team consisted of representatives from the following ACS committees, divisions, and boards: CCS, CHAS, CPT, SOCED, CHED, Ethics, CA, GEAB, TYCAB, along with representation from the AACT and university and high school faculty.

In August, the work of the TFSEG was published in two documents that will be useful in building or strengthening chemical laboratory safety efforts.

- *Guidelines for Chemical Laboratory Safety in Academic Institutions*
- *Guidelines from Chemical Laboratory Safety in Secondary Schools*

Copies of these documents are currently being distributed to the chairs of chemistry departments nationwide. Requests for copies have already been received from universities in other countries, as well as from safety consultants to industries.

The TFSEG recognized that each institution and organization will be unique and may have their own special circumstances regarding chemical safety issues in the laboratory, especially in upper division and post-baccalaureate research facilities. However, all institutions do have similar core chemical safety expectations for their students. The document that has been created for the undergraduate level contains an extensive list of learning outcomes that can be used as a starting point to build an effective chemical safety program that results in a departmental culture of safety.

These Guidelines are organized much differently from most current chemical safety instructional materials. Rather than being organized around specific topics, e.g., flammables, corrosives, etc., they are organized around the concept of R.A.M.P. – an acronym for the Four Principles of Safety: **R**ecognize the hazard, **A**ssess the risk of the hazard, **M**inimize the risk of the hazard, and **P**repare for emergencies.[3]

Thinking about chemical safety in this manner helps the instructors and students focus on the underlying chemical principles of a potential hazard and take appropriate actions to either

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avoid or minimize the risks from that hazard. This also helps build critical thinking and problem solving skills by applying chemical theories and principles to actual laboratory activities and experiences. As a student's chemical knowledge increases, more complex topics, such as reaction kinetics and thermodynamics, can be incorporated. This is safety education.

Another item just released by the CCS is the Job Hazard Assessment (JHA) tool, an extension of the document "Identifying and Evaluating Hazards in Research Laboratories". The JHA will continue to help build critical thinking and problem solving skills and can be used in any academic or industrial laboratory. The JHA is based on a job or task and will help users identify potential chemical and physical hazards and implement corrective and preventative actions, including training, to reduce accidents, incidents, and near-misses.

All three items are available at no cost from the CCS. They may be accessed at the following links:

Guidelines documents: www.acs.org/safety

Job Hazard Assessment Tool: www.acs.org/hazardassessment

To request hard copies of the Guidelines, please send a message to safety@acs.org The Job Hazard Assessment Tool is only available as a download.

"How can we teach safety if we don't know what to teach?" a colleague once asked. Even though most faculty and instructors may have a general idea what chemical safety is and what to do, the Guidelines offer guidance on teaching this essential topic. The Job Hazard Analysis Assessment Tool gives additional focus in identifying potential hazards and implementing preventative actions. The over-arching goals of these CCS publications are to make our laboratory environments safer and to give our students, even those not pursuing a degree in chemistry, the tools with which to be safe while in our labs, in the workplace, and at home. ■

References:

1. Creating Safety Cultures in Academic Institutions: A Report of the Safety Culture Task Force of the ACS Committee on Chemical Safety, ACS, Washington, DC, 2012. http://www.acs.org/content/dam/acsorg/about/governance/committees/chemicalsafety/academic-safety-culture-report-final-v2.pdf (Accessed: Sept 21, 2015).
2. Identifying and Evaluating Hazards in Research Laboratories, ACS, Washington, DC, 2015. https://www.acs.org/content/dam/acsorg/about/governance/committees/chemicalsafety/identifying-and-evaluating-hazards-in-research-laboratories-draft.pdf (Accessed: Sept 21, 2015).
3. Robert Hill and David Finster. Laboratory Safety for Chemistry Students, John Wiley, Hoboken, NJ, 2010.

Symposium at Spring 2017 ACS National Meeting

The CPT has organized a half-day symposium titled "The Role of Research Experiences in the ACS Certified Degree" for the Spring 2017 ACS National Meeting in San Francisco.

The ACS Guidelines emphasize the value of student participation in a research experience as part of a certified degree. Research (which culminates in a written report) can be used to satisfy one of the in-depth courses and can account for up to 180 of the required 400 laboratory hours for student certification. Research experiences are expected to involve original work intended for publication in peer-reviewed disciplinary journals. The role and expectations of research in the certified degree will be discussed and the following speakers will describe how their departments incorporate research into the undergraduate degree requirements.

Barnard College – Rachel Austin

California State University, Fullerton – Nicholas Salzameda

California State University, Los Angeles – Carlos Gutierrez

Duquesne University – Jeffrey Evanseck

North Carolina A&T State University – Sayo Fakayode

Trinity College – Michelle Kovarik

University of Florida – Lisa McElwee-White

2016 BCCE SYMPOSIUM:

Meeting the New Macromolecular, Supramolecular, Mesoscale and Nanoscale (MSN) Requirement in the ACS Guidelines

The 2015 ACS Guidelines for bachelor's degree programs has a new requirement that the curriculum for the certified degree cover the preparation, characterization, and physical properties of at least two of the following four systems: synthetic polymers, biological macromolecules, supramolecular aggregates, meso- or nanoscale materials. There are two ways that chemistry programs may satisfy this requirement. One is through a stand-alone course. The other is through distributed coverage among two or more courses necessary for the certified degree. A distributed coverage should constitute the equivalent of approximately one-fourth of a standard semester course. Tom Wenzel, Chair of CPT, spoke generally about the MSN requirement. Other representatives of CPT presented examples of how programs can satisfy the MSN requirement.

Ron Darbeau described how the chemistry department at the University of Arkansas-Fort Smith is in the process of developing a required, team-taught, three-credit in-depth course covering the different MSN systems. He also talked about the important implications of the MSN requirement for students transferring from two-year to four-year institutions. The majority of programs are likely to use a distributed approach with some coverage of synthetic polymers in organic chemistry. That adds to the importance of having communication between four-year programs and two-year institutions from which they commonly accept transfer students.

Richard Schwenz described how the chemistry department at the University of Northern Colorado expects to meet the requirement through a distributed model involving required foundation and in-depth courses. Specific topics that would either be added to or expanded upon in the classroom and laboratory components were provided. Upon implementation, aspects of synthetic polymers will be included in the analytical, organic, and physical chemistry courses; aspects of biological macromolecules in biochemistry; and aspects of nanoscale materials in inorganic and physical chemistry.

Ron Brisbois of Macalester College talked about in-depth, special topics courses on supramolecular chemistry or polymers and macromolecules. These courses are enhanced through engagement with industrial and academic scientists outside of Macalester to introduce current work taking place in this field. He also talked about new ways that the coverage of MSN topics will be integrated throughout the classroom and laboratory curriculum in a distributed model.

Laura Kosbar of IBM T. J. Watson Research Center described a variety of ways in which polymer chemistry can be integrated throughout the foundation and in-depth classroom and laboratory curriculum. Her talk emphasized how the unique properties of synthetic macromolecules, compared to small molecules, are based far more on size than chemical structure or reactivity. She provided a top-ten list of topics, with examples, that students should know about polymers: (1) anatomy of a polymer, (2) polymer synthesis and kinetics, (3) molecular weight and molecular weight distribution, (4) crosslinking and its implications, (5) polymer "phases" and phase transitions, (6) instrumental techniques used to evaluate polymer properties, (7) rheology and non-Newtonian polymer properties, (8) phase separation with polymers, (9) interactions of polymers with small molecules, and (10) biopolymers.

Complete versions of all of the talks presented at the symposium are available on the CPT website under the "Symposia" tab on the home page (www.acs.org/cpt). ■

CPT Lunch with PhD-Granting Chemistry Departments

The ACS hosted a luncheon for representatives from more than 40 PhD-granting departments at the ACS National Meeting in Philadelphia. This biannual event is an opportunity for members of the Committee on Professional Training (CPT) to discuss common issues with department chairs of PhD-granting departments. The most recent luncheon addressed developments in graduate student training, a topic of continuing interest. Awareness of the individual development plan (IDP) for graduate students and postdoctoral associates is increasing. Graduate programs do not typically require IDPs but instead use them as a companion to other advising resources. Many departments are also offering the "Preparing for Life after Graduate School" program available through the ACS. In order to address career placement, some departments have added department-level staff or engaged the institution's career placement office.

An introduction to research course can be an effective means to promote literature searching skills and the parsing and reporting of information directly from journal articles. This course can also be a vehicle to liaise with the university library staff and leverage their interest in promoting the use of multiple databases and electronic resources.

The CPT is interested in practices that these larger research-intensive departments use to promote student engagement with the primary literature. An introduction to research course can be an effective means to promote literature searching skills and the parsing and reporting of information directly from journal articles. This course can also be a vehicle to liaise with the university library staff and leverage their interest in promoting the use of multiple databases and electronic resources. In some departments, development of these skills occurs as early as the freshman year, with technical writing courses appropriate for the youngest students. For senior students at some institutions, in-depth courses that provide answers to questions with a simple literature reference are an effective technique for enhancing student scholarship. Among this group of institutions, access to extensive library e-resources is the norm, and faculty ultimately bear the responsibility for student training in their area of research.

Additional discussion addressed best practices for endowing graduate students and postdoctoral associates with the hard and soft skills they need to be effective mentors for undergraduates. This responsibility also seems to fall on the shoulders of faculty, and is very personalized for each mentor-in-training, but faculty have developed effective strategies. These include regular meetings with mentors and mentees to maintain a healthy co-mentoring relationship between faculty and student. Some departments view departmental poster sessions as a vehicle not only for promoting scientific communication, but also a crowd-sourcing approach to student mentoring that invites different perspectives from other trainees and faculty. Mini-IDPs (see above) for undergraduates have also been used by graduate students in mentoring younger students. ■

Announcements

Congratulations!

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

Adelphi University

Christopher Newport University

Jacksonville State University

University of South Carolina Upstate

University of Turabo

The current number of ACS-approved programs is 689.

Thank You! We Could Not Have Done It Without You!

The Committee would like to express its appreciation for the contributions of Visiting Associates to the approval process. These volunteers play a critical role in the evaluation of programs that are applying for ACS approval.

Melvin Druelinger – Colorado State University-Pueblo
Robert Grossman – University of Kentucky
Carlos Gutierrez – California State University, Los Angeles
David Harvey – DePauw University
Bert Holmes – University of North Carolina at Asheville
David Kanis – Chicago State University
Daniela Kohen – Carleton College
Lisa Lewis – Albion College
Cora MacBeth – Emory University
Emily Niemeyer – Southwestern University
Miriam Rossi – Vassar College
Tim Royappa – University of West Florida
K.C. Russell – Northern Kentucky University
Kevin Shea – Smith College
Barry Snider – Brandeis University
Marcus Thomsen – Franklin & Marshall College

Certificates Available for ACS-Certified Graduates

Chemistry majors who receive a baccalaureate degree from an ACS-approved program and complete a curriculum described in the ACS Guidelines may be certified to the Society for membership purposes by the head or chair of the approved program. If you would like to have certificates available for presentation to your certified graduates, please contact the office by email at cpt@acs.org.

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A New Individual Development Planning Tool for Graduate Students and Postdocs

ChemIDP™
A career planning tool for chemical scientists

ACS introduces ChemIDP™, an individual development planning tool designed to help graduate students and postdoctoral scholars in the chemical sciences plan and prepare for rewarding careers. ChemIDP™ is a space to explore over 45 careers for chemists, develop strategies to strengthen skills, set goals, and map plans that reflect the users background, experiences, and career aspirations. To access this free site, visit https://chemidp.acs.org.

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 or contact GradEd@acs.org; 202-872-6864.

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

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