21st Biennial Conference on Chemical Education

Denton, Texas
August 1-5, 2010

Workshop Topics and Leaders

A Complete Year of Virtual Lab Experiments for General Chemistry
C S Frost

Virtual labs are now used by thousands of students at numerous institutions, chem departments, and programs every semester. Results have been analyzed and shown to contribute greatly to education and love of chemistry. This workshop will demonstrate easy selection and adoption of virtual chem labs from a complete lab library for traditional and online courses. The workshop will include demonstrations of the lab experiments themselves as well as a complete environment for student completion of assignments along with their virtual lab-work, automatic submission to instructors, and instructor feedback and grading. Workshop participants will also see how they can easily customize the labs and their associated assignments to perfectly fit any general chemistry course.

Advanced Jmol Techniques
Robert Hanson

This workshop is intended for experienced Jmol web site developers and will be a chance to exchange ideas with each other and the facilitators from the Jmol development team. Participants should bring a project they are planning or already working on to discuss. Participants are _strongly_ encouraged to bring their own laptops. The $15 fee includes a CD with numerous example pages and scripts written by Bob Hanson.

Advanced Nuclear Science for Chemists
George Miller

Nuclear Science has many facets of importance to applications in modern chemistry. We'll get into intimate details of nuclear power, nuclear waste processing, nuclear medicine, provenance in art and archeology, etc., with demos and practicals.

An introduction to Jmol
Jonathan Gutow

This workshop is intended for people who are unfamiliar with or relatively new to using Jmol for molecular visualization. Participants will be introduced to the capabilities of Jmol and some of the ways Jmol is being used. Participants will then use Jmol to build one or more web pages with live 3-D molecules. Depending upon interest, these pages could involve any level of chemistry from high school through college and any area. No web page design or programming experience necessary. Participants are encouraged to bring their own laptop. The $30 fee includes the book, "How to use Jmol to study and present molecular structures (Vol. 1)" by Angel Herráez.

AP Chemistry: An Inquiry and Forensic Approach towards

Chemical Experimentation
Jesse Bernstein

Have you found a single lab manual that truly works for your AP Chemistry course? Do you find that you still have to search thru many lab manuals to find adequate AP labs? Well, look no more! We have developed an AP Chemistry Experimental Manual that incorporates Inquiry Based and Forensic Activities along with some of our favorite AP experiments developed or modified over the many years we have taught. These experiments have been designed to challenge your AP students and get them to think! Most Chemistry courses include laboratory experiments that give explicit instructions that are designed for students to follow; to get the 'right answer'. Students give little thought as to the experimental process. This workshop is designed to help to get the AP student to think about and plan for the experiment before they arrive in the laboratory. Some of the experiments will be performed during the workshop. Each participant will receive a CD containing the lab manual that includes detailed teacher notes for each lab that allows for modification of each experiment; a picture of virtually all setups is included on the CD. This workshop was first offered at ChemEd 2009 to a full house. We suggest bringing goggles and a lab apron for this workshop.

Applications of the Cambridge Structural Database in Undergraduate Education and Research
Gary Battle

The Cambridge Structural Database (CSD) serves as the worldwide repository of small-molecule crystal structure data. As such, this unique database of over half a million molecules is a crucially important resource for undergraduate education and research. An on-line database, the CSD enables students to visualize and manipulate molecules in 3D, and provides the opportunity to work with real measured data. Attend this hands-on workshop and learn how chemical knowledge extracted from the CSD is currently being used to enhance learning throughout the chemistry curriculum. A range of student assignments and class activities that utilise this major scientific resource will also be demonstrated.

Assessing Student Learning in the Instructional Science Laboratory
Gautam Bhattacharyya

This workshop is designed to help chemistry educators develop a philosophy of educative assessment with respect to student learning in the laboratory. In an educative assessment environment, the emphasis is on helping students learn better. An important component is collecting information to assess the degree to which students are achieving specific learning outcomes. However, it does not stop there. In addition to collecting evidence of student learning, educative assessment also focuses on instructors providing feedback and giving the learners opportunities for self-assessment. The workshop facilitators

will work with the participants to develop the concept of educative assessment and will present on the following topics: formative vs. summative assessment, auditive vs. educative assessment, learning goals vs. outcomes, and different ways of assessing student performance in the laboratory. This is a hands-on/minds-on workshop where each participant will leave with a set of assessment procedures useful for addressing specific student learning outcomes, providing useful feedback, or allowing the students to perform self-assessments of their conditions. Each participant will receive the book Assessing Student Learning.

Before, During and After Class Learning Cycle Activities
John Gelder

Examples of instructional materials for "before", "during", and "after" class meetings using an inquiry oriented instructional strategy (the Learning Cycle Approach) will be presented during this workshop. The activities for before, during, and after a particular class meeting are linked together and address specific learning objectives for the course. The Before Class Exploration (BCE) is a web-based exercise that students do before they attend a lecture. It will usually consist of a data collection activity using a simulation program along with a few questions about the data. The activity will run through a web browser and should require only 10 to 15 minutes of a student's time to complete. Upon submission of the BCE, students receive a copy of their responses and, when appropriate, an expert's response to the same questions for comparison. The instructor can access all student responses to the BCE prior to lecture to gain a better picture of the student's pre-existing knowledge. The During Class Invention (DCI) will use data generated in the BCE and along with questions/problems develop a concept that focuses on a course learning objective. The DCI is designed to be completed by small cooperative groups to allow for some self-instruction. Students can report their consensus response for the instructor's consideration using a student response system and/or by turning in a written response. The After Class Application (ACA) is a web-based set of questions that will allow students to apply their knowledge of the concept introduced by the BCE and 'invented' by the DCI. The questions on the ACA will be both conceptual and algorithmic.

Burners Flames and Candles
Mordechai Livneh

This workshop offers a thorough insight into one of the basic phenomena in science and in life in general – Combustion. Each year during Hanukah (The Jewish Festival of Light), we conduct similar workshops in the undergraduate students' labs. We also present demo lectures to younger students of various ages and sometimes also to their parents. Over the years we had discovered that the public in general, including science teachers, sometimes lack basic ideas on this "hot" topic. In our workshop we offer 20-30 experiments that mostly deal with portable propane burners and candles. Most of the experiments will

be done by the participants and some will be demonstrated by us. To mention some; The Dancing Flame, The Candle See-Saw, Fire Without Matches, Properties of Propane Gas, Flame Under Water, The Effect of Oxygen, and many more. The experiments will be introduced in a didactic way that can be modified to all ages. In his book "The history of a candle", Michael Faraday told his young audiences that "There is no better gate to science than the observation and investigation of the physical phenomenon of the candle". This workshop will follow that phrase, adding to it modern aspects of burners.

Calibrated Peer Review™ Version 4 (CPR4)– Supporting the Scholarship of Teaching
Arlene Russell

Calibrated Peer Review™, a widely adopted instructional management tool, enables student writing that probes understanding of concepts without increasing grading resources. CPR4 now provides assignment authors with a citation record, which documents the use and adaptation of their creative work. Instructors can create new materials or choose to adapt from the new indexed library of assignments. In a CPR4 assignment, students write short essays on a specific topic following directions that encourage critical thinking. After electronic text submission, students review prewritten and scored "calibration" essays, which train them as reviewers. They then anonymously review peer work and receive feedback on their performance. Research shows that CPR use can improve student concept understanding, writing skills, and evaluation skills. The workshop will focus on issues in authoring and publishing effective assignments that can be easily used or adapted by others. Experienced CPR users are invited to publish their existing assignments in the new central library; new users are encouraged to explore and create materials for their own courses. An exam question or a homework assignment, which students have struggled with, provides an ideal topic for a CPR assignment. Participants should come with topics they want their students to understand deeply.

Caveman Chemistry: Hands-On Projects in Chemical Technology
Kevin Dunn

Non-science students often approach chemistry with reluctance and trepidation. This workshop will explore a strategy for engaging students through a series of 28 hands-on chemical projects. We begin in the Stone Age, making fire by friction, arrowheads, and honey wine. We make a ceramic crucible from clay, spin yarn from wool, and extract potash from wood ashes. We smelt bronze in our crucible and dye our yarn with indigo. In later projects we make paper from hay, soap from fat, mauve dye from aniline, and photographs from egg whites and salt. Along the way we learn a history of chemical technology from the Paleolithic campfire, to the crafts of antiquity, to the alchemy of the Middle Ages, to the chamber acid and soda factories of the Industrial Revolution, to the multi-national chemical giants

of the twentieth century. The registration fee includes the book, Caveman Chemistry. Website: www.cavemanchemistry.com.

Chemical Education Research: Statistics Workshop
Diane Bunce

It is recommended that participants take the morning workshop entitled: Chemical Education Research – Developing Researchable Questions and Corresponding Methodologies prior to attending this workshop. Participants are encouraged to bring research ideas with them to work through the design process. The purpose of this workshop is to provide tools for researchers to choose the appropriate statistical analyses for their research designs. The statistical analyses explored in this workshop will go beyond the t and F tests into more advanced statistics specifically ANOVA. The workshop will address the following: 1.) identifying variables and selecting appropriate research design; 2.) choosing the statistical analysis relevant to the research design along with consideration of the assumptions and restrictions within the analysis; 3.) running various analyses in SPSS; 4.) interpretation and conclusions of results from the analyses. The workshop will include three parts during which attendees will have the opportunity to discuss research design, input data into SPSS for analysis, and interpret SPSS outputs in order to make valid conclusions from the results.

Chemical Education Research—Developing Researchable Questions and Corresponding Methodologies
Diane Bunce

The purpose of this workshop is to introduce the participants to the process of developing ideas for Chemical Education Research projects into viable research questions that correspond to both the original idea and the data that can be collected to address the question. Participants are urged to bring research ideas with them. The format of the workshop will include working in small groups to help define and operationalize the research questions. Once the research questions have been discussed and revised, plans for conducting the studies will be constructed, discussed, critiqued and revised. Small group discussions will be used to help participants determine whether the data they are proposing to collect addresses the research question. Attention will also be paid to how the data should be analyzed.

Chemistry Experiments for Outreach to Elementary School Students
Dave Berry

This workshop will be a hands-on experience of three experiments that we use in our visits to elementary schools around the province of British Columbia. Each student that we meet does an experiment that is appropriate for their age group, typically Kindergarten - grade 2, grades 3-5, grade 6 and above. The experiments are (a) making slime (b) making an indicator and identifying an unknown kitchen powder and (c) analyzing the thiocyanate in saliva. We will describe the structure of the

program known as Scientists and Innovators in the Schools but the primary focus of this workshop is to let the participants see how it works in their own hands.

Chemistry Modeling using PhET Free Simulations
Patricia Loeblein

Do you want to help your students make sense of Chemistry? Interactive simulations can help students develop their ideas about chemistry through life-like investigations, visuals that includes molecular models, and inquiry based lessons. The PhET project provides a free website of simulations that are specifically designed to support student learning. A few of the chemistry simulations are: Salts and Solubility, Gas Properties, and Reactions and Rates. This workshop will help you design effective lessons and use lessons that other teachers have shared. In this workshop, you will learn about the research that helped establish the simulations and guidelines for inquiry-based activities. You will have time to explore the simulations, look at lessons available free on the web, and work on writing a lesson for your class. Check out the PhET website at http://phet.colorado.edu/web-pages Bring your laptop to optimize your experience.

Chemistry of Art in the Laboratory
Patricia Hill

This workshop will introduce college and university faculty to several lab activities relating chemistry and art. The workshop is modeled after a 5-day intensive workshop for college and university faculty (The Chemistry of Art) conducted under the auspices of The Center for Workshops in the Chemical Sciences (CWCS). The half-day workshop will consist of 4 or 5 lab activities facilitated by facilitators and alumni of the CWCS Chemistry of Art workshop. Activities will include: analysis of coins using a homebuilt paramagnetic apparatus; analysis of paints and pigments by reflectance spectroscopy; modifying the surface of metals; preparing and comparing cyanotypes and diazo blueprints. The activities are appropriate for use in general education lab science courses for non-science majors as well as in general, organic and analytical chemistry courses for science majors. The CWCS is supported by the NSF, DUE, CCLI Program (DUE-0618678).

Chemistry with Vernier
Jack Randall

This workshop offers hands-on experience collecting and analyzing chemistry data using Vernier data-collection solutions. Use our exciting new LabQuest Mini computer interface or our popular LabQuest as a stand-alone device with its vivid color screen. Conduct a selection of experiments from the 97 found in our three popular lab books, Chemistry with Vernier, Advanced Chemistry with Vernier, and Investigating Chemistry through Inquiry. Sensors such as the pH Sensor, Drop Counter, Temperature Probe, Gas Pressure Sensor, Conductivity Probe, and Colorimeters will be used. Try out our new SpectroVis Plus VIS-NIR array diode spectrophotometer, with its higher resolution, wider range, and fluorescence capabilities. Experiments will include visible absorbance

spectral analysis, Beer's law, kinetics, emissions, and fluorescence. You will also be able to try the new low-cost Vernier Mini GC. It has a very small footprint, and uses room air, requiring no compressed carrier gas. Peak analysis is easy using Logger Pro on the computer or LabQuest App on our handheld solution. Appropriate for college and high school chemistry.

Creating Significant Instructional Laboratory Experiences
Daniel Domin

This workshop is designed to help chemistry educators use contemporary instructional design principles to make undergraduate instructional laboratory experiences more meaningful and significant. The workshop facilitators will work with the participants to develop the concept of a significant learning experience and will deliver presentations on the following topics: the interactive nature of significant learning, six dimensions of significant learning goals, integrating learning goals with instructional activities and assessment, and applying backward design principles. This workshop is based on L. Dee Fink's book Creating Significant Learning Experiences which will be provided to each participant. This is a hands-on/minds-on workshop where it is expected that each participant will leave with a set of instructional laboratory learning goals and activities that are not only unique to his or her learning environment, but will also make the instructional laboratory experience more meaningful for both the instructors and students.

Designing and Implementing Safety Programs Embedded in the Curriculum
Dave Finster

The 2008 ACS CPT Guidelines for Bachelor's Degree Programs reaffirm that undergraduate chemistry programs must include safety education "as in integral part of the chemistry curriculum" and that "throughout their studies students must experience safety procedures and processes." Further, "because safety is an integral part of scientific education, questions related to safety should appear in examinations." Conversations with industrial chemists regularly reveal that graduates of undergraduate chemistry programs are woefully under-prepared with regard to safety. This workshop will explore the reasons for "inadequate preparation" with the intent of designing arguments and models for improved safety instruction. Participants with "good" safety programs are encouraged to share what they do. Participants with "improve-able" safety programs are welcome to share their challenges. The goal of the workshop will be to help everyone upgrade their safety programs. The motto of the workshop will be "Don't let perfect stand in the way of good."

Digital Resources from the ChemEd DL
Linda Fanis

Interested in using digital resources in your classroom? Explore the multitude of resources found at the Chemical Education Digital Library (ChemEd DL), a Pathway project of the

National Science Digital Library (NSDL). This hands-on guided-inquiry workshop will give you the opportunity to explore ChemEd DL's innovative collection of educational resources including Molecules 360, Chemistry Comes Alive! video, Moodle courses, the Periodic Table Live! and so much more. In one session you will find new resources and learn how to integrate it into your classroom curriculum. Ultimately, the ChemEd DL will be the place on the Web to find or share digital content for chemical sciences education. Learn about how you can use, contribute, share, and organize chemistry education materials through ChemEd DL.

Editing Wikipedia and the ChemPRIME General Chemistry Wiki
Ed Vitz

Collaborative workspaces like Wikipedia have a huge impact on the way we learn and work, so some experience with using them in educational settings may become an important professional skill.

Recognizing the power of wikis in education, we have developed the free ChemPRIME wiki General Chemistry text. ChemPRIME is transformative in the way it presents the subject in multidisciplinary Tracks, each presenting General Chemistry topics through "Exemplars" from disciplines including Food chemistry, Sports, Medicine, Biology, and Geology. A unique track, "CoreChem" is an evolving wiki version of the General Chemistry text Chemistry by Collins, Davies, and Moore, which establishes the traditional, progressive development of concepts for all Tracks. Users may add Exemplars specific to the various fields that inspire students to learn the chemistry.

This workshop will provide online practice with wiki editing in Wikipedia and ChemPRIME, which run on the same MediaWiki® "engine". We'll provide experience with the general architecture of wikis, basic wiki editing, uploading graphics and Jmol models, markup languages, licensing policies, and discuss the use of wikis in an educational setting.

Enabling 21st Century Chemistry Education
Gary Nicholson

Prepare your students for the future: 21st Century science education requires 21st Century science methods and tools. PASCO's Chemistry workshop is designed to empower teachers to deliver authentic 21st Century science experiences using standards-based content and innovative electronic measurement systems.

Energize your Chemistry Labs with Carolina's New Inquiries in Science™ Chemistry Series
Bruce Wilson

Learn how our new hands-on kit series improves student performance and makes teaching challenging topics effortless. Experience our five-step learning cycle and guided-inquiry approach as you perform activities from our "Exploring Voltaic and Electolytic Cells" kit. Free teacher materials and door prizes.

Engaging Students Through Biography: Producing Video Profiles of Chemists
Samantha Glazier

Participants will learn the technical and artistic techniques to produce a short video biography of a chemist, and how to incorporate the exercise into their own classes. The workshop will cover the technical aspects of selecting a video format, getting good audio, working with editing software, uploading and sharing, writing treatments and narration scripts, and conducting interviews. We will also discuss connecting science literacy and media literacy, how to "read" images of science in the media, and how biographies can be used to examine the range of careers possible with a chemistry degree. Equipment will be provided by the workshop leaders, but participants are welcome to bring their own equipment as well. Participants will receive a DVD containing the videos made in the workshop plus a DVD of chemist profiles made by the workshop leaders.

Engaging Students to Develop Performance Skills, Conceptual Understanding, and Problem-Solving Proficiency
David Hanson

Participants will be introduced to and receive copies of two General Chemistry activity books: "Foundations of Chemistry" and "Solving Real Problems with Chemistry." The activities in these books utilize POGIL pedagogy to help students develop skills that essential for success, enhance their understanding of concepts, and increase their proficiency in solving multi-part problems that have a real-world context. The use of these resources in both large (> 50 students) and small (< 50 students) classes will be discussed. Participants will identify issues and concerns that are relevant to their contexts and formulate resolutions that assure student success.

Facilitating POGIL in an Upper Level Course: Analytical Chemistry
Juliette Lantz

Process oriented guided inquiry learning (POGIL) has been used in the teaching of nearly all sub-disciplines of college chemistry. However, implementing POGIL in an upper division course such as analytical chemistry presents some unique challenges that distinguish teaching this type of course from teaching in general and organic course sequences. The goals of this workshop are to a) introduce users who are already familiar with POGIL to newly developed materials for analytical chemistry; b) help instructors develop implementation strategies that lead to effective use of these materials in an upper-level classroom and c) discuss assessment strategies an instructor could use to gauge the success of POGIL materials in analytical chemistry or related courses. These goals will be accomplished through a 45-minute introductory session followed by an hour-long interactive session where participants will work through selected POGIL analytical chemistry materials. A discussion of implementation and assessment strategies will take place, led by the

facilitator. A prerequisite for participation in the workshop is a familiarity with the POGIL approach and POGIL materials. Previous attendance of at least one POGIL workshop is encouraged since this will not be an introductory workshop.

"Finding Solutions" for your Chemistry Labs with Carolina's New Inquiries in Science™ Chemistry Series
Bruce Wilson

Increase student understanding of difficult concepts such as solubility, freezing point, boiling point, molar mass, and pressure by using a guided-inquiry approach. Carolina's Inquiries in Science™ chemistry units provide hands-on activities and supplies that make teaching challenging topics effortless. Free teacher materials and door prizes.

Flinn Scientific Presents Best Practices for Teaching Chemistry™—Experiments and Demonstrations
Irene Cesa

Join us as we present exciting and interactive demonstrations, show video clips, and demonstrate the features and benefits of our new, comprehensive Teaching Chemistry™ professional development program. Imagine the opportunity to learn best practices from 20 award-winning master teachers as they carry out their favorite experiments, demonstrations, and chemistry lab activities. You can! The activities in the online Flinn Scientific Teaching Chemistry eLearning Video Series will have a major impact on the way you teach chemistry as the presenters share the inspiration, stories and strategies that have proven successful in their classrooms. Discover how each 40-minute video will help you build content knowledge and improve your pedagogical skills and confidence! Handouts provided for all lab activities.

Forensic Science: An Introduction to the Analysis of Evidence
Lawrence Kaplan

The Center for Workshops in the Chemical Sciences (CWCS) conducts workshops for college and university faculty. The Forensic Science workshop is a 5 day intensive program that provides a background in the analysis of various kinds of evidence ranging from fingerprints and trace to drugs and DNA. This workshop will provide the participants with an opportunity to have hands on experience with some specific techniques and instruments used in the analysis of evidence frequently associated with modern criminal activities. The half-day workshop will consist of 4 or 5 activities coordinated by alumni of the CWCS Forensic Science workshop. Activities may include: determination of breath and saliva alcohol concentration; presumptive drug analysis; lifting fingerprints; and trace evidence analysis. The activities are appropriate for use in general education lab science courses for non-science majors as well as in general, organic and analytical chemistry courses for science majors. The workshop will be held twice during one day of the BCCE; once in the

morning and repeated for another group of participants in the afternoon. The CWCS is supported by the NSF, DUE, CCLI Program (DUE-0618678).

Gasses and Masses
Irwin Talesnick

In this hands-on workshop, you will use an innovative kit for students to explore the properties of gases. You will build a model that you can use to help teach mass spectrometry. A fee of $30 is charged to help defray the cost of the kits you take with you.

Getting Started with Green Chemistry
Robert Peoples

There is a lot of talk about green chemistry and sustainability these days, but how do I get started? This workshop will cover the basics of green chemistry and provide a wealth of examples of applications currently practiced in academia and industry. We will also discuss lessons learned and available resources for teaching green chemistry, for the classroom and laboratory. Other opportunities available to your students for extracurricular activities, further study, careers, and awards in green chemistry will be shared. And there will be ample opportunity to network with other workshop participants. We will set you on the path to getting started with green chemistry.

Hands-On Workshop on Molecular Modeling: Teaching More Effectively with Modern Simulation Software
Jurgen Schnitker

Molecular modeling as a teaching tool no longer has to be limited to visualizing and querying static models. Even the most inexpensive of current computers operate at such high speeds that interactive dynamic simulations of extended systems have become a realistic option for general chemistry and other undergraduate chemistry courses. As a consequence, the difficulties can be addressed that many students have in moving beyond single molecule representations to robust mental models of bulk phenomena and intermolecular interactions. The workshop will introduce attendees in a hands-on way to a variety of illuminating computer experiments for teaching laboratories and lecture demonstrations. It will become evident that opportunities for active learning need not be lost by having learners passively watch animations: by using strictly science-based software, we can expose students to the inherent issues that arise in a real laboratory.

Inquiry-based Activities for General Chemistry II-Entropy
Laura Eisen

Entropy is one of the more difficult topics covered in general chemistry, and students often have trouble understanding both the concept of entropy and the role that entropy plays in many of the phenomena that are studied in the course. In this workshop, based on the approach used in the American Chemical Society's general chemistry textbook, we begin with activities designed to help students explore the meaning of entropy. We then investigate the role

that entropy plays in a variety of phenomena, including heat transfer, osmosis, phase change, and colligative properties. We also examine the common misconception that the solubility of ionic compounds depends primarily on energy changes. In order to model the inquiry-based pedagogy, participants will do the activities and then discuss how they might be used in a classroom setting.

Inquiry-based activities for general chemistry: I- Intermolecular forces
Nadia Marano

All general chemistry courses teach about intermolecular forces but students often have misconceptions about their physical basis and relative strengths. The purpose of this workshop is to provide several inquiry-based activities for teachers of general chemistry to help students explore the physical basis and avoid these misconceptions. The activities introduce three types of intermolecular forces by interpreting boiling point data of the group IV-VII hydrides. We continue with activities that use these forces to explain familiar properties of water. For example, we explain the high boiling point of water relative to other hydrogen bonding molecules by building hydrogen-bonded networks, which also explain the relative density of ice. We introduce energy diagrams in the context of relative rates of evaporation of nonpolar molecules, alcohols and water. Finally, we apply these concepts to a biological molecule by building models of DNA bases to explain why the bases pair as they do. The workshop will model inquiry-based learning by having participants complete the activities and then discuss them.

Introduction of Metrology to the Analytical Chemistry Curriculum
Jerry Messman

An understanding of metrology, as it applies to analytical chemistry and quantitative analysis, adds value to the educational background and real-world readiness of students as they enter the analytical science workforce. It is particularly advantageous in the placement and employment of students in analytical science laboratories embracing international quality management systems and accreditation. As such, metrology is creating a new paradigm for chemical analysis in the 21st century. It is increasingly based on harmonization strategies that are recognized internationally for improving accuracy and establishing comparability of chemical measurement results over time and space. This lecture-based workshop introduces and elaborates on the concepts and principles of metrology as part of a comprehensive, coherent measurement system for building upon many of the traditional subject areas of chemical analysis. Participants learn formalized metrological aspects of analytical chemistry including reference material standardization (for calibration, method validation, and quality control), traceability, and estimation and reporting of measurement results. Examples of metrology in analytical chemistry are presented for applications in clinical, environmental, forensic, industrial hygiene, and nutritional analysis.

Introduction to POGIL Biochemistry
Jenny Loertscher

Process oriented guided inquiry learning (POGIL) has been used in the teaching of all sub-disciplines of college chemistry. However, implementing POGIL in upper division biochemistry courses presents some unique challenges that distinguish teaching these courses from teaching in general and organic course sequences. The goal of this workshop is to introduce majors-level biochemistry instructors to implementation of POGIL in the biochemistry classroom. This workshop will engage participants in active learning strategies by modeling classroom structure and formative assessment techniques using biochemistry materials. Topics to be addressed may include funded initiatives in biochemistry, availability and development of materials, techniques aimed at teaching applications as opposed to foundational concepts, and coping with student resistance. This workshop will include only a brief general introduction to POGIL and therefore familiarity with the approach would be helpful. Although the workshop is targeted for those just beginning to use POGIL in biochemistry, experienced implementers may gain additional insights on classroom implementation and could benefit from connecting with a community of biochemists interested in POGIL.

LEPS: A Large Enrollment Guided Inquiry Physical Science Course
Rebecca Kruse

The LEarning Physical Science (LEPS) curriculum is designed to be richly interactive, student- centered, and collaborative, but is intended for use in large/lecture-format classes or other settings where hands-on experimentation and whole class discussions are difficult. To overcome these limitations, LEPS makes use of interactive tools such as class response systems, interactive demonstrations, online homework, and computer simulations. LEPS is based on the Physical Science and Everyday Thinking (PSET) curriculum. LEPS focuses on core conceptual themes of energy, forces, and the atomic-molecular theory of matter. In addition, LEPS explicitly engages students in learning about the nature of science and learning. This workshop will introduce participants to the LEPS curriculum, including instructor and student materials, and explore the possibilities and limitations of guided inquiry in large/lecture format classes. Development of LEPS is supported by an NSF Phase 2 CCLI grant (DUE-0717791).

Light-Emitting Diodes (LEDs): Recent Advances, Green Applications, and Cutting-Edge Science
Michael Condren

Light-emitting diodes, or LEDs, are becoming increasingly commonplace, but yet simultaneously revolutionary. Their high energy efficiency, low heat generation, and small size make them ideal for applications ranging from flashlights to home lighting to large screens at sport stadiums. This interactive workshop will explore the

recent advances in the science behind these tiny, energy efficient lights. Attendees will engage in activities and small experiments with LEDs, learn about free related online education resources by the University of Wisconsin Materials Research Science and Engineering Center (MRSEC) on Nanostructured Interfaces, and develop ideas for integrating the cutting-edge science into chemistry and physics curricula.

Make and Take Big Demos
Joseph Sencen

All participants will make and take three different pieces of equipment that demonstrate the gas laws. All materials will be supplied. They include two 3'x4' presentation boards and a specially engineered carbonated beverage bottle cap. You will find that teaching Boyle's law and Charles' law will be easier and more engaging because teachers will have students put their hands on all of these demos instead of just watching the teacher demonstrate.

Making the Most of Your SPECTRONIC Spectrophotometer
Gordon Bain

SPECTRONIC spectrophotometers can be found in almost every high school, college and university in North America, and continue to sell in their thousands annually. How are SPECTRONIC instruments relevant in a 21st century curriculum? What experiments can your students do with these instruments to learn about modern methods of analysis? What is the future of visible spectroscopy as an analytical tool? Your presenters bring over 60 years of experience working with spectrophotometers in environments from a large undergraduate teaching program to pharmaceutical research. Join the spectroscopy experts from Thermo Fisher Scientific for a workshop to interest anyone who works with introductory students in the laboratory. We will present and practice visible spectroscopy experiments where students do analyses like those found in today's analytical labs. The workshop will include hands-on wet chemistry practice, instrumental analysis, data work up and experiment outlines for you to take away and use in your classroom.

Master Glass Blowing
Bill Smith

Learn foundation techniques from a Master Glassblower.

Mini-Labs: Teaching with Inquiry on a Budget
Daniel Branan

Students everywhere love chemistry demonstrations -- especially if they involve explosions. But have you ever wanted to move beyond the "wow" factor and find a way to incorporate active student learning into your demos? What if you could get them to think more deeply about what they're observing, and then find out if they really understand what they've experienced? Those questions initiated our quest to create "interactive demos" at the US Air Force Academy Department of Chemistry. Over the past year and a half, this effort has evolved into inquiry-based learning activities. We now refer to these activities as "Mini-

Labs", because they also contain the additional dimension of a simple formative assessment of a student's knowledge and awareness of chemical principles. The "Mini-Lab" was conceived of as an idea to help instructors easily add inquiry-based learning activities to their curriculum by providing an array of activities that are easy to implement and not supply-intensive and that are designed around sound pedagogical principles.

Misconceptions in Chemistry
Al Hazari

Students develop their own understanding of how "nature works." These pre-concepts are brought to school and teachers have to reflect on them for better instruction. In addition, there are "school-made misconceptions" which originate from inappropriate curriculum and instructional materials. This workshop aims to help K-16 teachers and professors diagnose and cure students' pre-concepts.

Modeling Stable & Radioactive Nuclei, Radioactive Decay, and Half-Life
Charles Vincent

Using inexpensive materials, participants will learn how their students can construct models for nuclei of both stable atoms and radioactive isotopes. These models are used to help demonstrate different types of radioactive decay. Participants will also learn how to use simple classroom activities that help teach the half-life concept. Presenter Tim DeVries is an exhibitor with the American Nuclear Society.

Molecular Simulations in the Chemistry Classroom: Using Off-the-Shelf Computers for More than Internet Access
Jurgen Schnitker

Making connections between macroscopic and molecular phenomena is the essence of learning chemistry. Molecular modeling can greatly help in making the connection in an effective and intuitive way. Technology has now advanced to a point where hundreds or even thousands of atoms can be handled easily with off-the-shelf computers, including student-owned laptops. As a consequence, simulations of "real" molecules and "real" samples of bulk matter are feasible on a routine basis. The workshop will show how to assemble microscopic samples of common chemicals with electronic building tools. In subsequent dynamic simulations, the physical and chemical behavior of these samples will be explored. The ability of the simulation approach to address student misconceptions and the inherent motivational value of dynamic simulations will be discussed.

National Science Foundation-Division of Undergraduate Education Programs and Proposal Writing Workshop
Eun-Woo Chang

Undergraduate education is central to the National Science Foundation's mission in human resource development. The Division of Undergraduate Education (DUE) serves as the focal point for agency-wide support for undergraduate education. The program activities of

DUE aim to strengthen and continuously improve the vitality of undergraduate education for all students in science, technology, engineering and mathematics (STEM) courses in all U.S. institutions of higher education. Within DUE programs, particular emphasis is placed on improving access to STEM education for all segments of U.S. society, including persons with disabilities, populations underrepresented in STEM fields or in technical or teaching careers. This workshop has two components. The first is a discussion of the Division of Undergraduate Education's (DUE) programs that are most likely to be of interest to chemists involved in undergraduate education. The second component is an interactive session on successful grant writing for NSF. This will include participant analyses; helpful hints and fatal flaws; NSF's Intellectual Merit and Broader Impact Review Criteria; and other topics of interest to participants.

Nuclear Science for Chemists
George Miller

The nucleus holds all of chemistry together! We'll explore how this happens, what happens when it doesn't (radioactivity), and more. Introductions to nuclear power, nuclear medicine, nuclear wastes, dating methods, and many opportunities for future chemists. Hands-on experiments about radioactive decay.

Online Public Compound Databases - Chemical Structure Based Resources for Educators
Antony Williams

The Internet hosts a wealth of chemistry related information and the number of "public compound databases" has grown dramatically. Such resources can be valuable for educators interested in sourcing data and information related to chemical substances. This session will provide an overview of the Internet sites now available including freely available spectroscopic data (served up as a game: www.spectralgame.com), access to chemical synthesis procedures and open access and peer-reviewed publications. Internet-based resources require a “user beware” attitude that will be discussed in the session with examples taken from quality issues on platforms including Wikipedia. This workshop will introduce RSC ChemSpider, a free portal for chemists hosting data from over 300 data sources with over 20 million chemical substances from publishers, vendors, wikis, blogs and Wikipedia. We will discuss “crowdsourced” data validation efforts and hosting data collections from your labs to share with the public. This session will include hands-on training in ChemSpider including searching for data and information, data deposition and curation. This workshop is sponsored by the DivCHED Committee on Computers in Chemical Education.

OrganicPad: A Free-Form Structure Drawing Program
Melanie Cooper

Do your students have difficulties constructing Lewis structures? Do you wish you had a more meaningful way of providing your students feedback in how to construct them? This

workshop will focus on the use of OrganicPad, an innovative computer-based structure-drawing program for use in chemistry classrooms. The program provides a naturalistic interface where students may draw structures and reaction mechanisms without a potentially complicated interface that may both impose an additional cognitive load on the student and affect what the student draws. Specifically, participants will have the opportunity to explore OrganicPad's teaching features including: (1) real-time student and instructor feedback; (2) the creation of interactive lessons and tutorials; and (3) its use for the teaching/practice of mechanism-drawing skills. We will also suggest teaching and learning activities stemming from our research on how students develop representational competence. Participants will be provided tablet-PC's for use during this workshop and will be given complementary copies of the program for personal use.

Perform A Distance Learning GOB Chemistry Lab using high quality "at home" labs
Kathy Carrigan

Teaching chemistry fully online, including a "hands-on" laboratory component, is a reality and the results are impressive. Kathy Carrigan, Portland Community College (Portland, OR) Chemistry Department Chair presents learning results from teaching chemistry online with a "wet lab" from LabPaqs. Ron Krempasky, VP of Academic Relations for LabPaqs reviews trends in online science teaching methods and results from a recent survey of students taking their science courses online. We will supply materials for you to experience doing a part of one of the labs to get a feel for how effective they are. Kathy shares how she overcame the obstacles of launching her online GOB (Allied Health) courses that are comparable to face-to-face courses. She presents her experiences for successfully working with students in online courses and supporting student lab experiences. Workshop participants will have the opportunity to actually do a lab performed independently by students at home.

POGIL-SWH Workshop
Frank Creegan

POGIL (Process-Oriented Guided Inquiry Learning) and SWH (the Science Writing Heuristic) are two complementary approaches to laboratory work that follow a three-stage learning cycle and involve active learning and guided inquiry. In response to a question posed by the instructor (POGIL) or questions developed by the students (SWH) students work in teams to gather data from experiments run under a variety of conditions. They examine the pooled data from which they construct theories and make claims that can be backed up by the experimental results. Group discussions, reflective writing, and in some cases additional experiments are used to further develop the concepts. Participants in this workshop will examine model POGIL and SWH experiments, work with student-generated data in a simulated laboratory setting, and convert existing and currently used lab

activities to POGIL or SWH experiments. Workshop participants should bring copies of lab activities for conversion to POGIL or SWH experiments. Participants are expected to have prior experience or knowledge of POGIL and SWH. http://www.pogil.org and http://avogadro.chem.iastate.edu/SWH/homepage.htm

POGIL: Authoring POGIL Activities
Rick Moog

This workshop will provide an introduction to the process of writing effective POGIL activities. All participants will be expected to have attended the POGIL: Introduction workshop at BCCE, or have equivalent experience from other POGIL workshops or events.

POGIL: Classroom Management with
Rick Moog

One of the challenges for POGIL facilitators is managing the classroom, especially with very large classes. This workshop will address many of the typical classroom management issues that arise in a POGIL classroom, and will demonstrate how 'clickers" can provide an effective solution to many of these issues - in classrooms of any size. All participants in this workshop will be expected to have attended the POGIL: Introduction Workshop at this BCCE, or have equivalent previous POGIL experience.

POGIL: Enhancing Classroom Facilitation
Rick Moog

The purpose of this workshop is to enhance facilitation skills in the POGIL classroom at any level. Participants will participate in or observe a POGIL classroom implementation and then reflect on what they have observed and learned. Important aspects of effective classroom facilitation will be discussed. NOTE: Some familiarity with POGIL is a prerequisite for this workshop. Participants are expected to have attended the Introduction to POGIL workshop at BCCE or another introductory POGIL workshop or have implemented POGIL in the classroom previously.

POGIL: Introduction
Rick Moog

This workshop will provide an introduction to POGIL: Process Oriented Guided Inquiry Learning. (http://www.pogil.org) Participants will be introduced to the fundamental principles and philosophy of this student-centered, group learning pedagogy, and will experience a POGIL classroom from a student perspective. There will also be an introduction to the structure of a POGIL activity, and some data on student learning outcomes will be presented.

Producing __casts for Your Chemistry Courses
Keith Walters

With every year new tools are available to create multimedia "casts" (e.g., podcasts, screencasts, vidcasts) and increasing numbers of chemistry educators are using them in their courses. While most people that that producing these “casts” is difficult and time-consuming, producing high-quality “casts” is actually easier and

faster than you might think. This workshop will provide attendees with a hands-on experience to record their own multimedia presentations using various software and hardware tools (including both PC, Mac, and Tablet PCs). Attendees will be encouraged to bring their own computers for use during the workshop, and/or use available onsite computer lab facilities. Also, bring your own pics/videos/presentations/ideas and see how easy it is to get them ready for the web! Trial versions of many popular programs used to create these "casts" will be provided to the attendees.

Qualitative Educational Research: Design and Implementation
Gautam Bhattacharyya

This workshop is designed to help chemical educators begin to formulate and conduct their own chemical/science education research studies using qualitative research methods. The workshop leaders will deliver presentations on the main features of this research tradition: identifying problems, preparing guiding questions, choosing appropriate theoretical framework(s), developing interview protocols and other instruments, and collecting and analyzing data. The participants will be asked to work on activities in small groups after each topic is covered in order to become familiarized with the practice. These activities will also serve as an opportunity to receive feedback from the workshop facilitators. Although the organizers will provide necessary examples for the activities, participants are encouraged to bring research topics of interest so that we may help them design their studies. Workshop fees include the book, Theoretical Frameworks in Chemistry/Science Education, for each participant.

Recruiting Future Teachers While Transforming Courses: The Colorado Learning Assistant Model
Laurie Langdon

Interested in transforming your course to be more interactive? Looking to increase the pool of talented science students who go into teaching? The Colorado Learning Assistant Model can help. Learning Assistants (LAs) are talented undergraduate students hired to help transform courses to be collaborative, student-centered, and interactive. Meanwhile, LAs make up the pool from which K-12 teachers are recruited. Since 2003, 694 LA positions have been filled in 9 departments, and approximately 35 courses have been transformed at CU-Boulder. LA-supported courses show increased student learning, and 12% of LAs have been recruited to K-12 teaching careers, tripling the number of chemistry majors enrolling in teacher certification programs. In this workshop, we will introduce the Colorado Learning Assistant Model, discuss implementation issues, and provide materials to assist faculty in establishing an LA program. If you're already using approaches such as POGIL or PLTL, coupling those efforts with an LA program can help to achieve additional goals of recruiting students into teaching and fostering collaboration among faculty from chemistry, education, and other STEM disciplines.

Reviewing for the Chemical Education Research Feature of the *Journal of Chemical Education*
Diane Bunce

The purpose of this workshop is to introduce participants to the process of reviewing and writing reviews that are useful to both the Journal in making decisions to accept or reject a manuscript and to the authors in terms of making revisions. The essential parts of an acceptable manuscript will be discussed as well as how to judge the viability of the research submitted. Additional information will be provided on the automated process of online submission, reviews and decisions. Hands on experience with sample manuscript examples will be provided.

Science and Civic Engagement
Cynthia Maguire

Science Education for New Civic Engagements and Responsibilities (SENCER) is an NSF-sponsored program that seeks to develop a community of learners and scholars who demonstrate the connection between science and civic engagement in their classrooms. After attending the Science and Civic Engagement Symposium, come to this workshop for hands-on practice applying SENCER techniques. Participants will leave with concrete ideas to impact student retention of science knowledge beyond their classrooms.

Scientific Soapmaking: The Chemistry of Handcrafted Soap
Kevin Dunn

In the past 20 years a cottage industry has grown around the production of soap on a relatively small scale. Only a minimal physical plant is needed to produce custom-formulated soaps on a scale from 10-100 lbs per batch. This cottage industry is made up primarily of women producing soap and selling it at craft fairs, boutiques, on the Internet, and to hotels desiring private-label soap. The science of soapmaking touches on many chemical topics, including stoichiometry, equilibrium, and the properties of acids, bases, alcohols, esters, and oils. This workshop would be appropriate for high school and college faculty desiring to teach a course for students interested in handcrafted soap as a business or hobby. It would also be appropriate for faculty wanting to include a soapmaking module as part of another course. Workshop fee includes a copy of the book, Scientific Soapmaking. Website: ScientificSoapmaking.com.

Teaching and Learning Chemistry with Molecular Workbench
Daniel Damelin

The Molecular Workbench (MW) is a free, open-source tool that delivers visual, interactive simulations for teaching and learning science. In this workshop, participants will get a chance to explore existing simulations and curriculum materials and learn how to build new ones with guidance. Please bring your own laptops. Free CDs will be provided.

Team Learning Strategies
Cheryl Frech

Are you looking for ways to make your chemistry course more interactive?

Would you like your students to read the material that you assign before they come to class? Have you run out of ways to make your lectures interesting? Try team-based learning. Working in instructor-formed teams, students will proceed through the course interacting with the material individually and with their team. The result: students learn to work as a productive member of a team, become more responsible for their own learning, and learn how to learn. In this workshop you will learn strategies for team-based learning. The handouts and templates provided will allow you to convert your course to one that is more engaging for your students and more fun for you to teach.

The ChemCollective: Virtual Labs, Tutors and Scenario Based Learning for Introductory Chemistry
David Yaron

Workshop attendees will get hands on experience with educational materials in the ChemCollective (http://www.chemcollective.org) digital library. These materials cover high school, AP and introductory college chemistry. Our virtual lab is a flexible Java applet that allows students to design and carry out their own experiments. Over a hundred virtual lab activities are available that help students connect the algebraic manipulations of the traditional introductory course with authentic chemistry. Tool for authoring virtual labs are also available and over a third of our current labs were contributed by the community. Our scenario based learning activities help students connect chemistry to the real world. These include a murder mystery, detection of arsenic in drinking water, and dyes that stain DNA. A set of tutorials is also available covering stoichiometry and chemical equilibrium. The chemical equilibrium tutorials were based on over two years of research on what makes chemical equilibrium so difficult to teach and learn. The tutorials implement a new teaching strategy that our evaluation studies have found to more than double student performance on difficult equilibrium problems.

The Murder Most Foul of Millicent Matilda Oles
Deborah Koeck

Sirens sounded and the clang of bells was heard in the night as an explosion rocked the campus of the small town college. As the smoke cleared and investigators were able to enter the building, the body of a young woman was found lying in the hallway just outside of the physical chemistry laboratory. Surrounded by a noxious liquid that was flowing from a spilled vile, Millicent Matilda Oles was covered by a dye-stained lab coat and was very, very dead. Several suspects have been interviewed and motive and opportunity has been found for five possible suspects. Evidence has been collected and your assistance is needed to analyze the data and conduct the chemical and physical analysis needed to solve the crime. In this session, participants will use scientific techniques to discover who committed the dastardly deed. Suspects will be eliminated using analytical chemical methods and basic

physics. Vernier probes will be used for data collection and chemical and physical analysis. Crime scene investigations using hands-on techniques and critical thinking skills spark the curiosity of students of all ability levels. Participants will learn how to solve a crime scene investigation and how to create crime scenes for their own classrooms. In this session, participants will use scientific techniques to discover who committed the dastardly deed. Suspects will be eliminated using analytical chemical methods and basic physics. Vernier probes will be used for data collection and chemical and physical analysis. Crime scene investigations using hands-on techniques and critical thinking skills spark the curiosity of students of all ability levels. Participants will learn how to solve a crime scene investigation and how to create crime scenes for their own classrooms.

The REAL way to "Network" in your Lab!
Doctor DeMento (Dr. Jerry DeMenna)

Laboratory Information Management Systems (aka: LIMS for the Industrial sector) are critical components for most Analytical operations in the real world. Pharmaceutical Research, Chemical Manufacturing, Environmental Testing, Government Laboratories... all need to coordinate and consolidate their Data, whether from a $75 pH Electrode or a $75,000 GC-MS. This is done by standardizing the Analytical data into a universal format. MeasureNet Technology has designed the only true Academic LIMS package to take Analytical Data from any Electrochemical Probe (pH, ISE, Conductivity), Spectrophotometric (UV-Vis, Colorimetric, Fluorescence, Infra-Red), Chromatographic (GC, HPLC) and Physical (Temperature, Pressure, Force, "Titrimetric", Gravimetric)... and generate Raw Data files and Processed Results, depending on the Teaching requirements. This Workshop will show you how to make all these measurements and generate a variety of Curves, Plots, Spectra, Chromatograms, Graphs and other formats... and how the MeasureNet Curriculum Library can allow you to design-a-lab for your School!

Use of the Submersible, Audible Light Sensor in Chemistry Experimentation
Cary Supalo

Demonstration of how the Submersible Audible Light sensor (SALS) can be use in chemistry experiments to convey useful information non-visually by means of an audible tone output. The SALS can be used to detect the formation of a precipitate to indicate to students who are blind or low vision when a color change has occurred. Several commonly used experiments will be used to demonstrate how the SALS can create a multi-sensory learning experience for all learners.

Using Social Networking for Chemical Education
Robert Belford

Dramatic changes in scholarly communication are underway, and this workshop is designed to help chemical educators make use of these new capabilities. Recent initiatives by the American Chemical Society and many other scientific publishers to

expand the capabilities of online journals will certainly accelerate these changes. Students and faculty are already using programs like Facebook, Twitter, and LinkedIn to maintain professional and social contacts. A few also use social tagging programs, like Delicious or Connotea, to manage information. Not many teachers have set up aggregators to access to these feeds even though publishers provide RSS feeds for their journals, and few professors seem to be using these programs to their maximum potential. The next big thing in search appears to be real-time search of social networking sites. This workshop would teach about using programs, like Delicious, RSS aggregators, Wikis, Twitter, and Facebook, for classroom applications and professional information management. Workshop attendees will receive a short handbook describing the resources discussed in the class and this workshop is sponsored by the DivCHED CCCE.

Using Talking Probes to Conduct Chemistry Experiments Non-Visually
Cary Supalo

The workshop will demonstrate how to use the Job Access for Windows with Speech (JAWS) text-to-speech screen reader interface with the Vernier Software & Technology Logger Pro data collection software package to collect data and give real-time probe readings in spoken output to students who are blind or otherwise print impaired. A series of JAWS hot keys have been created to provide spoken real-time probe readings and techniques to receive statistics information. Participants will also learn how to use an audio graph trace feature recently included in Logger Pro 3.8 designed to give print disabled persons a qualitative representation of the information being conveyed in a graph by means of an audible tone change. In addition to using the JAWS Logger Pro interface to enhance learning in the field of chemistry through the "Chemistry with Vernier" curriculum, hands-on ways to measure volume and lab bench organization will also be discussed.

Using Talking Probes to Conduct Chemistry Experiments Non-Visually
Margaret Gjertsen

WebAssign is the perfect homework management system for chemistry. Many new tools and feedback options have been added in 2009 and 2010. Create assignments easily using questions from leading intro, general, and organic textbooks or write your own questions. Your students can complete assignments anytime, anywhere over the web and receive instant feedback. You can view their progress at any time. Come to our workshop and see why so many chemistry teachers now have more time for teaching and spend less time grading homework with WebAssign.

By partnering with leading chemistry textbook publishers, we offer a large database of ready-to-use, end of chapter homework questions. Questions are in a variety of formats, often with several formats mixed within one question: numerical, image map, multiple-answers, fill-in-the-

blank, multiple-choice, rank order, true/false, essay, algebraic, file upload, and poll. Each student receives unique questions with randomized variables. WebAssign supports significant figures with hints to alert students to insert the appropriate number of digits. For organic chemistry questions, the JME drawing tool allows students to input complex organic molecules.

WebAssign is a simple to use, hosted service. Sign up for a free faculty account and begin using it immediately. WebAssign works for you 24/7. See why thousands of teachers would not teach without it.

Who Killed MOANA LOTT?
Deborah Koeck

On June 16, Moana Lott, an analytical technician in the shoelace-testing laboratory, was working late at the Souless Shoe Factory. On June 17, Jack Pott, the sole-proprietor of Souless, staggered into work at 9 AM. As he rounded the corner by his office doorway, he saw a woman sprawled in the middle of the hallway. He ran to see who it was and immediately recognized the lifeless form of a strangled Moana Lott. IT WAS MURDER!!! In this session, participants will use scientific techniques to discover the method of the demise of Mona Lott. Suspects will be eliminated using analytical chemical methods and basic physics. Vernier probes will be used for data collection and chemical and physical analysis. Crime scene investigations using hands-on techniques and critical thinking skills spark the curiosity of students of all ability levels. Participants will learn how to solve a crime scene investigation and how to create crime scenes for their own classrooms.

Writing and Reviewing Articles for the *Journal of Chemical Education*
Norbert Pienta

Participants will be asked to review an article ahead of time and then discuss the reviews from a set of reviewers. The workshop will include a discussion of guidelines, common shortcomings, and strategies for both authors and reviewers.