ACS National Meeting

Program for the Division of Chemical Education: Chicago, March 25–29, 2007

by Catherine H. Middlecamp, George M. Bodner, Wayne E. Jones, Jr.

All CHED technical sessions including the High School Program will be held in the McCormick Place Convention Complex North, 2301 South Lake Shore Drive. Exceptions are the Undergraduate Program (in the Westin Hotel Michigan Avenue), the Undergraduate Research Poster Sessions (in the Sheraton Chicago Hotel), and any evening programs. Unless otherwise noted, morning sessions begin at 8:30 a.m., afternoon sessions at 1:30 p.m.

Saturday, March 24

Evening, 6 p.m.

Division Social Hour and Dinner

The CHED social hour and dinner will be held at Harry Caray's Restaurant, 33 West Kinzie Street; Kinzie is a block north of the Chicago River and Wacker Drive; the restaurant is between State and Dearborn. Harry Caray's is an Italian steakhouse named for the Hall of Fame baseball announcer. The social hour will begin at 6 p.m., followed by dinner at 7 p.m. Tickets to the dinner (from ACS, $50) must be purchased in advance through ACS when registering for the meeting; they may not be purchased on site.

Sunday, March 25

Morning

A. Research in Chemical Education, Part I—Conceptions Research

William J. F. Hunter, *Organizer*
Douglas Mulford, *Organizer, Presiding*

This symposium, sponsored by the CHED Committee on Chemical Education Research, is a forum for research conducted on the teaching and learning of chemistry at any level. Presentations will address: the motivation for the research and the theoretical bases in which it is grounded; methods used to gather and interpret data; and the findings and their significance interpreted in light of theory and method.

B. Community College-Led Advances in Undergraduate Education

Thomas Higgins, *Organizer, Presiding*

Cosponsored with CMA, WCC, YCC, and CWD. This session will highlight some of the contributions community college faculty are making to undergraduate research and the scholarship of teaching and learning, followed by a discussion of how the presenters have successfully found support for their ideas both inside and outside their institutions. The role and strength of inter-institutional partnerships between community college and baccalaureate-granting institutions will also be addressed, as well as the factors that promote successful student matriculation from the community college.

C. Using Social Networking Tools to Teach Chemistry, Part I

Harry Pence, *Organizer*
Andrea Gay, *Organizer, Presiding*

Cosponsored with CINF. During the past few years there has been a surge of interest in Internet programs that fall under the general category of social networking. The most obvious are those used by our students, such as FaceBook. Other examples would be blogs, plogs (project logs), vlogs (video logs), wikis, and podcasts. Our goal is to explore the

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Chicago Meeting Information

Meeting Program: All ACS Divisions

- **Program, Registration, Housing Information,** including forms for registration, hotel reservations, and ordering tickets to social events (luncheons, dinners, etc.): use the ACS Web site, *http://www.chemistry.org/*. Early registration ends March 2, 2007.

Program and Activities: CHED

- **CHED technical sessions** (except the Undergraduate Program, see above and page 402, and evening programs) will be in the McCormick Place Convention Complex North, 2301 South Lake Shore Drive; morning sessions begin at 8:30 a.m. and afternoon sessions at 1:30 p.m. unless otherwise noted here or in the final program.
- **Tickets** to the CHED dinner (Saturday evening, March 24; SE-01, $50) and the High School/College Interface Luncheon (Sunday, March 25; SE-02, $28) are available only through ACS.
- **Booth at Exposition** will be 434–436 in McCormick Place, representing CHED in general, *JCE and JCE Software*, the Exams Institute, Outreach Activities, and more. Hours: Monday and Tuesday 9–5; Wednesday 9–1.
- **Abstracts** of CHED sessions are available to CHED Members through the ACS Web site (*www.chemistry.org*); they are expected to be available at the Division's Web site, *http://www.DivCHED.org*, to all Division Members and Affiliates. Information about accessing these abstracts will be announced through the *CHED Newsletter*.
- **General information** about Chicago (such as museums, parks, and historical attractions) appears on p 406. Information is also available in the *CHED Newsletter* and in issues of *Chemical & Engineering News*.

affordances and constraints of these approaches as they specifically apply to chemistry instruction.

D. Sustainability and Chemical Education: Industry's Perspective
Martin A. Abraham, *Organizer*
Matthew A. Fisher, *Organizer, Presiding*

Cosponsored with IEC, CEI, and SUST. Sustainability in the practice of chemistry is increasingly a priority for many areas, including industry. This symposium will focus on the needs of the chemical industry in understanding the challenge of sustainability, how it is affecting chemical industry, and the aspects that are important for undergraduate and graduate students seeking careers in chemical industry.

E. Educating the Public About the Challenges for Improving the Quality of Drinking Water
Cang Li, *Organizer, Presiding*

Water, a natural resource, is limited and poorly distributed. Pollution and the lack of water are among the biggest public health problems in 21st century. Worldwide, more than 10 million people, half of them children, die annually from diseases related to unsafe drinking water. This symposium will provide insight for teachers, students, and the educated public into the nature of water pollution, regulations, water treatment technologies, and public health and safety.

F. Process-Oriented Guided Inquiry Learning (POGIL), Part I
Richard S. Moog, *Organizer*
Alexsa Silva, *Organizer, Presiding*

POGIL is a student-centered instructional approach that combines group learning and guided inquiry, with an emphasis on the development of important process skills. This symposium includes presentations from all aspects of this pedagogic approach, across a range of courses and institutional types, including lessons learned from classroom experience, assessment of student learning outcomes, and development of new materials and their use.

G. High School Teachers Program: Inquiring Minds Want to Know, Part I
Ami LeFevre, *Organizer*
Lee R. Marek, *Organizer, Presiding*

Cosponsored with WCC. This program begins with the James Bryant Conant Award in High School Chemistry Teaching, in Honor of Eleanor W. Siegrist and also includes a variety of presentations and activities—from high-school teachers, chemical professionals, and university-level chemical educators—designed to provide high school chemistry teachers with information and tools which they can use in their classrooms and laboratories.

Landmark Chemistry Books of the Twentieth Century III: Authors from the University of Illinois

Sponsored by HIST, Cosponsored with Bolton Society, CHED, and CINF. This symposium features classic chemistry books that were written by faculty and staff at the University of Illinois at Urbana-Champaign (UIUC) (R. C. Fuson, T. Moeller, J. C. Bailar, Jr., Marion Sparks, A. J. Bard and L. R. Faulkner, W. H. Flygare, R. S. Drago, H. Malmstadt, and C. Enke), series that started at UIUC (Organic Syntheses, Organic Reactions, and Inorganic Syntheses), or those that evolved at UIUC (Chemical Abstracts).

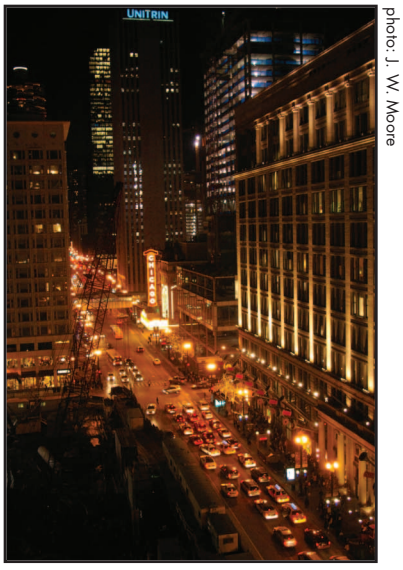

photo: J. W. Moore

Looking north on State Street at night reveals Chicago architecture: old, new, and under construction.

Noon

High School–College Interface Luncheon

The luncheon will be held in McCormick Place, room S100A. Purchase luncheon tickets (SE-02, $28) in advance through ACS. (See also p 396.)

Afternoon

A. Research in Chemical Education, Part II—Programmatic and Curricular Research
Douglas Mulford, *Organizer*
William J. F. Hunter, *Organizer, Presiding*

B. NSF-Catalyzed Innovations in the Undergraduate Curriculum
Susan H. Hixson, *Organizer*
Pratibha Varma-Nelson, *Presiding*

This symposium features speakers from projects funded by NSF that are developing educational materials or strategies aimed at improving the learning of chemistry by undergraduates with diverse backgrounds and career aspirations.

C. Using Social Networking Tools to Teach Chemistry, Part II
Andrea Gay and Harry Pence, *Organizers*
Michael Holman, *Presiding*

D. George C. Pimentel Award in Chemical Education: Symposium in Honor of A. Truman Schwartz. Science Literacy and the Liberal Art of Chemistry
Conrad L. Stanitski, *Presiding*
Wayne C. Wolsey, *Organizer, Presiding*

This symposium investigates and celebrates the place of chemistry within the corpus of human knowledge, in particular, the liberal arts. It is based on the contention that some understanding of chemical phenomena, concepts, and methodology should be part of the intellectual store of every educated man and woman.

E. Nanotechnology in Undergraduate Education. Incorporating Nanoscale Science into Undergraduate Courses
Kimberly A. O. Pacheco, *Organizer, Presiding*

Incorporating nanotechnology early into the undergraduate curriculum enables students to begin thinking and visu-

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photo: J. W. Moore

Millennium Park, Chicago's newest, is in the heart of the city.

alizing at the molecular and atomic levels in their first and second years. NSF-sponsored programs have successfully highlighted nanotechnology as an ongoing area of interest that undergraduates can readily grasp and incorporate into their general understanding of the sciences. Hands-on laboratory experiences enhance and promote retention of these concepts.

F. Process-Oriented Guided Inquiry Learning (POGIL), Part II—Implementing POGIL in the Classroom
Richard S. Moog and Alexsa Silva, *Organizers*
Frank J. Creegan, *Presiding*

G. High School Teachers Program: Inquiring Minds Want to Know, Part II
Ami LeFevre, *Organizer*
Lee R. Marek, *Organizer, Presiding*

Landmark Chemistry Books of the Twentieth Century III: Authors from the University of Illinois
Sponsored by HIST, Cosponsored with Bolton Society, CHED, and CINF

Starting a Successful Research Program at a Predominantly Undergraduate Institution
Sponsored by YCC, Cosponsored with Council on Undergraduate Research, and CHED

Evening, 7:30–9:30

A. General Posters, Hyatt Regency Hotel, Riverside Center
Richard W. Schwenz, *Organizer, Presiding*

High School Teachers Program: Inquiring Minds Want to Know

Where and When: N228 McCormick Place

All portions of the High School Program will take place Sunday, March 25; the program is in N228 McCormick Place Convention Complex North, 2301 South Lake Shore Drive.

Registration

All attendees must register for the meeting to participate in the technical sessions and programs. Registration provides full access to the special High School Chemistry Day program on Sunday, the entire ACS meeting (Sunday–Thursday), and the Exposition (Monday–Wednesday). Cost for registration for precollege teachers is $78 and includes the luncheon. Early registration is between January 8 and March 5. On-site registration is possible but not encouraged.

Morning Program

8:30 Introductory Remarks

8:35 Keynote address by Eleanor Siegrist, recipient of the James Bryant Conant Award in High School Chemistry Teaching: "Thirty-Nine Years of Motivating and Enjoying Students".

9:30 John Fortman will present his highly entertaining session, "Demonstrating Carbonate Chemistry from the Pyramids to Soda Pop".

9:50 Jim Spencer and Patrick Daubenmire review an innovative approach to teaching, "Process-Oriented Guided Inquiry Learning (POGIL)".

11:00 Bill Deese presents a program that blends the history of science, chemical demonstrations and the art of juggling: "Demos of the Dead Chemists Society".

Luncheon: noon–1:30 p.m., S100A McCormick Place

ACS members should obtain luncheon tickets from ACS (SE-02, $28). A feature of each national meeting, the High School/College Interface Luncheon brings together educators from different levels with the goal of facilitating an exchange of ideas. There will also be a drawing for door prizes.

Ken Spengler, former department head of Palatine High School, is featured: "A Skeptical Look at Administration in High School".

Afternoon Program

1:30 The afternoon begins with George Bodner who will present "Eternal Verities: How to Make your Students Hate You Less if Not Necessarily Love You More".

2:20 Mary Harris and Linda Fanis will provide ideas for Earth Day 2007 in "Celebrate Earth Day: Resources from the *Journal of Chemical Education*".

3:00 Jim Spencer will return with a session on "Redesign of Advanced Placement Chemistry".

3:25 Finally, Lynn Hogue and Mickey Sarquis from Miami University will present the workshop, "Lowering Students' Activation Energy for Learning Chemistry".

Continuing Education

Attendees can track professional development for attending sessions; Illinois teachers can earn 8 CPDUs for attendance.

Organizers

Ami LeFevre and Lee Marek are the local organizers.

Monday, March 26

Morning

A. Research in Chemical Education, Part III–Cognition and Prediction Research
William J. F. Hunter, *Organizer*
Douglas Mulford, *Organizer, Presiding*

B. ACS Award for Achievement in Research for the Teaching and Learning of Chemistry: Symposium in Honor of J. Dudley Herron
Charles R. Ward, *Organizer*
James H. Reeves, *Presiding*

This symposium honors J. Dudley Herron, the first recipient of the ACS Award for Achievement in Research for the Teaching and Learning of Chemistry, in recognition of his contributions to the development of the field of research in chemical education.

C. Impending Issues in Chemistry Teacher Education
William J. F. Hunter, *Organizer, Presiding*

This symposium will highlight strategies used by teacher education institutions to deal with important issues they face in science and chemistry teacher education: teaching teachers to meet standards, accreditation, build comprehensive programs, promote cognitive change in students, and state testing to meet science requirements of NCLB.

D. Broadening Participation in Undergraduate Research, Part I
Mary K. Boyd, *Organizer, Presiding*

Cosponsored with CMA, WCC, YCC, SOCED, COMP, and CWD. The benefits of undergraduate research have a very strong impact on students from groups underrepresented in the sciences. The symposium will include presentations on the importance of undergraduate research for underrepresented students as well as successful approaches to recruit underrepresented students, including program revision, partnerships, and funding opportunities.

E. Nanotechnology in Undergraduate Education: Nanotechnology in the Undergraduate Laboratory
Kimberly A. O. Pacheco, *Organizer, Presiding*

F. Process-Oriented Guided Inquiry Learning (POGIL), Part III—Assessing POGIL Implementations
Alexsa Silva, *Organizer*
Richard S. Moog, *Organizer, Presiding*

Undergraduate Research Poster Session, 11 a.m.–1 p.m., Sheraton Chicago Hotel, River Exhibit Hall
Andrea T. Bennett, *Organizer*
Jodi L. Wesemann, *Organizer, Presiding*

G. Analytical
Posters 263–385

H. Chemical Education
Posters 386–447

I. Nanotechnology
Posters 448–498

J. Organic Chemistry
Posters 499–783

K. Polymer Chemistry
Posters 784–833

L. High School Chemistry Research Poster Session, 11 a.m.–noon
Terri Taylor, *Organizer, Presiding*
Cosponsored with SOCED

This One is Just Right! Information Resources for Small Colleges. Part I
Sponsored by CINF, Cosponsored with CHED

Afternoon

A. Research in Chemical Education, Part IV—Research on Guided Inquiry and Miscellaneous
Douglas Mulford, *Organizer*
William J. F. Hunter, *Organizer, Presiding*

B. Exploring and Exploiting Nature with Biomimetics: Biomolecular Self-assembly and Biocatalysis
Soumya Mitra, *Organizer*
Nicole Dickson, *Presiding*

Cosponsored with WCC, BIOL, and INOR. This symposium takes a multidisciplinary approach to the utilization of nature as a platform for technological advancement in the field of biomimetics. It will feature talks from a number of disciplines including organic, bioinorganic, biochemistry, computational chemistry, chemical biology, and biophysics. The knowledge gained would not only be applied toward our overall understanding of chemical sciences, but also correlate and appreciate the connection between chemistry, biomimetic strategies, and medical sciences.

C. Center for Workshops in the Chemical Sciences (CWCS), Part I—General Topics
Lawrence J. Kaplan, and Jerry C. Smith, *Organizers*
David M. Collard, *Organizer, Presiding*

CWCS has been supported by NSF for six years. With a new grant, we will continue conducting workshops and evaluating the impact of the program while developing a Community of Scholars in several topical areas derived from workshop activities. Directors of the CWCS will present an overview of the workshop program while instructors will discuss the content and scope of their individual workshops.

D. Broadening Participation in Undergraduate Research, Part II
Mary K. Boyd, *Organizer, Presiding*

E. Nanotechnology in Undergraduate Education: Nanotechnology across the Curriculum
Kimberly A. O. Pacheco, *Organizer*
Richard W. Schwenz, *Presiding*

F. Process-Oriented Guided Inquiry Learning (POGIL), Part IV—POGIL throughout the Curriculum
Richard S. Moog, *Organizer*
Alexsa Silva, *Organizer, Presiding*

Undergraduate Research Poster Session, 2–4 p.m., Sheraton Chicago Hotel, River Exhibit Hall
Andrea T. Bennett and Jodi L. Wesemann, *Organizers*

G. Biochemistry
Posters 880–1088

H. Environmental Chemistry
Posters 1089–1163

I. Inorganic Chemistry
Posters 1164–1299

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J. Medicinal
Posters 1300–1355

K. Physical Chemistry
Posters 1356–1476

Beyond the Bench: Non-Traditional Careers in Chemistry
Sponsored by CHAL, Cosponsored with CHED, CINF, SCHB, WCC, and YCC.

Chemistry Pedagogy 101
Sponsored by YCC, Cosponsored with CHED.

This One is Just Right! Information Resources for Small Colleges, Part II
Sponsored by CINF, Cosponsored with CHED.

Evening

A. Sci-Mix, Hyatt Regency Chicago, Riverside Center, 8–10 p.m.
Cathy Middlecamp, *Organizer, Presiding*
Papers 106–113, 120, 124, 126, 129–130, 132, 134–135, 137, 143–144, 146–147, 152, 154, 161, 164, 173, 175, 183. See final program for descriptions.

B. Successful Student Affiliates Chapter Poster Session, Hyatt Regency Chicago, Riverside Center, 7:30–9:30 p.m.
Andrea T. Bennett and Jodi L. Wesemann, *Organizers*
Cosponsored with SOCED. Papers 1477–1573.

Tuesday, March 27

Morning

A. Teaching Chemistry to the Visually Impaired
David Wohlers, *Organizer, Presiding*
Data acquisition software and probes can now be accessed by speech software, enabling visually impaired students more hands-on involvement in the chemistry laboratory. Recent funding by NSF's Research in Disabilities Education program has supported the development of low-cost laboratory sensors to convert visual observations of a chemical reaction into sound. Research that details the cognitive development affected by hands-on experience continues to unfold. This symposium will explore recent advances in this important area.

B. Exploring and Exploiting Nature with Biomimetics: Rational Manipulation of Biomolecular Architecture
Soumya Mitra, *Organizer*
Michelle Roettger, *Organizer, Presiding*

C. Center for Workshops in the Chemical Sciences (CWCS), Part II—Forensic Science
David M. Collard and Jerry C. Smith, *Organizers*
Lawrence J. Kaplan, *Organizer, Presiding*

D. Developing A Safety Plan for Teaching Chemistry in the Home School Situation
Frankie K. Wood-Black, *Organizer, Presiding*
Cosponsored with CHAS. Learning is a constant task with repetition being one of the tools that re-enforces the activity and knowledge. People tend to get complacent about a number of topics and the safe handling of materials is one that we as educators cannot allow to happen. This symposium will focus on ways of including chemical health and safety and good laboratory practice into all aspects of the curriculum.

E. Communicating Chemistry, Part I
Len Fine, *Organizer*
John C. Kotz, *Organizer, Presiding*
Cosponsored with CINF. Chemistry has changed in the last several decades, so the symposium will center on the skills and resources students can use in 21st century chemistry, including the use of books, magazines, and newspapers, as well as wikis; blogs; audio and video podcasts; educational games; online databases (such as Chemical Abstracts and Google Scholar); and the organization and presentation of quantitative and qualitative information (with, for example, molecular modeling tools, spreadsheets, and presentation tools).

F. Advances in Teaching Chemistry at the Nanoscale at the K–12 Level, Part I
George M. Bodner, *Organizer*
Kelly M. Hutchinson, *Presiding*
The NSF-sponsored National Center for Teaching and Learning in Nanoscale Science and Engineering is involved in many aspects of bringing advances in teaching chemistry at the nanoscale into reality. This symposium will focus on: (1) professional development for K–12 teachers; (2) instructional materials being developed for introducing middle-school and high-school students to chemistry at the nanoscale; and (3) research on the teaching and learning of chemistry at the nanoscale in middle-school and high-school classrooms.

Afternoon

A. Chemical Evolution, Chemical Change Across Space and Time, Part I—Chemical Evolution in Astrophysics
Lori Zaikowski and Jon M. Friedrich, *Organizers, Presiding*
Cosponsored with GEOC, and NUCL. This symposium follows chemical evolution from the big bang to the origins of life on Earth. Multidisciplinary use of chemical principles and techniques is central to understanding the evolution of the universe. Presentations by leaders in their fields will provide a framework for a session on teaching the evolutionary nature of chemistry. The Teaching Evolutionary Chemistry session will focus on the implementation of symposium themes in classrooms and labs.

B. Exploring and Exploiting Nature with Biomimetics: Molecular Recognition and Drug Delivery
Soumya Mitra, *Organizer, Presiding*

C. Center for Workshops in the Chemical Sciences (CWCS), Part III—General Topics
Lawrence J. Kaplan, and Jerry C. Smith, *Organizers*
David M. Collard, *Organizer, Presiding*

D. Bridging Research and Service: The Discovery Corps Experience, Part I—Post Doctoral Fellows
Rachel Theall, *Organizer*
Geoffrey D. Bothun and Anne K. Bentley, *Presiding*
In 2004 the NSF Division of Chemistry initiated the Discovery Corps Fellowship (DCF) program to support projects that combine research and service in areas of national priority. Through DCF, postdoctoral and senior (mid-career) fellows are provided unique, and conceivably "non-traditional," professional development and training opportunities. This symposium will highlight many of the innovative projects, past and current.

British artist Anish Kapoor's 110-ton Cloud Gate sculpture, inspired by Hg(l), reflects the Michigan Avenue skyline.

Prairie flowers in Lurie Garden grace Millennium Park, with the Frank Gehry-designed Jay Pritzker Pavillion in the background.

photos: J. W. Moore

E. Communicating Chemistry, Part II
John C. Kotz, *Organizer*
Len Fine, *Organizer, Presiding*

F. Advances in Teaching Chemistry at the Nanoscale at the K–12 Level, Part II
George M. Bodner, *Organizer*
Shanna Daly, *Presiding*

Benchmarking the Research Competitiveness of U.S. Chemistry and Chemical Engineering.
Sponsored by PRES; cosponsored with International Activities Committee, CHED, CEPA, COMSCI, and CPT.

Wednesday, March 28

Morning

A. Chemical Evolution, Chemical Change Across Space and Time, Part II—Geochemical Evolution of the Solar System and Earth, 9 a.m.
Lori Zaikowski and Jon M. Friedrich, *Organizers, Presiding*

B. Building Connections to Non-Major's Chemistry, Part I
Karen Anderson, *Organizer, Presiding*

Exploring affective issues and providing a contextual framework for essential chemistry concepts go a long way toward facilitating student learning of topics in general, organic, and biological (GOB), liberal arts, and other non-major chemistry courses. This symposium offers novel approaches, techniques, and processes to improve student motivation, confidence, and ultimately learning linked to fundamental chemistry content applied to a student's desired area of study.

C. Center for Workshops in the Chemical Sciences (CWCS), Part IV—Forensic Science
David M. Collard and Jerry C. Smith, *Organizers*
Lawrence J. Kaplan, *Organizer, Presiding*

D. Bridging Research and Service: The Discovery Corps Experience, Part II—Senior Fellows
Rachel Theall, *Organizer*
Stephanie L. Gould, *Presiding*

E. Communicating Chemistry, Part III
Len Fine, *Organizer*
John C. Kotz, *Organizer, Presiding*

F. Bringing Authentic Research into the Undergraduate Laboratory, Part I
Donald J. Wink, *Organizer*
Gabriela C. Weaver, *Organizer, Presiding*

Students often cannot participate in undergraduate science and mathematics research programs until they are well advanced in their undergraduate education. NSF, through its Undergraduate Research Centers program, now supports studies of methods to provide students with authentic research experiences early in their college work. Papers in this symposium will cover the different aspects of one of these URC's, the Center for Authentic Science Practice in Education.

ACS Award for Encouraging Women into Careers in the Chemical Sciences: Symposium in Honor of Bojan H. Jennings
Sponsored by WCC, Cosponsored with CHED

On Beyond Keyword Searching: Advanced Instruction in Chemical Information
Sponsored by CINF, Cosponsored with CHED

Afternoon

A. Chemical Evolution, Chemical Change Across Space and Time, Part III—Prebiotic Chemistry
Lori Zaikowski and Jon M. Friedrich, *Organizers, Presiding*

B. Building Connections to Non-Major's Chemistry, Part II
Karen Anderson, *Organizer, Presiding*

C. Center for Workshops in the Chemical Sciences (CWCS), Part V—General Topics
Larry J. Kaplan, and Jerry C. Smith, *Organizers*
David M. Collard, *Organizer, Presiding*

D. Applications of Electronic Homework Systems, Part I
Sally S. Hunnicutt, *Organizer*
Suzanne M. Ruder, *Presiding*

We will examine the ways in which electronic homework systems such as WebAssign, LON-CAPA, or OWL are used in chemistry courses across the curriculum. Presenters may discuss the advantages of different systems, the types of problems assigned, how electronic homework supplements classroom activities, training, and how electronic homework systems affect student learning.

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E. Broadening Participation in Undergraduate Research, Part III
Mary K. Boyd, *Organizer*
Bridget L. Gourley, *Presiding*

F. Bringing Authentic Research into the Undergraduate Laboratory, Part II
Gabriela C. Weaver, *Organizer*
Donald Wink, *Organizer, Presiding*

Educating the Laughing, Stormy, Husky Youth of the Midwest: Chicago-Area Colleges and Universities

Sponsored by HIST, Cosponsored with ACS Chicago Section, PROF, and CHED. This symposium explores how the teaching of chemistry is central to the educational mission of many schools. Two urban research universities present their colorful histories and impact on Chicago. A college specializing in the arts, media, and communications incorporates chemistry into its curriculum. Chemistry is a major discipline at a premier community college that is larger than many universities. Learning and lecturing preferences of an incoming class of pharmacy students is the topic of another presentation. A state-supported math and science academy prepares talented students to assume leadership roles in future developments of science and technology.

Thursday, March 29

Morning

A. Chemical Evolution, Chemical Change Across Space and Time, Part IV—Teaching Chemical Evolution, 9 a.m.
Lori Zaikowski and Jon M. Friedrich, *Organizers, Presiding*

B. General Papers, Part I, 8 a.m.
Tyson A. Miller, *Organizer, Presiding*

C. Development and Implementation of Learning Objectives in Chemistry Departments: A View of Progress at a Myriad of Institutions, 8 a.m.
Marcy Towns, *Organizer, Presiding*

Cosponsored with CPT. Many chemistry departments are in the process of crafting goals and learning outcomes for their programs. Faculty must clarify expectations for student learning and consider how the curriculum and the pedagogy match their expectations for student learning. There is a need to communicate nationally about these efforts and share models. Our goal is to highlight the development and implementation of programmatic assessment at a range of institutions.

D. Applications of Electronic Homework Systems, Part II, 8 a.m.
Sally S. Hunnicutt, *Organizer, Presiding*

E. Bringing Research to the Undergraduate Course Curriculum, Part I, 8 a.m.
Nitya Jacob, *Organizer*
Stefan Lutz, *Organizer, Presiding*

Research-based laboratory courses offer new opportunities but also present new challenges to engage and prepare undergraduates for a career in the chemical sciences. The symposium will focus on the pedagogical and logistical aspects of developing and teaching such courses, providing a platform to present and discuss current and future course ideas.

Afternoon

A. Modernizing the Undergraduate Laboratory with Research and Instrumentation, 1 p.m.
Alexander Grushow, *Organizer, Presiding*

Talks will discuss methods used to modernize undergraduate laboratory instruction with particular focus on the adaptation of research projects for instructional means and the use of modern state-of-research-practice instrumentation. Speakers will describe their laboratory experiments, discuss barriers to implementation of their method, and provide data to indicate the measures of a successful implementation.

B. General Papers, Part II, 1 p.m.
Tyson A. Miller, *Organizer, Presiding*

C. Chemical Sensors in Undergraduate and Graduate Education, 1 p.m.
Nina J. Ronkainen-Matsuno, *Organizer, Presiding*

Chemical and biological sensors are employed in a variety of disciplines, ranging from electrochemical analysis, biomedicine, and aeronautics, to industrial process control and environmental monitoring. The popularity and widespread use of chemical sensors in modern society has created a need to incorporate this technology into the teaching curriculum as laboratory experiments, research projects, seminars, and lectures. We explore ways to introduce students to sensors.

D. Synthesizing New Chemists: A Discussion in Practitioner Development, 1 p.m.
Gautam Bhattacharyya, *Organizer, Presiding*

The emerging discourse in the chemistry community regarding the training of future practicing chemists has raised some concerns about adequately preparing future professional chemists capable of tackling the challenges of the 21st century. Establishing an epistemology of professional practice for chemists should be an integral part of this discussion. Doing so will help students develop in the classroom and the laboratory. This symposium will explore recent research in practitioner development in chemistry.

E. Bringing Research to the Undergraduate Course Curriculum, Part II, 1 p.m.
Stefan Lutz, *Organizer*
Nitya Jacob, *Organizer, Presiding*