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DGR | ACS Directory
of Graduate
Research
web

**2014 ACS Directory of
Graduate Research —
DGRweb is released!**

Conduct free online searches
at www.acs.org/dgrweb

CPT Open Meeting

We invite you to attend the CPT open meeting at the 249th ACS National Meeting in Denver, Colorado, from noon to 1:00pm on Sunday, March 22, 2015. The location is not yet available. Please check the CPT Web page (www.acs.org/cpt) later for details.

New Guidelines Move Closer to Final Approval

The Committee moved closer to adopting a set of new guidelines for bachelor's degree programs at the CPT meeting in San Francisco. In October, the Committee released a draft of the revised guidelines to chemistry department chairs and invited them to provide feedback.

The Committee will review the responses and then release the new guidelines early next year. Changes in the 2015 Guidelines will be much less than the sweeping changes that occurred in the transition to the 2008 Guidelines. Contact hour requirements for faculty and instructional staff are being kept at 15; however, programs are given more flexibility in the use of averaging over two semesters to achieve that number. Contact hours for instructional staff who only teach labs are slated to rise to a maximum of 16 hours per academic term. Programs will now need five full-time permanent faculty members wholly committed to chemistry. Programs currently below this number will have until 2025 to meet the new requirement. Polymer chemistry will now be

required in the curriculum; however, the extent of coverage of this topic is left to the discretion of the program. Approved programs will still need an NMR spectrometer and will now need to have instrumentation on site and used by undergraduates in four of the five following categories: (1) optical molecular spectroscopy, (2) optical atomic spectroscopy, (3) mass spectrometry (includes GC-MS and LC-MS); (4) chromatography and separations, and (5) electrochemistry. The guidelines also have statements that speak to issues of online and virtual instruction and have a requirement that there be a significant hands-on component in the introductory laboratory experience for certified graduates. Finally, the Committee has changed the reporting period for approved programs from five to six years. We appreciate the extensive feedback we received from the community during our discussion of guideline revisions. That feedback has been important in influencing the final form of the new guidelines. ■

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.

CPT Symposium at the Biennial Conference on Chemical Education: The Capstone Experience

On August 4, 2014, the ACS Committee on Professional Training organized a symposium at the Biennial Conference on Chemical Education (BCCE) in Grand Rapids, MI. This symposium explored the forms that a capstone experience for chemistry majors could take. Representatives from the chemistry departments at the University of Cincinnati, Drake University, University of Evansville, Hope College, Kalamazoo College, Leeds City College (UK), and Widener University gave presentations describing the practices at their institutions. The presentations can be found on the CPT website.

These talks illustrate the broad range of approaches programs can take in developing a capstone experience. Examples included one-credit senior seminar courses that focus on student skill development to advanced laboratory experiences with a strong presentation and writing component. Many programs described requirements for undergraduate research either in conjunction with or in addition to the capstone experience. Possible approaches to the assessment of students in the course and to the effectiveness of the course in achieving the stated learning outcomes were also described.

We thank the presenters and the attendees, all of whom contributed to make this a successful and highly informative symposium. ■

Lunch with the Heads, Chairs, and Representatives of PhD-Granting Institutions

On August 8, 2014, the ACS Committee on Professional Training held a luncheon with heads, chairs, and representatives of PhD-granting institutions in San Francisco. Thirty-eight attendees discussed and expressed their views on capstone experiences for chemistry majors, individual development plans (IDPs) for graduate students and post-doctoral associates, and the utility of the *ACS Directory of Graduate Research* (DGRweb).

Many voiced that a capstone experience should not be required. However, institutions could benefit from examples of best practices of capstone experiences. This resource would be particularly beneficial for new faculty. Suggestions for implementation of capstone experiences are inclusion as part of laboratory courses such as instrumental analysis, stand-alone courses, or research projects where students plan, execute the plan, and reflect on the outcome.

IDPs are a relatively new concept in chemistry programs. They are currently fueled by some federally sponsored training programs, which require them as part of the training of pre- and post-doctoral trainees. IDPs empower the trainee to inventory their interests, explore career options, and plan for the future. The majority of chemistry departments represented at the luncheon does not have IDPs and would be cautious about implementing IDPs in their departments. Some of the concerns voiced at the meeting were implementation, utility to students who already have career plans, and the timing for a trainee to implement an IDP. A good site to demystify IDPs is maintained by AAAS (myidp.sciencecareers.org).

The participants provided constructive criticism on the utility of past editions of DGRweb. Comments included that the length of time it takes to update the data in the Directory, the availability of other mechanisms to obtain the same information, and the possibility that this resource is no longer useful to faculty, and maybe to students. The 2014 edition of the *DRGweb* (www.acs.org/dgrweb) provides enhanced search options, which complement the information provided by popular search engines.

We thank the attendees all of whom contributed to make this a successful and highly informative luncheon. ■

An International View on Chemistry Education

AUGUST 12, 2014

The symposium “An International View on Chemistry Education” was one of several internationally-focused sessions at the 248th National ACS meeting held in San Francisco in August. This Division of Chemical Education session was organized by Edgar Arriaga and Cynthia Larive and sponsored by the Committee on Professional Training (CPT) with co-sponsorship from the International Activities Committee (IAC). The symposium brought together educators from around the globe to discuss current practices and opportunities in the education and training of chemists.

Three presentations described the certification or accreditation procedures for undergraduate chemistry degree programs in the US, Canada, and Europe. In her presentation, “*Trends in chemistry education in the US as seen through the lens of the ACS approval program*”, Dr. Lee Park from Williams College, kicked off the symposium with an overview of CPT and the ACS approval program. An important component of the ACS approval program is its efforts to promote excellence in undergraduate education among the 680 public and private institutions meeting the requirements outlined in the ACS Guidelines. Though the Guidelines do not require an international experience, they do encourage students to acquire knowledge of one or more foreign languages or an international experience to enhance their ability to communicate with other chemists worldwide and better participate in the global chemistry enterprise. The increased flexibility afforded by the 2008 ACS Guidelines should better enable programs to integrate an international experience, for example through study abroad, with the rigors of attaining an ACS certified degree. A new version of the ACS Guidelines is anticipated in early 2015.

Dr. Glen Loppnow, University of Alberta, discussed the accreditation of Canadian undergraduate chemistry programs managed by Canadian Society for Chemistry (CSC), which also accredits programs in other countries (<http://www.cheminst.ca/about/cic/csc/csc-accreditation>), in his presentation “*Post-secondary undergraduate chemistry and science education in Canada: Accreditation standards and new directions*”. The CSC accreditation is similar to the ACS approval process, but follows a 10-year cycle, requires one initial site visit, and a periodic assessment after the initial five years. Out of the 48 chemistry programs at Canadian universities, 41 are

currently accredited. The province of Quebec has separate accreditation system.

In his presentation “*Chemistry programs in European countries: Eurobachelor and Euromaster frameworks*”, Dr. Anthony Smith, University of Lyon, spoke about the Eurobachelor and Euromaster frameworks, which use the Chemistry Quality Eurolabels (<http://ectn-assoc.cpe.fr/chemistry-eurolabels/default.htm>), awarded by the European Chemistry Thematic Network (ECTN) to define standards of undergraduate chemistry programs in 29 countries. Currently, 90% of the students in bachelor's, master's, and doctorate programs in participating countries are within this framework. The evaluation

Though the Guidelines do not require an international experience, they do encourage students to acquire knowledge of one or more foreign languages or an international experience to enhance their ability to communicate with other chemists worldwide and better participate in the global chemistry enterprise.

criteria for bachelor's students are similar to those used by the ACS-CPT but have a greater emphasis on breadth and a language requirement reflecting the cultural diversity of the ECTN membership. The Chemistry Quality Eurolabels are valid for five years and currently there are more than 100 granted labels in 16 different countries.

The presentation, “*Teaching chemistry at university: Challenges for Latin America*” by Dr. Maria Gabriela Lorenzo from University of Buenos Aires, described the strategies taken to educate the large number of students attending her university. As a free and public institution with an enrollment of 270,000 students and an inclusive admissions policy, the university faces the challenges of providing a high quality education for a large and heterogeneous population of students. In addressing this challenge, the faculty of the University of Buenos Aires

benefits from a strong interaction between chemical education research and teaching with the dual goal of improving teaching and learning.

Dr. T.S. Andy Hor, National University of Singapore, described the intersection between the university, technology, and industry in his presentation “*Chemistry education in a knowledge-based economy driven by open innovation*”. University education in Singapore enjoys a partnership with industry that benefits companies, the university, and its students. Research institutes serve as the interface between the universities and industry with both parties benefitting from the synergies of the arrangement through joint research projects and supervision of students. In addition to valuable research experiences, a problem-based learning approach helps prepare students as independent learners and practitioners.

With the final three presentations, the focus returned to the education and training of chemists in the United States, with an emphasis on the value of providing opportunities for undergraduates to have an international experience. In his presentation “*International research training program in natural products and environmental health: A unique interdisciplinary research experience*”, Dr. Isai Urasa at Hampton University, described an international research program involving his institution. Over a 15-year period, teams of Hampton University faculty and students visited the University of Dar es Salaam, Tanzania, Egerton University, Kenya, and University of Benin, Nigeria where they engaged in ten-week research experiences on natural products isolation and activity testing and environmental chemistry with a focus on water resources.

Building on this theme, Dr. Bradley Miller, Director of the ACS Office of International Activities spoke on “*ACS international research experiences for undergraduates*”, funded by the National Science Foundation (NSF). Though the number of U.S. students who study abroad as part of their undergraduate education is growing, less than 10% of those students are in the physical and life sciences. The ACS international Research Experiences for Undergraduates (iREU) program is now in its third funding cycle with a current focus on materials chemistry research. Interest in this program is high, and in 2014, there were over 300 applicants, from which 17 students were selected to participate in projects in Germany, Italy, Singapore, and the United Kingdom.

The final presentation by C. Renee Wilkerson Greave, NSF, was “*National Science Foundation programs to support international collaboration*”. The International Science and Engineering (ISE) section of the NSF Office of International and Integrative Activities funds a variety of programs that promote international collaborations for research and education. Among these are programs focused on undergraduate students such as the iREU program. The

NSF Partnerships for International Research and Education (PIRE) program funds innovative, international research and education collaborations that are typically multidisciplinary in nature and SAVI (Science Across Virtual Institutes) aims to accelerate advances in science and engineering research and education through international collaborations. Other opportunities to support international activities include standard awards to individual investigators that may include international research, education and training activities, and support for attendance at international workshops or conferences.

Following the oral presentations, speakers and audience members participated in a lively period of questions and comments further highlighting the value of equipping students with the global perspective that comes with the experience gained from study or research in another country. ■



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.

Announcements

2014 ACS Directory of Graduate Research (Newly Released)

The ACS Committee on Professional Training is pleased to announce the release of the 2014 edition of the ACS Directory of Graduate Research (DGRweb).

DGRweb is a free, searchable online database that provides the most comprehensive compilation of information on graduate study in the chemical sciences at universities in North America. The newly released 2014 edition has improved and expanded searching capabilities, including the ability to generate spreadsheets with statistical data on the number of graduates, faculty, and enrollments based on user-defined search criteria. Also, this new edition provides the ability to find NSF Research Experiences for Undergraduates (REUs).

- Facilitates research collaborations in the chemical sciences
- Enables networking across chemical subdisciplines
- Helps students with selecting a graduate program
- Identifies Research Experiences for Undergraduates (REUs)

Conduct free online searches at www.acs.org/dgrweb!

Watch these two videos to learn more about DGRweb.

https://www.youtube.com/watch?v=gXMYACABH_w

<https://www.youtube.com/watch?v=gead1izlHKM>

Congratulations!

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

[Berea College](#)

[Grove City College](#)

[Rockhurst University](#)

[University of South Carolina Aiken](#)

The current number of ACS-approved programs is 680.

CPT Open Meeting

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Report on the CPT Chemical Information Resources Survey

Summer 2013

Summary of Results from 2013 Information Resources Survey

- Schools generally report that current literature access at their institutions is adequate for course work, with slightly lower numbers for research.
- About a quarter of schools report some limitations on ILL, with master's departments reporting more problems than other types of institutions.
- Forty-six percent of the schools responding reported that elimination of the journal requirement would hurt their ability to maintain their literature holdings.
- The majority of programs (close to 60%) offer some kind of explicit training for students in the use of various information resources.

Background

The ACS Committee on Professional Training (CPT) last conducted a survey on library resources in the fall of 2000. As the Committee works to revise the current guidelines, it seemed like an opportune moment to conduct a new survey. In 2000, there were many concerns about the ability of library budgets to keep pace with increasing journal costs, and the ability of smaller departments, in particular, to provide adequate access to a

sufficiently broad array of current literature to meet the needs of their students and faculty. At that time, the key points raised by the 2000 library survey were those summarized and published as part of a CPT special report in the winter 2002 (see survey page at www.acs.org/cpt). The Executive Summary from that report is reproduced below.

At that moment in time, there was a great deal of concern about the rising costs of institutional journal subscriptions, the

Executive Summary from 2000 Library Resources Survey

- Out of 617 surveys, 416 were returned: this 67% return rate reflects the importance of chemical information issues to the academic chemistry community.
- Library budget cuts are beginning to have a noticeably negative impact on education in chemistry. Further reductions would have significant negative consequences for chemistry education.
- Expenditures for all forms of chemical information vary drastically depending on highest degree granted. Institutions at which the doctoral degree is the highest offered in chemistry spend almost 1 order of magnitude more on chemical information than do institutions conferring only bachelor's degrees. Institutions at which the master's degree is the highest degree offered in chemistry are especially struggling to afford chemical information.
- A "digital divide" is developing in the ability of institutions to provide modern electronic access to chemical information: doctoral institutions are far more able than master's or bachelor's institutions to afford significant numbers of electronic journal subscriptions and/or access to Chemical Abstracts through the SciFinder Scholar gateway.
- Despite significant improvements in electronic gateways to chemical information and databases, the use of chemical information in undergraduate chemistry curricula appears to be diminishing.

adequacy of interlibrary loan services, the difficulties associated with accessing *Chemical Abstracts*. Libraries were facing budget cuts which impacted journal subscriptions as well as monograph holdings. The rising costs associated with information access gave rise to some real concerns about differential access at larger, research-intensive institutions vs. smaller undergraduate institutions. The CPT recognized the difficulties many smaller institutions were having maintaining adequate and broad access to the literature, so the 2008 ACS Guidelines supported smaller institutions by maintaining a requirement that they have access to a minimum number of journal titles available on site, as well as requiring that institutions be able to provide access to *Chemical Abstracts*. These requirements allowed many institutions to maintain a minimal level of library budget funds.

2013 Survey Scope

CPT began thinking about an updated library survey around 2012. However, since the means by which chemical literature is accessed and navigated had changed so dramatically since the time of the last library survey, the decision was made that the focus of the 2013 survey should shift away from localized, on-site library holdings and budgets to better represent the nature of information access in the 21st century. The Committee solicited input from various science librarians who reported that questions about individual departmental

holdings or subscriptions histories were likely to be very difficult to evaluate in light of the shift to complex and wide-reaching consortial arrangements that are in place at many libraries these days. The Committee decided, therefore, that the more important questions to probe concerned chemical information resources more generally: access to current and archival chemical literature (rather than holdings) as well as access to other chemical information resources such as databases, search engines, and information management tools (e.g., bibliographic tools). In addition, in keeping with the shift in focus of the 2008 ACS Guidelines, the Committee wanted to probe the training that students receive in the skills they need to navigate and work with these resources. These skills include the ability to conduct different types of searches (e.g., structure, citation, keyword, CAS number, patent), to organize the information retrieved (bibliographic programs), and to understand and report on the information retrieved (written and oral communication of results, proper citation, etc.)

2013 Survey Results

In the summer of 2013, the CPT sent out a survey on Information Resources to 944 schools (both approved and non-approved programs). We received responses from 35% or 332 schools. Responses came from schools of different types: public vs. private (47.2%:52.4%), highest degree offered (57.2% BA/BS:

Summary of Results from 2013 Information Resources Survey

- Schools generally report that current literature access at their institutions is adequate for course work, with slightly lower numbers for research. Institutions tend to report that the archival access is not quite as good, particularly in terms of meeting research needs.
 - Master's institutions as a group have the hardest time with literature access, with 82% of master's level schools reporting that archival access is adequate for research
 - In comparison, 94% of PhD schools and 87% of BA/BS schools report adequate access
- About a quarter of schools report some limitations on ILL, with master's departments reporting more problems than other types of institutions.
- Forty-six percent of the schools responding reported that elimination of the journal requirement would hurt their ability to maintain their literature holdings.
 - 58% of the bachelor's programs
 - 57% of the master's programs
 - 34% of the PhD programs
- The majority of programs (close to 60%) offer some kind of explicit training for students in the use of various information resources (e.g. structure searching, citation searching), either as a stand-alone course or as a significant portion of a course.

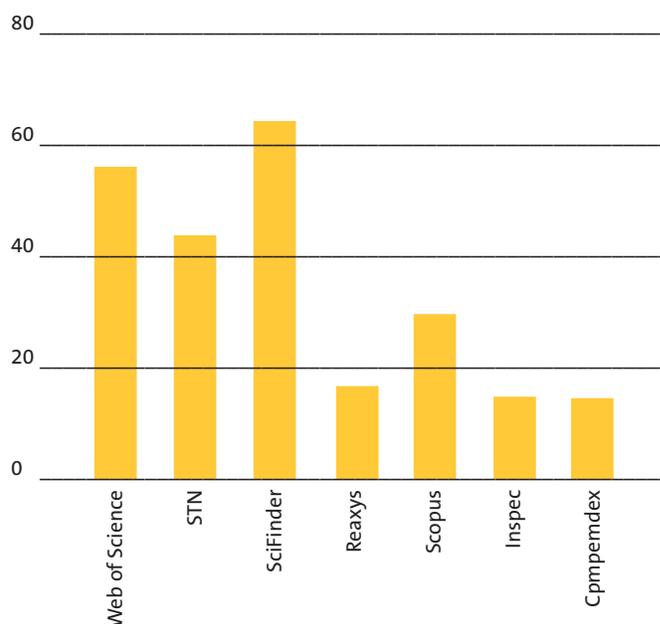
14.7% MA/MS: 27.7% PhD), and approved vs. non-approved programs (89.7%; 8.7%).

Based on the responses the Committee received, it is clear that the proliferation of digital packages and consortial arrangements means that access to the current literature is considerably less problematic for schools (particularly smaller ones) than it once was. The growing “digital divide” identified in 2000 seems to be less of a concern now than it was at the time of that earlier survey. That said, some schools (particularly smaller ones) do report some concerns over archival access as some digital packages are for current-year access only. In addition, for those institutions striving to maintain on-site, localized subscriptions and access, the continually rising costs of journal subscriptions — and continuing cuts in library and IT budgets at individual institutions — remain serious concerns. At the same time, roughly half of the

In the coming years new chemists will need to be thoroughly trained in the use of tools needed to search the literature, but also in tools that will allow them to manage, store, and record information responsibly and ethically

responses received indicated that requirements for access to a minimal number of journals (as well as to Chemical Abstracts) have helped many schools maintain access to a broad array of high quality journals as well as the ability to meaningfully search that literature. Just over half of the public institutions responded that the journal requirement helped them maintain access to the literature, with the greatest impact felt at public bachelor’s and master’s programs. With the advent of digital content, interlibrary loan (ILL) has grown far less cumbersome than it once was, with most schools (> 94%) reporting that ILL access is generally adequate for teaching and research needs, both from the perspective of cost (few schools reported practical limitations on their ILL usage) and timeliness of response. A summary of the most salient results is given on opposite page.

% respondents with access to subscription-based database/search tools



In light of these responses, the new ACS Guidelines will retain the requirement that departments maintain immediate institutional access to a minimum number of journals. These journals should be high quality, peer-reviewed publications, and examples of possible titles are provided on the CPT web page. As always, this list is intended to provide guidance but is not a listed of required titles.

Beyond questions of access to the scientific literature, this survey queried the training that departments and institutions provide to students in how to make use of various information resources. Most institutions consider training students in the use of chemical information and resources important for all their majors, not just their research students. Of the most common subscription-based tools and databases, considerably more institutions have access to Web of Science, STN, and SciFinder than to other commonly used subscription-based tools such as Reaxsys, Scopus, Inspec, and Compendex. Though local access of these tools is often limited by numbers of seats or licenses, very few institutions (~2%) reported that the limitations were problematic for either faculty or students. Institutions reported widespread use of these as well as various free resources by students, in

course work as well as in research. The most commonly used tools in courses and research were Google Scholar (88%/93%), SciFinder (88%/91%), PubMed (85%/86%), Web of Science (57%/61%), PubChem (55%/61%), and US Patents Online (40%/56%). Patent searching was seen as far less critical than all other types of searching addressed in the survey (structure, keyword, citation, property).

Fifty-eight percent of the respondents reported that they explicitly train students in the use of these resources in a stand-alone course or as a significant portion of a designated course. In the majority of these institutions (83%), this course is taught by faculty members, and at most (85%), all chemistry majors are required to take this course. There is, however, a good deal of variation in the moment in their undergraduate years that students receive this training.

Forty-one percent of the institutions do not offer explicit training in the use of chemical information resources. Of these, 71% report that such training is distributed throughout the curriculum and that most students do receive some kind of training. They report a much greater variation in when students are exposed

to this information, as well as the quality and thoroughness of the training, with the focus being more driven by research-related interests than classroom needs.

Future Thoughts

It is clear that the means of accessing and searching through existing literature and data is changing rapidly. In the coming years new chemists will need to be thoroughly trained in the use of tools needed to search the literature, but also in tools that will allow them to manage, store, and record information responsibly and ethically (including bibliographic tools, electronic record keeping, institutional archives, among others). With these likely developments on the horizon, the Committee was pleasantly surprised to learn many departments already apparently train students explicitly in the use of at least some of the varied information resource tools (databases, search tools and engines focused on scientific literature and data).

Indeed, continuing in the direction first highlighted in the 2008 ACS Guidelines, the new guidelines will continue to emphasize the development of student skills in undergraduate training. ■