

# **SENCER SUMMER INSTITUTE 2005**

## **Notes on the Program**

### **ARRIVAL, TRANSPORTATION, REGISTRATION, AND THE SSI 2005 OFFICE**

After you check in at the Fairmont Hotel, the Concierge will have information on options for getting to the Santa Clara University campus. Probably your best option will be to use the buses (Royal Coach Tours) SENCER has chartered. They will depart from the front of the Fairmont Hotel to the Santa Clara University campus starting from 11:00 a.m. on Friday and starting from 6:30 a.m. on Saturday and Monday. This trip takes about 15 minutes. Information on the return charter buses will be found in each day's schedule. There will be no buses on Sunday or Tuesday, as all SENCER sessions (including the Post-Institute workshops) will be held in the Fairmont Hotel.

Registration for SSI 2005 will take place at the Fairmont Hotel in the South Tower Foyer on Thursday evening, August 4<sup>th</sup> from 5:00 p.m. to 8:00 p.m. and on Friday, August 5<sup>th</sup> from 8:00 a.m. to 1:00 p.m.

SENCER will maintain a campus office on the Santa Clara University campus in Bannon 210 on Friday (August 5<sup>th</sup>) from 12:00 noon to 6:00 p.m. and on Saturday and Monday (August 6<sup>th</sup> and 8<sup>th</sup>) from 8:00 a.m. to 6:00 p.m. On Sunday, August 7<sup>th</sup>, the campus office will be closed. The SENCER staff office for Sunday, August 7<sup>th</sup> will be in the Redwood Room of the Fairmont Hotel and will be open from 8:00 a.m. to 12:30 p.m. On Tuesday, August 9<sup>th</sup>, the staff office in the Redwood Room will be open from 8:00 a.m. to 6:00 p.m. Staff, identifiable by the t-shirts that say SENCER STAFF, will be present to assist participants. Just ask for any help you need.

Maps of the Santa Clara University Campus and the Fairmont Hotel meeting levels will be in the binder that you will receive at registration.

### **Pre-Institute Workshops**

SENCER will be offering Pre-Institute Workshops this year to supplement and enrich the Institute program. Workshop presenters have preferences regarding the optimal number of participants, etc, so enrollment in the workshops is limited. Therefore, we request that you be pre-registered for the session you would like to attend. If you are interested in participating in one of these workshops, and have not registered as yet, check with Patti Simon at [patti.simon@sencer.net](mailto:patti.simon@sencer.net) prior to July 30<sup>th</sup> or consult the SENCER Registration Desk on August 4<sup>th</sup> or 5<sup>th</sup> at the Fairmont Hotel in San Jose to determine if space is available. We will do our best to accommodate your interest.

This year there will be six Pre-Institute Workshops; one will be a "two-session" workshop that will begin on August 4<sup>th</sup> and continue on the morning of August 5<sup>th</sup>. The others will take place on August 5<sup>th</sup>, just prior to the official start of the Institute.

**THURSDAY, AUGUST 4, 2005**

**12:00 – 5:00 PM PRE-INSTITUTE WORKSHOPS**

**How to Design a SENCER Course  
(Special 2-day workshop continuing August 5th)—Part I**  
*Fairfield Room*

The most common method of designing a course involves making a list of content items, organizing those items into a topical outline that becomes a syllabus, and fleshing out the topical items with appropriate lectures and labs. While this method produces courses that are well-organized in terms of presentation of material, the whole process can be accomplished without ever articulating the underlying goals of a course beyond those of content coverage and without consciously deciding which teaching strategies and assessments are most appropriate for achieving the goals of the course.

Designing a SENCER course is a challenge, and focusing on articulating and achieving course goals, rather than on building a course around a list of content items, is one practical way of designing a course that will help you avoid the "beat it to fit, paint it to match" trap.

The 2-session workshop will focus on a goals-based approach to course design. The workshop will guide participants through the goals-setting phase with an emphasis on setting goals that promote higher order thinking skills on the part of students. The workshop will also help participants begin the process of choosing content, selecting teaching strategies, and designing student activities, assignments, and assessments to ensure that students meet those goals. The method introduced in the workshop is by no means the only way to design a course, but it does offer a systematic, intellectual approach that has been used very successfully in many years of week-long workshops called *Designing Effective and Innovative Courses in the Geosciences*, which are now part of the program *On the Cutting Edge: Workshops for Geoscience Faculty* (<http://serc.carleton.edu/NAGTWorkshops/>).

For those unable to attend the workshop, the *Cutting Edge* web site now has an on-line tutorial for course design that will guide an interested faculty member through the course design process outlined during the workshop. The tutorial is available at <http://serc.carleton.edu/NAGTWorkshops/coursestutorial/index.html>

Barbara Tewksbury  
Hamilton College

**FRIDAY, AUGUST 5, 2005**

**9:00—12 NOON     PRE-INSTITUTE WORKSHOPS**

As noted, this year, in addition to the special “How to Design a SENCER Course” workshop, five additional Pre-Institute Workshops are being offered. They are described below.

**Active Learning Techniques in Large and Small Classes**

*Atherton Room*

For more than a decade, national leaders in STEM education, including the National Research Council and the National Science Foundation, have been extolling the value of teaching science through active learning. Most of us who teach in the sciences appreciate the value of hands-on learning and incorporate these in our courses through laboratory experiences. But there has been less incorporation of active learning in the “lecture” portions of our classes.

This session will demonstrate a number of techniques that foster active learning in science classes. Ways to adapt the techniques to different sized classes will be discussed. Participants will experience a number of the techniques and have the opportunity to reflect on how the techniques can be used in their own classes.

Laurie Fathe  
George Mason University

**Assessment: For and By Faculty**

*California Room*

This workshop will focus on classroom and course assessment as well as “real time” techniques to uncover what students know. We will explore several embedded assessment tools used by faculty to develop an overall course evaluation strategy.

Some questions we will be asking together include: what are our obligations after uncovering what students know (or don’t know?) and what should we do to match our expectations (and those of students) to our objectives and our teaching focus?

In this workshop, we will work towards embedding a variety of assessment tools in a typical traditional class syllabus in step-wise increments. Working in small groups, participants will be provided a syllabus to build from. Better still, if you wish, bring your own syllabus to work on and we’ll use it to help us develop a genuine learning community.

Karen Kashmanian Oates  
Harrisburg University of Science and Technology

Terry McGuire  
Rutgers University

## **Designing Service Learning Opportunities**

*Cupertino*

This session focuses on the basics of designing service-learning opportunities in order to enhance student learning in the sciences. The interactive format includes a presentation of service-learning definitions/models and a discussion about how to utilize campus resources and develop partnerships with local nonprofit organizations.

Types of reflective analysis assignments and guidelines to assess student learning will be shared. Samples of essential paperwork, such as "service-learning agreements" and "risk release forms" will be included along with references to a website where participants may access the sample paperwork.

During the second half of the session, participants will work in small groups, develop learning objectives that incorporate service-learning activities into existing or new courses, and share ideas about assessment techniques. Participants may also begin generating ideas about where students might engage in service-learning based on how the course content is connected to various needs within the greater community.

Lynn Leavitt  
George Mason University

## **Fostering Civic Engagement: Integrating the Sciences with Other Disciplines in Learning Communities**

*Belvedere*

The learning community (LC) pedagogy fosters the integration of multiple perspectives and disciplines as teachers and learners embrace holistic approaches to seeking solutions to complex, intractable, societal problems. The workshop facilitators will present an overview of the diverse ways that LCs can be structured to target particular learning goals. They will describe exemplary LCs that integrate sciences with other disciplines (e.g., humanities, social sciences) and will share techniques for assessing learning outcomes of participating students and faculty members.

The workshop facilitators represent a diversity of institutional types— a private four-year college (Wofford College), a public two-year college (Holyoke Community College), and a public four-year university (Fairmont State University). Attention will be given to the influence of institutional type on the LC pedagogy.

Participants will work through an interactive, guided exercise to develop their own "SENCER-ized" LC model to share with the group. Participants from diverse disciplines, institution types, and campus constituencies are encouraged to attend.

Ellen Goldey  
Wofford College

Brian Hagenbuch  
Holyoke Community College

Phil Mason  
Fairmont State University

## **Problem Based Learning and Critical Thinking**

*Valley Room*

Problem-based learning (PBL), as a pedagogical strategy, converges with critical thinking, as an educational outcome, in many close and surprisingly interesting ways.

This workshop will use PBL techniques to engage participants in exploring and unpacking the following questions:

- (1) What skills and dispositions are central to effective critical thinking and problem-solving?
- (2) What techniques might I incorporate into my teaching repertoire to further engage my students in learning course content using PBL, and, at the same time, achieve greater success in critical thinking?
- (3) What are the basic elements of a successful PBL curricular module?
- (4) What are some ways to evaluate PBL curricular problems and to assess critical thinking as a student learning outcome?

Session handouts will provide a research-based and robust definition of "critical thinking" useful in the full range of academic disciplines. Some "how-to" materials on teaching for critical thinking and on designing and evaluating problems for use in a PBL approach at the college level will be offered. This workshop builds on the constructivist educational philosophy to demonstrate college level teaching techniques effective and applicable in a wide range of academic disciplines by analyzing videotape, through small and large group classroom simulation exercises, by interactive Q&A, and by using actual professors' assignments.

Pete Facione  
Loyola University—Chicago

## **How to Design a SENCER Course – Special 2 day workshop beginning August 4<sup>th</sup>—Part II**

*Fairfield Room*

This session concludes the workshop previously described under August 4<sup>th</sup>. You must have been registered for and attended Part I in order to participate in Part II.

Barbara Tewksbury  
Hamilton College

## **THE SENCER SUMMER INSTITUTE 2005**

*(Shuttle buses will run from the Fairmont Hotel to Santa Clara University from 11:00 a.m. to 4:00 p.m.)*

**12 NOON**

### **LUNCHEON**

*Tent in Mission Gardens (Santa Clara University Campus)*

Participants are invited to an opening buffet luncheon. All dining at SSI 2005 will include vegetarian and non-vegetarian selections.

**1:30—2:00**

### **HOMEROOMS**

*Rooms as assigned (See Day-By-Day Schedule)*

**A Note on Homerooms** All participants have been assigned to a “homeroom” and “homeroom teachers”—members of the SSI 2005 core faculty. Homerooms are the basic organizing structure of SSI 2005. We’ll use them for communicating schedule and other changes, arranging team consultations, providing direct feedback to SSI 2005 organizers (“real-time formative evaluation”), checking on team progress and working on team projects, pursuing issues raised in the plenary sessions and other sessions, and, generally, for “taking stock.”

Homerooms are where we will begin most days. There will be a brief SSI 2005 agenda for each day. Homerooms will provide a space for all participants to set their own agendas, as well. From this first homeroom, we’ll proceed to the opening plenary. Your “homeroom teachers” will also be responsible for follow-up with you after the Institute. They will be in touch with you throughout the year to learn of your progress, help you stay connected to the SENCER National Office, and respond, as best they can, to any needs you have as you work on SENCER courses and programs or develop new areas of interest.

The locations for the homerooms are noted in the Day-by-Day Schedule.

**2:15—4:00**

### **OPENING PLENARY**

#### **“Engaged and Engaging Learning: SENCER as a Model”**

*Mayer Theatre*

David Burns and Karen Oates, presiding

The opening plenary will feature welcoming remarks, an overview to the Institute’s aims and aspirations, and brief remarks from the organizers. Key staff and logistics support people will also be introduced.

Dr. Rosemary Haggett, director of the Division of Undergraduate Education in the Education and Human Resources Directorate of the National Science Foundation, will deliver the opening plenary address.

**A Note on Concurrent Sessions** SSI 2005 offers a variety of concurrent sessions. Over the course of the Institute, there will be seven sets of concurrent sessions. In keeping with our SENCER “traditions,” many of these sessions are designed to simply give space to members to bring their own expertise, as well as their particular needs, to a group gathered together around similar interests and concerns. Others are more formal “workshops,” where participants will engage in a process lead by the workshop leader. Some are two-session workshops; others are one-session events that will be offered more than once. Still others are “information” sessions, where participants will have the opportunity to become acquainted or briefed on strategies, opportunities, and other program efforts. We will feature caucuses—opportunities to talk about topics of great potential for SENCER courses—as a new feature in concurrent sessions this year. We’ve asked all session leaders to keep the sessions interactive and lively.

**4:15—5:30**

**CONCURRENT SESSIONS I  
THE SENCER MODELS: SENCER IDEALS IN THEORY AND  
PRACTICE**

**A Note on the SENCER Models** An essential feature of the SENCER national program is the dissemination of models that embody the SENCER ideals.

We’re especially proud that this year’s new featured models have all been developed by faculty who have participated in previous SENCER Summer Institutes. This demonstrates one of the principal goals of the SENCER program: supporting faculty development that leads to the creation and testing of effective course models that, in turn, leads to these models being shared with new participants in the SENCER program and disseminated more broadly.

As in the past, the models we feature at SSI 2005 are offered “heuristically”—that is, for what we can learn from them. As you will see from the models (and the session descriptions below), our models are models of more than just the topics, themes, and civic issues around which they are organized. There are common features among the models to be sure, including the ingenuity and hard work of the developers that is evident in them. We’re proud to say that these are courses that make room for substantial engagement by students, even as they require extraordinary teaching. In short, it is the success of these courses that recommends them to us for use as SENCER models.

All 23 models selected so far are posted on and may be downloaded and printed from the SENCER Web site. CD-ROMs with all models will be provided to all Institute participants in their binders.

Please note: Paper copies of the models will not be available at the Institute. If you wish to refer to a printed text, please bring your own copy with you. SSI 2005 members who have laptops with CD-ROM drives are strongly encouraged to bring them to the Institute.

As you will see below, in the first Concurrent Session, thirteen of our SENCER model developers will host individual sessions to describe their work. An asterisk “\*” in front of the model name signifies that its developer or, in the case of a team of creators, at least one of its developers, will be present at SSI 2005. In parentheses following their name is the year the model developer first participated in a SENCER Summer Institute.

Model developers (and other core faculty members, for that matter) will be available for in-depth follow up, problem-solving, technical assistance, and consultation throughout the

Institute and may be “scheduled” (by you personally with the developers directly or through homeroom teachers) to participate in team time and or to meet with you at other points in the Institute. If you would like such a consultation, please bring a list of people with whom you (and/or your team, if applicable) would like to consult with to the first homeroom meeting.

The following two pages provide a complete list of the SENCER Featured Models 2001-2005; the name in **bold** indicates that the model developer is scheduled to present on the model at SSI 2005:

## THE SENCER MODELS 2001-2005

### The 2005 SENCER Models

#### Nanotechnology

Kristen Kulinowski (SSI 2003)  
Rice University

**\*Renewable Environment: Transforming Urban Neighborhoods**  
Steven Bachofer (SSI 2003) and Phyllis Cancilla Martinelli (SSI 2004)  
St. Mary’s College

**\*Chemistry of Daily Life: Malnutrition and Diabetes**  
Matt Fisher (SSI 2003)  
St. Vincent’s College

#### \*Riverscape

Anne L. Pierce (SSI 2003), Barbara Abraham, George Burbanck, and Judith Davis (SSI 2003)  
Hampton University

### The 2004 SENCER Models

**\*Chemistry and Ethnicity: Uranium and American Indians**  
Cathy Middlecamp (SSI 2001) and Omie Baldwin  
University of Wisconsin-Madison

**Chemistry and Policy: A Course Intersection**  
Christopher Smart (SSI 2004), Pinar Batur (SSI 2004), and Stuart Belli (SSI 2004)  
Vassar College

**\*Coal in the Heart of Appalachian Life: A Learning Community**  
Andreas Baur, Judy Byers, Galen Hansen, Erica Harvey,  
Debra Hemler, and Phillip J. Mason (SSI 2001)  
Fairmont State University

**\*Forensic Investigation: Seeking Justice Through Science**  
Gregory Miller (SSI 2001)  
Southern Oregon University

**The Mathematics of Communication: Keeping Secrets**  
Stephen Greenfield (SSI 2004)  
Rutgers University

**Sustainability and Human Health: A Learning Community**  
Donald E. Stearns (SSI 2001) and Kim Worthy  
Wagner College



## **The 2003 SENCER Models**

### **\*Brownfield Action**

**Peter Bower** (SSI 2003)  
Barnard College (Columbia University)

### **Chance**

Nagambal Shah (SSI 2003)  
Spelman College

### **Environment and Disease**

Michael Tibbetts (SSI 2003) and Colleagues  
Bard College

### **Global Warming**

Sharon Anthony (SSI 2001) and Sonja Weidenhaupt  
The Evergreen State College

### **Nutrition and Wellness/The Iowa Environment**

LaRhee Henderson (SSI 2001) and Charisse Busing (SSI 2003),  
Drake University

## **The 2002 SENCER Models**

### **\*Energy and the Environment**

**Trace Jordan** (SSI 2001)  
New York University

### **\*Geology and Development of Modern Africa**

**Barbara Tewksbury** (SSI 2002)  
Hamilton College

### **Human Genetics**

Kim Finer (SSI 2002)  
Kent State University-Stark Campus

### **Tuberculosis**

Richard Fluck (SSI 2002)  
Franklin and Marshall College

## **The 2001 SENCER Models**

### **\*Biomedical Issues of HIV/AIDS**

**Monica Devanas** (SSI 2001)  
Rutgers University

### **\*Chemistry and the Environment**

**Amy Shachter** (SSI 2001)  
Santa Clara University

### **\*Mysteries of Migration**

**Tom Wood** (SSI 2001) and Elizabeth Gunn (SSI 2001)  
George Mason University

### **\*Science, Society, and Global Catastrophes**

**Theo Koupelis** (SSI 2001)  
University of Wisconsin-Marathon

4:15—5:30

**CONCURRENT SESSIONS I**  
**SENCER IDEALS IN THEORY AND PRACTICE**

*Suggested Attendance: In prior years, teams have found it useful to spread members among the formal sessions so that, as a team, they could benefit from knowing several models.*

**Science, Society, and Global Catastrophes (2001)**

*Bannon 236*

“Science, Society, and Global Catastrophes” is organized around the exploration of past and possible future catastrophes that did and can affect our environment, including plagues, extinctions, global warming, ozone depletion, and collisions with space debris. The science content of the course includes the physics of meteorites, asteroids, and comets, their role in planetary formation, and impacts with the Earth, epidemiological and statistical data on HIV disease in Africa and the chemistry of greenhouse gases. Mathematical calculations and statistical modeling techniques are emphasized and the historical, scientific, and social aspects of each catastrophe are examined from different perspectives.

This course, taught at a two-year college, provides an example of team-teaching (5 faculty) and distance learning that is also math and writing intensive. The presenter, a physicist, will also discuss how the course has changed since originally developed and how it is being sustained now that he is no longer one of its instructors.

Theo Koupelis  
University of Wisconsin-Marathon

**Biomedical Issues of HIV/AIDS (2001)**

*Bannon 237*

“Biomedical Issues of HIV/AIDS” teaches the biology of infectious diseases, immunology, and virology through the questions that surround HIV/AIDS: Where did it come from? How is it transmitted? Can I get it? What can we do to help those that have it? Such driving questions motivate students to learn complex scientific content in microbiology and immunology. Challenging assignments and guest lectures help students understand that these questions cannot be answered solely by an appeal to biology alone, but are related to questions of economics, politics, education, human emotion, and psychology.

This course began as a large (400+) lecture course for non-science majors that emphasized active learning through online discussion groups, guest lectures, and peer-review strategies. More recently, new versions of the course have been taught on a smaller scale and in programs designed for “adult learners.” The presenter, a microbiologist and the director of faculty development and assessment programs at Rutgers, will also discuss how to use technology to incorporate student research and writing into large classes.

Monica Devanas  
Rutgers University

## **Chemistry and the Environment (2001)**

*Arts and Sciences 129*

“Chemistry and the Environment” is a laboratory course that uses environmental problems facing the campus and surrounding community, such as air and water quality or recycling policies, to teach basic chemistry, including the chemical composition of the atmosphere, basic chemical reactions, such as combustion and photochemical processes, and the stoichiometry of reactions. This knowledge is then linked to public policy questions through an Environmental Resource Assessment project where students collect data, develop hypotheses, design experiments, and develop recommendations.

This course offers a model of community-based research and collaborative learning. The presenter, a chemist and associate dean of the college, will also discuss the value of student group research projects as strategies to make learning “stick.”

Amy Shachter  
Santa Clara University

## **Mysteries of Migration (2001)**

*Bannon 241*

“Mysteries of Migration” emphasizes the observation and investigation of the phenomenon of migration in different species. Its goals are to provide students with a solid understanding of basic biological principles by studying their application to one of the most pervasive and interesting phenomena in nature, and to learn about and evaluate the domestic and international policy systems for addressing problems emerging from the movement of plants and animals. Developed by the presenter, a conservation biologist, and a policy specialist (Elizabeth Gunn), the course addresses basic biological and physical factors that influence migration—such as energy metabolism, behavioral adaptations, population genetics, terrain, weather patterns, and magnetism—as well as the policy implications of migration for the development of conservation and resource management policies, both within the United States and with other nations.

Mysteries of Migration is a learning community that incorporates several innovative pedagogies into its framework, including team teaching, experiential learning (field trips), peer evaluation, group work, and portfolio assessment. The presenter will also discuss how the “contextualized” learning, such as that which occurs in the learning community, affects subsequent learning in the sciences and the rest of the curriculum.

Tom Wood  
George Mason University

## **Energy and the Environment (2002)**

*Bannon 332*

“Energy and the Environment” is a course offering within the large-scale Foundations of Scientific Inquiry program at NYU. Enrolling between 120 and 130 students, with laboratory sections of 20, the course uses contemporary environmental issues—including global warming, the ozone layer, and water quality—as a framework for introducing foundational principles of chemistry, such as atomic and molecular structure, chemical reactivity, and thermodynamics. Students work collaboratively in groups of three on a specific research projects that focus on questions such as “Can Hudson River Water be Made Safe to Drink?” and “What is the Effect of Acid Rain on Plant Growth?”

The course exemplifies the incorporation of active learning techniques and undergraduate research in a large lecture class. The presenter, a chemist and assistant director of NYU’s Morse Academic Plan, will also discuss the challenges of aligning general education goals with the research and graduate education priorities of the larger university.

Trace Jordan  
New York University

## **Geology and the Development of Modern Africa (2002)**

*Bannon 333*

“Geology and the Development of Modern Africa” is a writing-intensive laboratory course in introductory geology that has been taught at Hamilton College since 1994. The course teaches geology and geologic processes through the exploration of the how geology impacted the history, culture, politics, and economy of Africa. Some of the many complex topics explored during the semester include: long-term fluctuations in fluvial activity and the rise and fall of dynasties along the Nile, the role of climate change and bedrock geology in the location and timing of development of Egyptian civilization, the economic implications and environmental consequences of damming the Nile at Aswan, and the relationship between geological resources, such as gold and diamonds, and the oppression of the people of South Africa. A centerpiece of the course is a month-long diamond exploration project where students are organized into virtual teams of geologists prospecting for diamonds in different areas of southern Algeria. Because each group is dealing with a different exploration area and different material conditions, they must make choices and decisions based on their data, and there is no single “correct” result.

This course presents a model of the use of role-play and simulations and of the benefits of involving undergraduates in the course-design process. The presenter, a professor of geology, will also discuss why she believes that “depth begets breadth” in learning and how courses like the one selected to be a SENCER model can lead to increased interest by students to become majors in STEM fields.

Barbara Tewskbury  
Hamilton College

### **Brownfield Action (2003)**

*Bannon 334*

“Brownfield Action” presents students with a fundamental problem in environmental forensics. Students form environmental consulting firms and sign a contract with a real estate corporation to determine the nature and extent of contamination on property they want to develop.

The heart of Brownfield Action is an interactive, cd-rom web-based hybrid that contains a three dimensional world whose playing surface is 2200 x 3200 feet. This surface extends to a depth of 600 feet and consists of over 2 million data points that contain information on surface elevation, depth to water table or bedrock, and soil or sediment type. Students can utilize a host of tools including seismic reflection and refraction, ground penetrating radar, magnetometry and metal detection, soil gas, and well and water sampling using drilling and push techniques. The playing field also includes a fictitious town complete with infrastructure (buildings, roads, wells, water towers, homes, businesses and residents) as well as a history and storyline. There is a municipal government complex complete with relevant historical documents and permits. There is a budget and accounting page. The use of these tools or any other activity costs money. Student teams compete to maximize profit and to produce a report that accurately reflects reality.

Lectures provide the information that students need to perform Phase I and Phase II environmental site assessments. Because every investigative team will take a different approach to solving the problem, Brownfield Action promotes teamwork and rewards creativity and strategic thinking.

The presenter, a senior lecturer in environmental science, will discuss how the real-world ambiguity and the organic, evolving, semester-long nature of the inquiry provides students with a better understanding of the interdisciplinary nature of the scientific process and its complicated relationship with economic, social, and political structures.

Peter Bower  
Barnard College/ Columbia University

### **Environmental Chemistry and Ethnicity: Uranium and American Indians (2004)**

*Engineering 318*

“Environmental Chemistry and Ethnicity” is taught by the presenter, a chemist, and Omie Baldwin, who is a clinical social worker/health professional and member of the Navaho Nation. The course focuses on the impact of the presence of uranium on the native peoples of the Southwest who lived (and still are living) on the land where the uranium was extracted. Students learn the composition of ores and naturally occurring isotopes, mining and milling technology, radioactivity and radioactive decay, radium and radon, ionizing radiation, and nuclear fission and fusion. Simultaneously they explore the history of the Navaho, their role as workers in radium-based industries, and the cancer incidence in their population. The policy questions addressed include the role of the federal government in Navaho tribal life,

the importance of nuclear weapons and testing in national defense and national security, and environmental and public health problems related to radium.

This team-taught course, which fulfills both science and ethnic studies requirements at the University of Wisconsin, is a model of integrative studies and departmental collaboration. In addition to reviewing the substance of the course, the presenter will describe strategies used to incorporate this course in the University curriculum.

Cathy Middlecamp  
University of Wisconsin-Madison

### **Coal in the Heart of Appalachian Life (2004)**

*Engineering 325*

“Coal in the Heart of Appalachia” is a learning community developed by Andreas Baur, Judy Byers, Galen Hansen, Erica Harvey, Debra Hemler, and Phillip J. Mason. The learning community links a team-taught, integrated science course, “Science in the Heart of Appalachia,” with a humanities course, “Introduction to Folklore.” It is organized around questions that have both regional and global significance, including: What is energy and what will be the future demand for it? What are non-renewable resources? What is the future of coal as an energy source? What responsibilities do I have as an energy consumer? What are the ecological, public health, and social/cultural consequences of extracting and burning coal? The humanities course places these questions in a cultural and historical context and examines the impact of the mining industry on Appalachian life.

Using coal as an organizing idea enables students to learn some basic principles of geology (stratigraphy, classification of rocks and minerals, and geologic time), chemistry (bonding, acidity, combustion, and the organization of matter), physics (energy, heat and thermal emissions, and power plant functioning, and biology/ecology (photosynthesis, aquatic community structure/responses to acid pollution, carbon cycling/global warming, and respiratory physiology/disease).

This learning community is an example of integrated science, team teaching, and community-based research. The presenter, a biologist who is also dean of the college of science and technology, will discuss how this learning community has led to the development of new programs, including one on obesity, that the Fairmont State SSI 2005 alumni team is currently pursuing.

Phillip J. Mason  
Fairmont State University

## **Forensic Investigation: Seeking Justice Through Science (2004)**

*Daly Science 201*

“Forensic Investigation” capitalizes on a new popular awareness of forensic science to connect science content to the important civic questions raised by our criminal justice system. Although the course is taught by a chemist, it draws on many scientific disciplines and outside experts from the faculty and the local community participate as guest presenters.

The course is organized around well-known criminal case-studies that highlight particular forensic techniques and the scientific content upon which they depend. For example, trace evidence and fingerprint detection requires an understanding of computerized quantitative and qualitative analysis, sampling, and spectroscopy. Arson and explosive investigation draws on organic and inorganic chemistry and atomic bonding. Forensic toxicology rests on a knowledge of biology, including immunology, cell structure, and genetics. All of this scientific knowledge is explored in a specific legal and ethical context where individual rights, criminal law, public opinion, and societal biases play a role.

In addition to featuring guest lecturers and experts, this laboratory course uses interactive classroom technology. The presenter will discuss how this technology allows for immediate and anonymous feedback and helps monitor student understanding of the topics introduced.

Gregory Miller  
Southern Oregon University

## **Riverscape (2005)**

*Daly Science 202*

“Riverscape” is the of product Hampton University’s SENCER Project. Designed by Anne Pierce, George Burbank, Barbara Abraham, and Judith Davis, Riverscape is a series of timed interactions among five courses. Focusing on declared as well as potential pre-service education majors (pre-service teachers), Riverscape aims to increase their awareness of their roles as agents for civic engagement in the classroom, particularly in the Hampton Roads area where many students are doing their student teaching and other internships.

Through collaborations with biological, environmental and marine science and computer science majors, the pre-service teachers develop an understanding that learning plans will be more effective when they are designed to center around issues of importance and value to their students’ community and society at large. A major focus of the project is the conservation of riparian species and wetlands ecology. This is a body of knowledge that is 1) addressed by the Virginia K-12 science standards, 2) included in the biological science course undergraduates take in their first two years of study, and 3) of interest to students who live and work at the confluence of the Hampton, James, and Elizabeth Rivers.

First proposed as a SENCER project because the pre-service teacher preparation curriculum did not have an integrated approach to science education, the project now incorporates the teaching topics prescribed in the Virginia Standards of Learning, thus enhancing the success of pre-service teachers in delivery of science content.

The presenter, an assistant professor of education, will demonstrate how, by using Riverscape as the unifying theme, students develop an awareness of how citizens address civic and scientific questions related where they live, where they teach in clinical field placements, and where the impact of hurricanes, transportation on land and sea, and population growth combine to pose complex questions.

Ann Pierce  
Hampton University

### **The Chemistry of Daily Life: Malnutrition and Diabetes (2005)**

*Daly Science 310*

“The Chemistry of Everyday Life” uses two contrasting but related global health problems—the lack of food and the over-consumption of food—to teach basic concepts in chemistry, including metabolism and metabolic regulation, the chemical structure of fats, carbohydrates, and proteins, enzyme function, DNA structure, and drug toxicity. These topics are explored in relation to the policy questions generated by rising incidence of malnutrition and hunger, genetic testing, drug development and approval processes, risk assessment for food additives and drugs, and rising medical costs due to obesity and its medical consequences.

This course is a model of collaborative and group learning. The presenter, a chemist, will also discuss the use of “Just-In-Time Teaching” to provide continuous and immediate assessment of student progress.

Matthew Fisher  
Saint Vincent College

### **The RETUrN Learning Community: Observing the Redevelopment of a Superfund Site (2005)**

*Engineering 105*

“RETUrN” is a learning community focused on an actual place, the Alameda Naval Air Station. The redevelopment of Superfund sites involves planning and implementing solutions to the numerous scientific and sociological challenges of an individual site. The redevelopment goal of returning highly contaminated land back into a useful space for a community is dependent on the community’s input. The scientific questions to solve can be biological, chemical, and/or geological and they are coupled to the sociological questions that are also imperative to solve. For this learning community, a sociology course (taught by Phyllis Martinelli) and environmental science course, taught by the presenter, were linked thematically to the redevelopment of a former Navy base, Alameda NAS.



The model features an intensive, team-based, real-world student and faculty collaboration with extensive field-based, community-connected work. The presenter, a chemist, will discuss the development of this learning community and review strategies used to establish collaborations. Participants will also be invited to engage in a brainstorming activity regarding Superfund sites. The session will help participants discover sites, including brownfields, that are amendable for study throughout the country.

Steve Bachofer  
Saint Mary's College of California

## **RELATED SESSIONS**

### **Nine Steps to Designing a SENCER Model in About an Hour**

*Bannon 238*

(This session will be repeated.)

This exercise is to help individuals and teams imagine and design SENCER model learning communities (LCs), courses, and/or other curricular programs that foster civic engagement by teaching “through” multidisciplinary, complex, civic issues “to” basic science and mathematics, or other subjects and disciplines, for that matter.

Based on *Designing a Learning Community in an Hour* heuristic developed by Jean MacGregor and Barbara Smith ([www.evergreen.edu/washcenter/LCHour.shtm](http://www.evergreen.edu/washcenter/LCHour.shtm)), this intense, highly-interactive session will enable participants to form groups, brainstorm possible themes, choose a target student population and “topic,” establish desired learning outcomes, identify needed resources, brainstorm and catalog implementation issues, and make a poster summarizing the proposed model to share with others.

Ellen Goldey  
Wofford College

### **SENCER in Theory and Practice: An Introduction and Orientation**

*Arts and Sciences 135*

This session is designed for participants who wish to learn more about the SENCER program, its origins, goals, accomplishments, the theories and ideas that lie behind it, and to explore challenges that can arise when implementing SENCER courses. It will present an overview of the approach, consider how the approach can be applied to subject areas in STEM disciplines as well as others, and explore strategies for implementation. This informal discussion session will also serve as a special orientation to the Summer Institute for those who feel they need assistance in making the most of the SENCER experience.

David Burns  
National Center for Science and Civic Engagement (NCSCE)

Karen Oates  
Harrisburg University of Science and Technology

**5:30—8:30**

**RECEPTION AND GALA WELCOME DINNER**

*Tent in Mission Gardens*

We invite you to join your fellow SSI 2005 colleagues for refreshments and a gala dinner in the gardens of the old mission church on this beautiful campus.

*(Shuttle buses from Santa Clara University to the Fairmont Hotel will run from 6:00 p.m. to 9:00 p.m.)*

## **SATURDAY, AUGUST 6, 2005**

*(Shuttle buses from the Fairmont Hotel to Santa Clara University will run from 6:30 a.m. to 8:00 a.m.)*

**7:00—8:00**                    **FULL BREAKFAST BUFFET**  
*Tent in Mission Gardens*

**8:00—9:00**                    **HOMEROOMS**  
*Same room assignments as on Friday.*

**9:15—10:30**                  **PLENARY SESSION**

**“The Learning Sciences, Technology and Education: Uses and Opportunities”**  
*Mayer Theatre*

Karen Oates, presiding

Our plenary speaker will be Dr. John Bransford of the University of Washington, director of the NSF-sponsored LIFE Center that conducts research and develops projects on the science of learning.

**10:30—NOON**                **TEAM TIME**

**A Note on Team Time** Each team comes to SSI 2005 with work it wants to accomplish. (Excerpts of each team’s aspirations/expectations are included in your notebooks.)

Team time is the time reserved for groups to work on your projects. You can use your homeroom or another location on campus of your choice. (Your homeroom “teachers” can help arrange this.) Homeroom teachers will be available to teams during the team time and can help coordinate team contacts with other faculty for individual consultations.

Team time is scheduled in order to allow it to blend into lunch time. This means there is a total of eight hours of scheduled time dedicated to teamwork. There is no team time officially scheduled for the afternoon of Sunday, August 6th, though in past years, many teams have used that time for important work.

Scheduled morning team time reflects the recommendations of Institute members who asked for team time early in the day for two reasons: they wanted to work while they were “fresh” and they wanted to be able to schedule additional team time at the end of the day, on their own, as they saw fit.

**Team Reports** We need teams to complete a fairly simple action plan that they will submit on CDroms that we will provide. We would like each team to complete the template, as best you can, by Tuesday, August 9<sup>th</sup> and turn it in to a SENCER staff member as you enter the final plenary session on Tuesday.

**10:30—NOON**            **Alumni and Advance Representatives Session: Making SENCER Work on Campus**  
*Adobe Lodge*

This session brings together alumni and advance representatives for mentoring and guidance about making SENCER approaches to science education work on campus. A panel of alumni will provide an overview of what they have learned — including both their successes and the mistakes they made — to stimulate subsequent discussions in small groups. Small groups will be organized according to broad interest areas and will include both alumni and advance representatives. After the groups have done their work, reporters from each group will comment on the major points and themes discussed. The panel of alumni will respond to these comments, facilitate a question and answer period, and offer a closing summary.

Richard Keeling and Bill Bennett, presiding

**NOON—1:00**            **LUNCHEON**  
*Tent in Mission Gardens*

**1:00—2:15**            **POSTER PRESENTATIONS**  
*Arts and Sciences Lobby*

**A Note on Poster Presentations** We are pleased to invite you to attend a special poster session that features the work of SSI 2005 participants. A “Call for Posters” yielded a group of projects covering a broad range of disciplines and civic engagement activities including astrobiology, mathematics, scientific literacy, and genetics. Poster developers will be on hand to share their work, exchange ideas, and answer questions.

You will receive a “Poster Abstracts” booklet that includes descriptions of each project as well as contact information and pictures of session contributors. We hope that this booklet will facilitate meaningful exchanges during the institute and opportunities to follow-up after the institute.

Matt Fisher, Barbara Krumhardt, and Danielle Kraus, SSI 2005 Poster Session Coordinators

**2:30—3:45**            **CONCURRENT SESSIONS II**

**Leading Change: Decision-Making, Critical Thinking, and Cognitive Heuristics —Part I**  
*Arts and Sciences 133*

(This is the first session in a two-session workshop.)

How might one refocus a course, or a program, or a set of curricular requirements more along the SENCER lines? For faculty, chairs, deans, and academic vice presidents this seemingly simple question betokens a plethora of complex responses, to say nothing about anxious moments. The academic leadership examples used in this workshop, thought experiments and vivid illustrations, enable participants to make sense of the pulls and pushes which all of us feel from time to time as we endeavor to think and act with due deliberation and practical common sense.

Exercising leadership and making decisions in professional or other life situations are ever-present parts of human experience. So why should this be so difficult? Well, in part because leadership decision-making is itself a complex phenomenon involving the interplay within each of us of at times divergent systems of rational judgment. The fruit of thousands of years of evolution, our brains have the capacity to make holistic, expeditious, single-rule, very highly time-and-energy-efficient decisions in response to the bewildering number of decision-making opportunities which we encounter every day. We also have the ability to deliberate on our options in detail and to consider all the pluses and minuses of various choices. These different approaches are, at times, both good and not-so-good. This workshop describes the findings of cognitive researchers who have explored and endeavored to name and describe some of our most common and powerfully influential of these cognitive heuristics and biases and how they affect our decision-making and leadership.

Pete Facione  
Loyola University-Chicago

### **Teaching Controversial Subjects in Science: Continuing Challenges, New Realities**

*Bannon 236*

(This session will be repeated.)

One method for engaging students in learning about science is to deliberately present them with issues that are controversial. Other issues may generate controversy both inside and outside of science classes with little prompting from the instructor. This session will focus on (although not be limited to) current controversies surrounding the teaching of evolution and attempts by various groups to introduce “alternative perspectives” into science courses in both K-12 and higher education. We will examine the strategies being employed in this nationwide effort and consider how science faculty from all disciplines might address them within the context of SENCER.

Participants will examine how political and other considerations are influencing the teaching and learning of science and the conduct of science courses at both the local and national levels. Participants will also consider ways that they, both individually and collectively, can begin to address such challenges both before and when they are presented in science courses.

Jay Labov  
The National Academies

### **Mathematical and Statistical Reasoning in Compelling Contexts**

*Bannon 237*

Many students with interests outside of "quantitative fields" perceive much of school and college mathematics as dull, difficult, scary and totally irrelevant. For these students, mathematics is a necessary evil, or a dreaded game, rather than a subject to be enjoyed and integrated into their personal and professional lives. What, then, are

the challenges of bringing mathematical and statistical reasoning into richer contexts so that students with multiple interests, strengths, purposes and world-views might see the beauty and understand the uses and abuses of quantitative approaches? Such a reformed view of mathematics and its place in our culture would not only benefit individual students, but also support our civil society that is becoming increasingly dependent on advances in mathematics, science, engineering and technology.

The facilitator will engage participants in considering his background that begins to paint a new vision for mathematical and statistical reasoning that takes advantage of the SENCER approach of contextualizing learning. This contextualized learning departs from the more traditional and stately cumulative, hierarchical and linear learning that has been one hallmark of mathematics education. The question, “Can math be successfully taught this new way?”, will be one special focus of this discussion.

David Ferguson  
Stony Brook University

### **HIV/AIDS and Student Engagement—Part I: Course Design and Related Issues** *Bannon 238*

(This is the first session in a two-session workshop. Participants are invited to attend either or both sessions.)

HIV continues as a worldwide epidemic of unprecedented proportion and poses every bit the “multidisciplinary trouble” today as it did when June Osborn coined the phrase to characterize AIDS in the early 1990’s.

Courses on HIV/AIDS and emerging diseases tend to be some of the most attractive courses to students on many campuses. These subjects also demonstrate the need for interdisciplinary approaches to science education.

This two-session sequence is designed for faculty who wish to create courses on HIV/AIDS, as well as those who would like to expand, modify and improve their current offerings.

The sessions will involve multiple faculty who have been involved in HIV/AIDS education programs for many years in both the US and Africa. An update (focused on epidemiology and developments in medical science) on the current state of the pandemic will be provided. In preparation for the session, participants are referred to the two SENCER Backgrounders on HIV—one by Dr. Keeling and the other by Professor Meyer for preparation for these sessions, and to Dr. Devanas’ course model, Biomedical Issues of HIV/AIDS.)

Topics of special relevance to faculty will include strategies for developing courses that effectively introduce students to the science of HIV/AIDS, developing connections to the local community, and stimulating active learning and engagement in students.

A second session will focus on implementation, including issues of getting SENCER courses appropriately placed in the curriculum.

Sherryl Broverman  
Duke University

Monica Devanas  
Rutgers University

Marion Fass  
Beloit College

Richard Keeling  
National Center for Science and Civic Engagement (NCSCE)

Debra Meyer  
University of Johannesburg

### **Active Learning Techniques in Large and Small Classes**

*Bannon 241*

For more than a decade, national leaders in STEM education, including the National Research Council and the National Science Foundation, have been extolling the value of teaching science through active learning. Most of us who teach in the sciences appreciate the value of hands-on learning, and incorporate these in our courses through laboratory experiences. But there has been less incorporation of active learning in the “lecture” portions of our classes. This session will demonstrate a number of techniques that foster active learning in science classes. Ways to adapt the techniques to different sized classes will be discussed. Participants will experience a number of the techniques, and have the opportunity to reflect on how they could be used in their own classes.

Laurie Fathe  
George Mason University

### **Service-Learning and the Sciences 101**

*Bannon 332*

This session describes the basics of designing service-learning opportunities in order to enhance student learning in the sciences. The format includes a presentation of service-learning definitions/models, reflective analysis techniques, and guidelines to assess student learning. In addition, participants will have the opportunity to engage in a discussion about how to utilize campus resources and develop partnerships with local nonprofit organizations. Essential paperwork, such as "service-learning agreements" and "risk release forms" plus guidelines to develop a science course that incorporates service-learning will be available along with websites where participants may access additional materials.

Lynn Leavitt  
George Mason University

### **How Do Students Learn?: A Follow-up Conversation with John Bransford**

*Bannon 333*

This informal session will enable participants to pursue issues raised in the plenary session with the speaker, John Bransford, and to learn more about the NSF-supported LIFE Center's research agenda.

John Bransford  
University of Washington

### **The Intellectual Challenge of Diversity**

*Bannon 334*

Here is how the presenter, a SENCER model developer and Senior Associate, describes her rationale and aims for this session:

“What do race and ethnicity have to do with teaching thermodynamics?” Ten years ago, this question surprised me when a colleague posed it. At the time, I had never before heard the word thermodynamics used in the same sentence with the words race and ethnicity. But this question marked the beginning of a journey into examining my own teaching practices. For me, bringing together science and ethnicity posed several intellectual challenges. The first was rephrasing this and other questions.

In this session, I will explain how I asked new questions and in the process met the challenge of moving ethnicity from the margins of the textbook to the center of my course. Together we will explore a model for teaching "through" issues that affect people, especially people of color.

Catherine Hurt Middlecamp  
University of Wisconsin—Madison

### **Where Does Science Fit in a 21<sup>st</sup> Century Education?: A Follow-up Conversation with Rosemary Haggett**

*Arts and Sciences 129*

This informal session will enable participants to follow up on the issues raised in Dr. Haggett's opening plenary remarks. It will also feature a brief description of the NSF-sponsored series of planning discussions on what it means to be liberally educated in the 21<sup>st</sup> century and where science fits into that education. Dr. Haggett will be joined in the discussion by Ralph Rascati (SSI 2001) of Kennesaw State University. Dr. Rascati coordinated one of the regional conversations for PKAL.

Rosemary Haggett  
National Science Foundation

Ralph Rascati  
Kennesaw State University



## **Think, Do, Reflect: Experiential Learning Outside the Classroom**

*Arts and Sciences 135*

Experiential learning outside the classroom adds meaning and excitement to learning. This session will explore how experiential learning opportunities may be successfully incorporated into many classes as part of restructuring to develop course learning communities. Participants will explore the development of Kolb-based experiential learning, demonstrating how real world experiences fit seamlessly into traditional course profiles.

This working session is designed to help you develop ideas for experiential learning outside the classroom, often in collaboration with community organizations. Examples will include field-based exercises demonstrated in the model course *Mysteries of Migration*.

Discussion will include the use of interdisciplinary readings, journal techniques and thoughtful reflection. Participants are invited to share their experiences. We hope to brainstorm experiential learning opportunities to incorporate into your courses.

Tom Wood  
George Mason University

## **Assessment: Using the SALG Website to Implement the SENCER-SALG Instrument**

*Engineering 105*

(This session will be repeated)

In this session, participants will be shown how to collect their SENCER-SALG pre- and post- data through the SALG website. The purpose of the SENCER-SALG will be described and participants will be given an introduction to the overall structure of the website. The presentation will afford participants an opportunity to “walk through” the process of using the site. Participants will be able to see the data for all students collected through the SALG site, as well as other data they can access from the site. Lessons learned from previous usage will be discussed. As the SENCER-SALG is in a continual state of development and improvement, input into the development process will be solicited and discussion will be encouraged.

Sue Lottridge  
James Madison University

Tim Weston  
University of Colorado, Boulder

**What Is “Civic Engagement”?: Changing Perspectives from Dewey to DotNets**  
*Engineering 106*

The goal of “civic engagement” lies at the core of SENCER’s educational mission. But what exactly do we mean by this term? Does “civic engagement” imply a way of thinking about knowledge in a democratic society? Or does it require personal action in a civic context? This session will examine some of the philosophical, pedagogical, and sociological writings on civic engagement. We will begin with John Dewey’s perspectives on education as the intersection of individual and societal development. We will compare Dewey’s views to contemporary literature on “educating citizens” within the context of the undergraduate liberal arts. Finally, we will examine whether these descriptions of civic engagement have any relevance for today’s students, who belong to the so-called “DotNet generation” (15 – 25 year olds). As educators, how should our perspectives be influenced by a recent survey finding that “more than half of the DotNets (57%) are completely disengaged from civic life”?

Trace Jordan  
New York University

**4:00—5:15                      CONCURRENT SESSIONS III**

**Leading Change: Decision-Making, Critical Thinking, and Cognitive  
Heuristics —Part II**  
*Arts and Sciences 133*

(This is the second session in a two-session workshop. Participation is open only to those who have attended Part I.)

Pete Facione  
Loyola University—Chicago

**Teaching Controversial Subjects in Science: Continuing Challenges,  
New Realities**  
*Bannon 236*

(This session repeats an earlier one.)

One method for engaging students in learning about science is to deliberately present them with issues that are controversial. Other issues may generate controversy both inside and outside of science classes with little prompting from the instructor. This session will focus on (although not be limited to) current controversies surrounding the teaching of evolution and attempts by various groups to introduce “alternative perspectives” into science courses in both K-12 and higher education. We will examine the strategies being employed in this nationwide effort and consider how science faculty from all disciplines might address them within the context of SENCER.

Participants will examine how political and other considerations are influencing the teaching and learning of science and the conduct of science courses at both the local and national levels. Participants will also consider ways that they, both individually and collectively, can begin to address such challenges both before and when they are presented in science courses.

Jay Labov  
The National Academies

### **Engaging Minority Students in STEM Education**

*Bannon 237*

Over the last two decades Stony Brook University has developed some highly successful programs for engaging underrepresented minority students in science, technology, engineering and mathematics (STEM) disciplines and careers. Much of that success has come as a result of building sub-communities that allow the special needs of certain groups to be addressed while at the same time engaging students with the vast human and material resources of the broader University.

The facilitator will open the session with a brief overview of the evolution of minority in STEM efforts at Stony Brook University. Quickly, the discussion will turn to individual institutional contexts so that participants can share challenges, successes, and emerging practices. The overarching goal is to have participants begin to develop plans to enhance the participation of minorities within STEM disciplines at their institutions.

David Ferguson  
Stony Brook University

### **HIV/AIDS and Student Engagement—Part II: Institutionalizing Your SENCER Course**

*Bannon 238*

(This session is the second in a two-session workshop. It is open to all those interested in implementation issues, regardless of attendance in Part I.)

The faculty in this session have all taught HIV/AIDS and disease classes at a range of institutions in the US and Africa. The presenters will discuss the various stumbling blocks such a course may encounter, such as: placement within the curriculum (Biology? Sociology? Introductory? Capstone?); identification of the intended audience; assignment of teaching credit for team taught courses; balancing scientific coverage versus social issues; balancing content versus activities; and making the case to your colleagues, chair or dean for support for your activities.

While the session will speak about experiences with HIV/AIDS courses, many of the issues to be raised are common to all SENCER courses.

Sherryl Broverman  
Duke University

Monica Devanas  
Rutgers University

Marion Fass  
Beloit College

Richard Keeling  
National Center for Science and Civic Engagement (NCSCE)

Debra Meyer  
University of Johannesburg

### **Building Structures into Your Classes to Enhance Student Learning**

*Bannon 241*

Traditionally, even very capable students with weak math backgrounds and low confidence have quickly disappeared from the ranks of college science and mathematics classes. But it is possible to stem this loss by building in structures to help students (and faculty) identify student weaknesses and build needed skills and basic knowledge. This session will discuss how to do this, using a real world model, a combined physics, pre-calculus, and calculus class designed for weakly-prepared students.

This session will provide an overview of the course and its structure, and discuss various student-centered techniques that can be used to enhance learning in science and mathematics classes. It will also discuss how such support structures help all students and can be incorporated across the curriculum.

Laurie Fathe  
George Mason University

### **Two-Year Schools, STEM Education, and SENCER**

*Bannon 332*

(A second session time for this discussion has been scheduled for Monday, August 8<sup>th</sup>, in Concurrent Session VI.)

Two-year schools are playing an increasingly important role in providing affordable access to quality education for almost half of all students attending public institutions of higher education in the United States. Quality teaching is the primary responsibility of faculty in two-year schools, and thus those who teach in them maintain a strategic position at the forefront of educational reform. Despite the opportunity to be a catalyst for change, we are often forced to work under the administrative rules created by four-year institutions, a system in which we provide

little to no input. Course transferability is but one of the many issues involved in efforts to successfully revitalize the STEM curriculum; other issues include workload hours, reward structure and compensation, support for innovative efforts, availability of teaching and laboratory resources, and assessment. Regardless of the limitations, two-year schools can provide an integral foundation for engaging students in STEM education, and faculty can provide leadership through developing innovative, inquiry-based, civically-oriented, STEM curriculum.

The session will primarily involve an open discussion among participants on the key issues facing two-year schools, especially those related to STEM education and SENCER. Our objectives in this session are the following: 1) to clearly articulate strengths, weaknesses, opportunities, and threats facing our schools, in order to better prepare for the future; 2) to create a set of suggested practices and policies that can act as a catalyst to support and sustain future innovations in STEM education, including curriculum changes influenced by the SENCER ideals; 3) to create a network of educators whose mission is to support the efforts of our colleagues in two-year institutions to become leaders in science education, scholarship and research, to promote seamless science and math education at all levels, and to support the development of meaningful learning experiences for all our students. (This is an ambitious agenda, to be sure, for one session, hence a second concurrent session has been reserved for 2:45 pm Monday afternoon to accommodate interest in pursuing the discussion at SSI 2005.)

Theo Koupelis  
University of Wisconsin—Marathon

Brian Hagenbach  
Holyoke Community College

Dennis Lehman  
Harold Washington College

**Writing in Science Courses: Mission Possible**  
*Bannon 333*

When writing assignments are included as part of your new (or old) course, several questions naturally arise: What might you keep in mind when designing your writing assignments? Once students turn in their papers, how do you respond to them? What are the ups and downs of peer review? Based on many semesters experience teaching an environmental chemistry course as “writing intensive,” this workshop will give lots of practical examples of what worked ... and what didn't.

Catherine Hurt Middlecamp  
University of Wisconsin-Madison

## **Civic Engagement: The Classroom and the Campus as a Civic Space**

*Bannon 334*

(This session will be repeated.)

What do we mean by civic engagement? The SENCER ideals will be used and as a model for organizing SENCER courses and will be presented as a springboard for discussing the many possibilities and ideas that are contained in the idea of “civic engagement.” Confronted with the job of organizing a course and a classroom, how can we think about how our choices determine what kind of civic space we create? This informal discussion session is designed to solicit members’ experiences, thoughts, and recommendations for how we can make SENCER courses “models” of the kind of civic engagement we desire in the larger world.

Also open for discussion is the somewhat more challenging question of how to make campuses authentic civic spaces, a matter of special relevance to SENCER aspirations, given SENCER’s emphasis on issues that can be said to cause “multidisciplinary trouble.” What are the cultural practices and norms that we need to consider, well beyond C.P. Snow’s still thorny dichotomies?

David Burns

National Center for Science and Civic Engagement (NCSCE)

## **Our Students as Partners in “SENCERizing” the Curriculum**

*Arts and Sciences 129*

Where do we find the creativity, energy, and fresh insight to revitalize our courses and programs? Who are the role models that motivate students to become more active learners? Who can provide unique insight into the mind and lives of students? The answer to these questions should be obvious, but it is often overlooked. Our undergraduates possess a variety of talents, but they are rarely given and opportunity to apply these talents to curriculum reform. When we invite our leading students to partner with us in this effort, the effects can be rewarding and far-reaching.

Facilitators of this session will describe specific ways in which they have partnered with students to seek external funding, plan and implement new courses, enrich mentoring and support services, facilitate classroom discussions, develop experiential and service learning activities, assess learning outcomes, market effective programs to various constituencies, and more. The students in the partnership develop confidence, maturity, pedagogical understanding, and communication skills, and they also inspire higher performance from their peers.

Concomitantly, professors learn from, and are energized by, these partnerships as well. Participants will be encouraged to share comparable experiences as we consider the ways and means to partner with talented students to further “SENCERize” our curriculum.

Ellen Goldey  
Wofford College

Steve Bachofer  
St. Mary’s College of California

Barbara Tewksbury  
Hamilton College

### **The ABC’s of Classroom Assessment in Higher Education**

*Arts and Sciences 135*

This session reviews basic assessment and evaluation concepts and discusses how concepts are applied to classrooms and small-scale program assessment. The presenters will outline basic assessment issues including the difference between assessment for diagnostic and accountability purposes, assessment levels, content domains, and assessment methods. The standard classroom assessment model for higher education (learning and performance objectives) will be presented and critiqued in light of innovative instructional and assessment practices. Case studies of best practices in assessment will also be presented.

Tim Weston  
University of Colorado, Boulder

Sue Lottridge  
James Madison University

### **The Perfect Fit: Using a Personal Response System in Your Courses**

*Engineering 105*

Personal Response Systems (PRS) have become amazingly popular over the two plus years they have been generally available, and for good reason. This session will describe the brief history of PRS, review at least some of the various systems available, suggest how you can encourage its implementation at your institution if it isn’t already available, and provide recommendations for using the system to improve student engagement and learning in any of your classes, large or small, and especially SENCER courses. Use of PRS is an excellent reinforcement of SENCER goals, and entirely consistent with the model of actively engaging students in the learning process. Use of PRS in your own classes will also demonstrate unequivocally how little students understand your lectures, if your experiences are anything close to mine!

The presenter will discuss his own experiences using the Personal Response System over the past two years in classes ranging from 10 students to 300 and provide some data on how much students say they like and learn from the system. This session will

also actively engage those present by having you use the system to answer some of the same questions posed to students in my own SENCER biology course for non-majors (not to worry, all responses are anonymous!). There will be ample time for those present to share their own experiences using PRS and to discover how the PRS can help professors improve their teaching as it helps students improve their learning.

Carl Huether  
University of Cincinnati

### **The “Ideal” Department: Some Strategies for Creating One** *Engineering 106*

In this session, a seasoned academic administrator will discuss strategies for organizing departmental work so that institutional missions in research, teaching, and service can be maximized and departmental members are encouraged and rewarded for employing their strengths in the service of the larger educational mission—the “corporate” responsibility of all educators.

The presenter, drawing on his experiences as a professor of chemistry, chemistry department chair, provost, and president will review some of the rude awakenings he’s experienced as a naïve academic who became a practicing administrator. He’ll also try to answer the question: is there anything of intellectual value that can be learned from academic administration?

The session is intended to be informal, highly interactive and fun. Participants will be encouraged to develop a set of ideals and strategies that SENCER can disseminate to assist in program implementation at collaborating campuses.

Melvyn Schiavelli  
Harrisburg University of Science and Technology

### **Consultations**

During this concurrent session time slot, a cohort of model developers and SENCER core faculty will be available for specific consultations with individuals and teams. A list of consultants available during Concurrent Session II will be distributed in the homeroom sessions.

### **5:30—7:15                    RECEPTION** *Tent in Mission Gardens*

Join your colleagues for rather substantial hors d’oeuvres and a cash bar at this opportunity to socialize and meet our SENCER Senior Associates and one another following this very full day of work.

*(Shuttle buses from Santa Clara University to the Fairmont Hotel will run from 6:30 p.m. to 8:30 p.m.)*

### **7:30—10:00                    ALUMNI RECOGNITION DINNER** (By Invitation) *Crystal Ballroom, Fairmont Hotel*



## **SUNDAY, AUGUST 7, 2005**

**7:00—9:00**                    **COFFEE/TEAM TIME**

*(Teams should feel free to use the tables Regency Foyer; Coffee and tea will be provided.)*

**9:00—10:15**                **PLENARY SESSION**

### **“Designing a SENCER Course: Don’t Just Bang It to Fit and Paint It to Match”** *Regency Ballroom*

Eliza Reilly, presiding

The most common method of designing a course involves making a list of content items, organizing those items into a topical outline that becomes a syllabus, and fleshing out the topical items with appropriate lectures and labs. While this method produces courses that are well-organized in terms of presentation of material, the whole process can be accomplished without ever articulating the underlying goals of a course beyond those of content coverage and without consciously deciding which teaching strategies and assessments are most appropriate for achieving the goals of the course.

Designing a SENCER course is a challenge. Focusing on articulating and achieving course goals, rather than on building a course around a list of content items, is one practical way of creating a course that will help you avoid the "beat it to fit, paint it to match" trap.

This plenary session will get you started in thinking about an alternative way to design courses—one that focuses on students, builds assessment in from the start, and encourages you to think seriously about "transferability" and how your course prepares students for their futures.

Barbara Tewksbury  
Hamilton College

**10:15—12 NOON**    **A WORKING BRUNCH**

### **How Can Global Experience Improve Science Education?** *Market Street Foyer*

We’re inviting participants to join together to explore a critical contemporary campus issue—“globalizing learning.”

To do this, we will need to move as quickly as possible through the brunch buffet to join one another at tables that will be hosted by one US and one international SENCER representative.

At the roundtable discussions, please share your thoughts on concrete ways and means to “internationalize” science education in order to improve learning and fulfill the SENCER ideals. Please help us suggest directions for SENCER’s international activities by exploring answers to the following questions, and others you think are important:

Why internationalize science education? How will internationalizing science education and civic engagement improve SENCER courses? How can we measure improved learning from internationalization initiatives?

We’re asking each roundtable to identify one or two “best practices” for institutionalization and follow-up activities with SENCER participants after SSI 2005. Each table will be asked to designate a “rapporteur” who will be responsible for recording the main points of the discussion. These will be published in the SSI 2005 Daily News, subsequent SENCER E-Newsletters, and will form the basis of developing work.

Ardith Maney, Debra Meyer, Ia Zhvania, and Karen Oates, presiding

## **12 NOON                      Field Trip to the Monterey Bay Aquarium**

*(Requires pre-registration and the payment of transportation and admission fees.)*

The Monterey Bay Aquarium is recognized as one of the outstanding modern aquariums in the world. As such, the Aquarium has an innovative education division, reaching millions of visitors and students annually. The Aquarium has developed creative programs for K-12 students, teachers, undergraduate and graduate students. The programs emphasize interaction with aquarium staff, hands on experience with exhibits, and opportunities to explore the natural world around Monterey Bay.

The Monterey Bay Aquarium Research Institute (MBARI) is part of the aquarium’s Information and Technology Dissemination Division. It exposes students to discovery based learning as researchers explore the vast submerged canyons of Monterey Bay. College students and teachers are a major education audience of MBARI programs.

Overall, Monterey Bay Aquarium education programs exemplify SENCER ideals and demonstrate the collaborative capacity that can be achieved when innovative educators in the classroom and in the community unite. This field trip will enable participants to develop first-hand knowledge of how to collaborate with community-based intellectual resources.

Field trip coordinated by Tom Wood

## **MONDAY, AUGUST 8, 2005**

*(Shuttle buses from the Fairmont Hotel to Santa Clara University will run from 6:30 a.m. to 8:00 a.m.)*

**7:00—8:00**                    **FULL BREAKFAST BUFFET**  
*Tent in Mission Gardens*

**8:00—8:40**                    **HOMEROOMS**  
*Same rooms as assigned on Friday.*

**8:45—10:15**                **CONCURRENT SESSIONS IV**  
**SENCER ALUMNI SYMPOSIA: A CELEBRATION OF WORK**

### **PANEL I ORGANIZING COLLEGE-WIDE REFORMS IN GENERAL EDUCATION THROUGH THEMES AND TOPICS**

*Arts and Sciences 133*

Pete Facione (SSI 2003), Chair  
Ralph Rascati (SSI 2001), Responder

#### **Science Education at Stonehill: Changing the Culture**

Stonehill College has spent the last four years introducing a new general education curriculum, The Cornerstone Program. The design and implementation of such a new program, which emphasizes learning outcomes and interdisciplinary connections, entails changing the culture and the expectations of both faculty and students.

In this session, specific problems encountered as the faculty designed and implemented the science components, particularly for non-science majors, will be highlighted. Ideas for solving such problems will be solicited from participants. The strengths and the weaknesses of the general education science curriculum will be discussed. Special consideration will be given to the question of how to reach the goal of focusing the curriculum more explicitly on SENCER ideals.

Maria Curtin  
Stonehill College

#### **The Application of SENCER Values to Curricular Revision: UNC Asheville's Integrative Liberal Studies Topical Clusters**

This presentation examines the curricular review and reform process at UNC Asheville, in particular the development of the ILS Topical Clusters, which feature the topical integration of natural science, social science, humanities and the arts, as the means for delivering the liberal arts curriculum. The Topical Clusters strategy steps away from traditional introductory course approaches to general education. In the new approach, faculty members are constructing course-level curricula around complex, unresolved public issues. Courses in the clusters address these issues from disciplinary perspectives while strengthening cross-disciplinary connections. Faculty members engage in collaborative curriculum development and choose from a variety

of curricular and co-curricular activities to enrich and supplement the classroom experience. Clusters leverage the strengths of learning community pedagogies, while providing a cost-effective means for curricular development and delivery.

Participants will be encouraged to explore the benefits of cluster approaches for encouraging SENCER-style curricular reform, suggest their own “sample” cluster topics and courses; generate guiding concepts, activities, and co-curricular enrichments to support their clusters, and discuss their own reform efforts with colleagues from other institutions.

Edward J. Katz  
Keith E. Krumpe  
University of North Carolina at Asheville

## **PANEL II PROMOTING EARLY AND ROBUST ENGAGEMENT IN THE SCIENCES BY ALL STUDENTS**

*Bannon 236*

Theo Koupelis (SSI 2001), Chair  
Cheryl Jacobsen (SSI 2001), Responder

### **The S.C.I.E.N.C.E.S.: The Success Catalyst – Instructors Energizing Novel Courses & Engaging Students**

Success of SENCER courses is as much a matter of the topics chosen as the instructors who teach them. At Ball State University we are engaged in several different approaches to teaching SENCERized course topics for non-science majors in the biological sciences. Our departure from the well-beaten “survey” course path has led us through various combinations and formats.

Ball State’s seven courses thus far include: Water Quality – Science for Today and Tomorrow; Weapons of Mass Destruction; Biotechnology – Science and Issues; Social Eye for the Biology Guy/Gal; Food Biotechnology – Focus on GMOs; and Food, Values, Politics & Society and its sister course Food, Science, Politics & Society. These courses have been taught by team instructors, supervisory instructor with a doctoral candidate instructor, and by single faculty members.

This session will use the Ball State experience to illuminate key issues for those who are designing SENCER courses. It will reprise several approaches to fostering civic engagement and review Ball State’s use of the Socratic method for getting students to think about such questions as: What is science? Who does science? How is science done? How much does science cost? Who pays for science? Who regulates science? What is civic engagement? What is the role of the public in science and scientific research?

Ann Blakey  
Ball State University

## **Science in the Modern World: A Novel Approach for Integrating Science General Education Into the Freshman Program**

An appreciation of modern science and its role in society is essential for an educated and enlightened citizenry. While this is sometimes called “scientific literacy,” the goal at SUNY Purchase is broader. Science in the Modern World is a course for non-science majors integrated into the freshman program to provide a common experience and introduction to science. It will allow students to apply their understanding of scientific issues over their four years and will inform their subsequent studies.

Attractive science courses in the freshman year will give students the opportunity to recognize or develop their nascent interests in science and to pursue those interests, whether as a major or minor.

Science in the Modern World consists of a series of sections taught by Biology, Chemistry, Environmental Studies, and Psychology faculty that share a similar structure and a set of common, overarching goals, including substantive material from the appropriate science. Each course provides the intellectual substance to understand some of the important scientific issues of our times, to discover the connection between science and enlightened public policy, to understand the role of science in modern society, and to promote civic engagement and responsibility.

This session will involve participants in a discussion of our Purchase College case study for a series of SENCER-type courses for our freshman program. We will consider the process of curriculum development and gaining faculty and administrative approval. Finally, we will discuss and solicit suggestions for pedagogical methods to encourage civic engagement within and outside the classroom.

Jan Factor  
Jim Daly  
Purchase College, State University of New York

### **PANEL III EXPANDING THE INFLUENCE OF SENCER IDEALS BEYOND COURSES FOR “NON-MAJORS”: APPLYING WHAT WE KNOW ABOUT LEARNING TO WHAT WE DO WHEN TEACHING**

*Bannon 237*

Laurie Fathe (SSI 2001), Chair  
Laura Blinderman (SSI 2004), Responder

### **SENCER and Pedagogical Change at the Institutional Level**

The pedagogy of SENCER is one that embraces concepts that are engaging professors and administrators across the curriculum. Civic engagement, active learning and interdisciplinary education are educational issues that cut across disciplines. Many institutions have used SENCER courses as a way to infuse active learning strategies across the curriculum and to model new ways of connecting knowledge.

What happens when SENCER principles move beyond science and influence interdisciplinary teaching and active learning beyond the SENCER course? How can the SENCER team promote pedagogical reform through individual efforts, administrative support, and adaptable academic structures?

This session will explore institutional change strategies that build upon the successes of SENCER courses and have moved from one course to larger initiatives.

Marion Field Fass  
Beloit College

### **Pedagogical Shifts/Paradigm Shifts: SENCER and the Education of Science Majors**

There is a pervasive belief that SENCER approaches are incompatible with “information rich” courses for science majors.

However, at Rutgers University we have demonstrated that teaching approaches that work for non-majors are also extremely effective in teaching science majors.

Topics to be discussed include rearranging the textbooks, engaging the students, and soliciting and responding to student concerns.

Reinventing the courses increased student achievement much more than “covering the material.”

Terry McGuire  
Rutgers University

### **PANEL IV FOCUCING ON FUTURE EDUCATORS: TWO APPROACHES FOR STRENGTHENING TEACHER EDUCATION THOUGH NEW CURRICULAR COLLABORATIONS**

*Bannon 238*

Cathy Middlecamp (SSI 2001), Chair  
Cindy Klevickis (SSI 2002), Responder

### **Interdisciplinary Activities and Data-Driven Civic Decision-Making**

Hampton University has participated in two programs that promote civic engagement around two science topics, Riverscape: an ecology model (see the SENCER Model Series) and Project Pitch. Project PITCH (funded through AAC&U) aims to develop an interdisciplinary HIV education curriculum supplement for area high schools, and then, to pilot test the educational activities with high school participants in a summer session program on campus.

Both of these projects aim to develop into campus-wide activities with greater funding and increased visibility. In this age of accountability, however, institutions

need to demonstrate a civic engagement philosophy and the new pedagogies produce significant gains in learning. This requires a dynamic assessment system.

To help discover the “value added” by the approaches undertaken, data from courses where authentic audiences are addressed in real world contexts have been compared to data collected from other courses taken at the same time, as well as to other similar courses that did not embrace a problem-based approach. The researchers wanted to determine what cross-disciplinary connections students are making and how these connections are impacting their future education and career plans.

This presentation will discuss how data from research shape student decisions about civic engagement, influence how they choose to deliver new course content as teachers-in-training, and affects their decisions on what elements of the message about science and civic engagements are seen as most important for their audiences.

Anne Pierce  
Judith Davis  
Hampton University

### **Elon University’s *Science Without Borders*: SENCER-izing a Multidisciplinary Science Course**

*Science Without Borders* is a non-majors multidisciplinary non-lab science course at Elon University. There are multiple sections of this ‘non-departmental’ course, designated SCI 121, taught each fall and spring semester by faculty members in the biology, chemistry, physics and engineering departments. Course content taken from [The Five Biggest Ideas in Science](#) (Wynn and Wiggins) includes the model of the atom, periodic table of the elements, Big Bang theory, plate tectonics, and biological evolution.

*Science Without Borders* not only serves to inform and educate future citizens about scientifically relevant civic issues, it serves to prepare and support future educators. The course now fulfills a science requirement in the elementary and middle grades education curriculum. Through modeling effective pedagogies for teaching science, faculty members identify education majors to mentor as teaching assistants. Pedagogical strategies include the use of a published ‘course pack’ of hands-on, minds-on class activities that engage students in the process of scientific thinking and problem solving.

Team members teach the scientific content of the course ‘through’ various public issues in accord with the SENCER ideals. This session will describe the scientific course content and various pedagogies used by different faculty to implement SENCER ideals. Topics to be covered include the development of student mentoring for pre-service teacher educators, a review of the administrative structure that supports this ‘non-departmental’ science course and details on the SoTL (scholarship of teaching and learning) proposal based on the course that was featured at the June 2005 CASTL (*Carnegie Academy for the Scholarship of Teaching and Learning*) Institute: *Developing Scholars of Teaching and Learning* in Chicago, IL.

Sandra Seidel  
Elon University

## **PANEL V STIMULATING STUDENTS TO PRODUCE AND DISSEMINATE NEW KNOWLEDGE**

*Bannon 332*

Monica Devanas (SSI 2001), Chair  
Arthur Bowman (SSI 2003), Responder

### **Using Group SENCER Poster Sessions in Large Lecture Classes**

Large classes pose significant challenges for instructors attempting to engage students in SENCER activities. Poster presentations about SENCER group projects represent one promising approach that encourages students to share what they have learned with their classmates. Additionally, by doing poster presentations, students learn how poster sessions are conducted.

In this session, participants will discuss methods of forming student groups in large classes. Through brainstorming, we will identify and evaluate ideas for SENCER projects your classes, estimating the class time required for the entire activity. Methods for evaluating group work and posters and evaluating individual student participation in the projects will be shared. Strategies to encourage student interaction during poster sessions will also be presented. The merits and liabilities of methods shared will be discussed. You should leave the session with concrete ideas for SENCER-izing your own classes.

Barbara Krumhardt  
Iowa State University

### **“Jumping into the Abyss; Flying with the Eagles”: Taking Risks and Learning How to Apply a SENCER Approach in Undergraduate Course Projects**

The SENCER Institute inspires and motivates participants to infuse SENCER ideals throughout all levels of their respective university settings. Efforts often start, appropriately, within the science arena and focus on new courses. Yet existing courses present a ready supply of opportunities to SENCERize learning outcomes. Courses in education may seem far removed from science, yet with further examination and clear vision, they provide fertile ground for engaging students in integrative learning that embraces scientific material. This presentation is designed to inform participants of the opportunities that lie outside science courses. Through the use of SENCER ideals, it will develop strategies for converting assignments within capstone courses in any number of disciplines.

Following participation in SSI-2004, the presenter jumped feet first into the implementation of a SENCER approach (involving students preparing to be elementary school teachers who chose to develop projects on a variety of issues within an undergraduate capstone course). The student projects lurched along over an initial bumpy timeline and an ensuing revision process, but emerged with some surprisingly inspirational outcomes.



This presentation will review methods for incorporating science-based topics and projects in capstone courses. Issues to be discussed include: making decisions about group process, handling collaborative responsibilities, overcoming pacing challenges, sharing evaluation and assessment components, and building faith and confidence within a resistant constituency.

The range of topics chosen by pre-teacher candidates included: obesity, water pollution, urbanization, the effects of smoking, malnutrition in Somalia, whale migration, and recycling. These topics formed the basis for projects that were developed through literature reviews and research activities that included civic engagement components and community service.

Cross-disciplinary applications exert a constant and challenging influence in these capstone courses. The presentation will strive to demonstrate how, even though content integration often makes for strange bedfellows, it also creates new alliances and suggests promising new directions. The presenter will offer her own list of what to-do and not-to-do when implementing SENCER strategies within existing courses.

Donna Cucunato  
Chapman University

## **PANEL VI CONNECTING CONTEXTS TO CONTENT TO IMPROVE LEARNING**

*Bannon 333*

David Ferguson (SSI 2001), Chair  
Eleanor Siebert (SSI 2003), Responder

### **Vote Early, Vote Often: The Mathematics of Democracy**

At Wartburg College, we offer a mathematics course for students who have demonstrated proficiency in basic algebra, but have no need of a particular area of mathematical study for their intended major. This course originally had SENCER-like elements, but no overarching SENCER theme.

Over the last year or two, we have been steering that course towards the theme of the Mathematics of Democracy. The course covers topics from the mathematics of social choice, such as voting theory (including a newly discovered way of visualizing this theory), power indices, fair division, and apportionment, as well as topics required to understanding election polling including basic statistics, mean, median, margin of error, and other sources of statistical error.

This approach allows us to improve student skills in many useful areas of mathematics, while giving the students a context in which to see why they must keep these skills alive.

This presentation will demonstrate how the SENCER ideals can be developed into a mathematics course that will satisfy and even intrigue mathematicians, not to mention engaging students. The session will also share resources about the mathematics of social choice.

Mariah Birgen  
Wartburg College

### **An Analysis of Some Strategies That Stimulate Civic Engagement in Large Classes**

Is it possible to incorporate civic engagement activities into the fabric of large, content-driven, introductory science classes? Absolutely. The infusion of civic engagement into Chemistry 151, as an example, has transformed the course from a typical lecture-based requirement at The University of Montana into an academic success and a public relations showpiece.

The course serves an annual student population of 650 students (450 in the fall and 200 in the spring) destined for careers in the applied sciences – forestry, wildlife biology, health care professions, exercise physiology, etc. These career aspirations represent a set of “contexts” in which learning and civic engagement can be stimulated. Students address real issues interweaving local environmental and public health issues into the course content, participating in the formulation of local air and water quality policy, staffing of local research conferences and science fairs, or mentoring at-risk grade school students.

The presentation will describe the course infrastructure that underpins the civic engagement component. It includes the deceptively simple grading scheme that houses an “extra credit” mechanism to subtly entice students into contributing out-of-class time to community activities. The presenter will demonstrate how his involvement in research on local environmental problems is adapted into sample problems for the traditional chemical topics that comprise an introductory course. (Some of these issues are also embedded in PowerPoint sequences used as remedial mathematical aids.).

The presentation will offer quantitative results on how the civic engagement components have impacted student academic performance in the course. The extra credit mechanism, for example, contributes to a measurable, though personally acceptable to the instructor, inflation in course grades (on the order of 3 to 6%). Graphical results of raw quiz/exam averages versus civic engagement participation to substantiate that students at both ends of the academic spectrum are avid consumers of the out-of-class opportunities. SALG results will also be presented and analyzed.

Garon Smith  
University of Montana

## **PANEL VII GETTING REAL AND GOING LOCAL: NEW RESOURCES TO IMPROVE ENVIRONMENTAL SCIENCE EDUCATION**

*Bannon 334*

Tom Wood (SSI 2001), Chair  
Rob Furey (SSI 2001), Responder

### **Technology for Civic Engagements: Using a Field-Portable XRF**

The field portable XRF elemental analyzer is versatile instrument that can support instruction on fundamentals on sampling and facilitate civic engagement experiences in chemistry, biology, and general science labs (and geology labs too). Students can easily conceptualize the instrumental method of detecting various elements and recognize the limitations of their sampling with appropriate field laboratory experiences. Since the instrumentation gives off ionizing radiation and students must be adequately educated on the potential radiation risks, the use of the technology provides a significant opportunity to learn about radiation. Since the methodology is nondestructive, samples can be analyzed by other methods, as well.

This session will feature a brief introduction to a few of the uses of field portable XRF, in particular, soil and lead in paint surveys performed with students. An instrument will be demonstrated followed by discussion of potential application noting some current examples in the literature. The demonstration may include sampling soils around collected from nearby locations. In addition to introducing this versatile instrumentation, the presentation will demonstrate how its use can be integrated into the curriculum to teach fundamentals and support civic engagement experiences. The presenter will also suggest how the use this instrumentation can lead to more collaborative mini-research projects linking STEM faculty and students (such as Chemistry, Biology, and Geology) with other disciplines including anthropology and art. While some barriers to implementation will be identified, the presenter will show how these barriers can become opportunities for increased learning.

Steve Bachofer  
St. Mary's College of California

### **Using the ESA21 Project Activities in Science Classrooms**

This talk will present an update on the results of the Environmental Science Activities for the 21st Century (ESA21) Project. An overview of the materials developed for the project will be given, as well as a discussion of the assessment of its impact on student learning. These assessments (done with the SALG instrument) have shown that the activities in the project have increased student interest in a variety of activities, as well as enhancing their learning experience. Results from the most recent assessments, as well as from past years, will be presented. Recent developments to modify the activities for use in secondary science classrooms will also be reviewed.

Designed by a consortium of scientists at Kennesaw State University, Bowling Green State University, Community College of Baltimore County, and the University of Southern Mississippi, the activities in the ESA21 project are a mixture of hands-on, field, and Internet experiences that seek to increase student awareness of their place in the environment. The activities in the project are grouped into multi-week modules that address a particular topic in environmental science, such as energy usage, biogeochemical cycling, and water pollution. Each module gives the students an in-depth introduction to the topic and is completed with a capstone activity that allows the student to estimate how their personal lifestyle impacts this issue.

John Pratte  
Kennesaw State University

**PANEL VIII THINKING GLOBALLY/ACTING GLOBALLY (AND  
LOCALLY)**

*Arts and Sciences 129*

Karen Oates, Chair  
Nana Japaridze (SSI 2003), Responder

**Institutionalizing SENCER on Our Campuses: A Progress Report from the Republic of Georgia**

The focus of this session is on how to ensure that international initiatives can be institutionalized in the cultures of different colleges and universities. The “big ideas” in this session will be illustrated through examples from SENCER’s collaborative initiatives with the three premiere institutions of higher education in the Republic of Georgia.

Topics to be discussed include: (1) how new courses get established and the use of the SENCER models in course development, (2) the role and function of “learning centers” in the overall project of institutionalizing pedagogical reforms, and (3) how students and faculty exchange is helping to achieve scholarly and administrative goals.

Of specific interest within the Georgian and US environments is the challenge of introducing and sustaining reforms in an environment of reduced support for higher education.

The presenters, who will also be joined by representatives from the Georgian and US collaborating institutions, will discuss their experiences, share their ideas and plans for continuing and expanding the collaborative project, and engage in dialogue with other participants who are interested in working transnationally.

Lali Ghogheliani  
Georgian Technical Institute

Ardith Maney  
Iowa State University

## **Improving Learning Through International Collaborations Focused On Shared Problems**

Much is said about the value of global engagement, “internationalizing the curriculum” and other contemporary preoccupations. Arguments for transnational or non-parochial education (“being cosmopolitan”) are often justified in moral or political terms. This is all well and good if you share these values and/or these politics and if you like the idea and experience of foreign travel. But what if you don’t? In this case and if you cared about improving science education, you’d need to determine if these “transnational encounters” have any effect on improving learning. Do they?

The presenters think that the answer is yes. Two reports—one based on an on-going project involving Duke (USA) and Egerton (Kenya) universities; the other reporting on in-class activities at University of Johannesburg (South Africa)—will be featured in this session. Regarding the Duke/Egerton activities, data will be presented that help answer how “internationalizing” the problem improved learning in a larger undergraduate class at an R-1 university and affects learning and student life at the collaborating Kenyan institution. In the second example, the presenters will discuss how introducing SENCER approaches within science classes at a South African university helped improve learning and opened up avenues for students to consider issues including where to find reliable “science” on HIV/AIDS where that science is “contested.” What emerges from these projects are notions of what is needed to sustain these reforms, what research questions present themselves for further examination, and how to make the learning benefits both reciprocal and enduring.

Sherryl Broverman  
Duke University

Debra Meyer  
University of Johannesburg

### **10:30—12:00            TEAM TIME**

*Teams meet as you choose. (Team planning template completion should be one of the items on your agenda.)*

### **10:30—12:00            ADVANCE REPRESENTATIVES PLANNING SESSION** *Engineering 325*

Advanced representatives will meet with SENCER staff to plan work for the coming year and to share ideas with the SENCER National Office on program development, follow-up and the deployment of desired resources.

Facilitated by Bill Bennett and Patti Simon

**10:30—12:00**            **SPECIAL ALUMNI WORK SESSION**  
*Arts and Sciences 133*

**Designing the Future for SENCER: What Are Our Next Steps?**

In this important planning session, SENCER's leaders invite alumni to participate in a vital discussion of SENCER's future. We are now beginning the final year of this five-year NSF-funded project; what happens next? What should our priorities be in developing an application for the next five years? How can a national effort bring the good work done on so many campuses to even greater scale? How should we organize SENCER's work in the future? How can we support curricular and pedagogical change both in individual institutions and across the field of higher education? How can SENCER continue to improve assessment, student learning outcomes, and student engagement? What goals should we set as we continue to inspire students to learn science, mathematics, engineering, and technology? How can we best increase the reach and scope of our work? What lessons from the first five years are most pertinent in planning the next five?

Facilitated by Richard Keeling and NCSCE Staff

**12:00—1:00**            **LUNCHEON**  
*Tent in Mission Gardens*

**1:15—2:30**            **CONCURRENT SESSIONS V**

**Designing a SENCER Course: Practical Applications and Follow-up with  
Barbara Tewksbury**  
*Arts and Sciences 133*

This session give participants an opportunity to apply to their own courses the design principles presented during the plenary address. Attendees can expect to draft higher order thinking skills and ancillary skills goals for students in their courses and begin to give thought to how to help students achieve those goals.

Barbara Tewksbury  
Hamilton College

**Community-Based Research**  
*Arts and Sciences 134*

This session will explore the basic tenets and practices of undergraduate Community Based Research for both science and non-science and majors alike. Together we will discuss the practice as it relates to the National Research Council's guidelines for best practices in science teaching as well as the missions of many of our colleges and universities. We will review the aims and objectives of this experiential learning practice and provide time to work on connecting curriculum to authentic discovery-based research practices and assessment.

Amy Shachter  
Santa Clara University

## **Financing SENCER and Other Science Reforms**

*Bannon 236*

(This session will be repeated.)

The session will provide an overview of NSF programs and funding opportunities, including the new programs on assessment. The current status of application success rates will also be discussed.

In place of the usual approach of offering a “catalog” of program possibilities, the presenter will ask participants to identify specific ideas they have for projects requiring support. With that sense of “need” in mind, the presenter will identify specific program support possibilities, where they exist. Particular emphasis will be paid to how NSF programs can be accessed to support SENCER campus innovations. SENCER has a goal of increasing assistance in adaptation and innovation at the campus level, with the view to disseminating local innovations as part of the continuing national program of SENCER.

Myles G. Boylan  
National Science Foundation

## **Collaborating with Your Local Campus Compact to Enhance Civic Engagement Opportunities**

*Bannon 237*

This session will develop participants’ awareness and understanding of Campus Compact and the existing resources available through this national network, including 30 state network offices, to promote and support activities aimed at strengthening students’ capacities to become engaged citizens. Participants will learn about initiatives designed to promote/support student and institutional civic engagement. Institutional obstacles to successful, sustainable initiatives will be identified and mechanisms/means to overcoming these potential obstacles will be discussed.

The presenters/facilitators will also use this session to learn from participants about promising practices and initiatives that foster student interest in the sciences and mathematics following the SENCER model and will the group will work together to identify ways that Campus Compact can collaborate with SENCER and institute participants to support the efforts of science and mathematics faculty who are concerned with improving teaching and learning in STEM disciplines, catalyzing student engagement in public problem solving, and promoting more widespread interest in STEM careers.

Elaine Ikeda, Executive Director  
California Campus Compact

Thomas Schnaubelt, Executive Director  
Wisconsin Campus Compact

Theo Koupelis  
University of Wisconsin—Marathon

**Assessment: Knowing What Your Students Are Learning**

*Bannon 238*

Do you use active learning, cooperative learning, or peer teaching in your class? Have you incorporated on-line discussions, computer-based problem sets, or other technology-assisted activities into your teaching repertoire? If so, have you wondered how well these techniques are working? Are they making any difference in student learning? Most faculty and students agree that these changes have improved education. But often we have not measured this, nor have we considered how these different approaches have changed student learning.

This session will explore the scope of learning, from acquiring content, to building skills, to shifting attitudes, all fostered by the new approaches. It will also offer ways to measure the richness of learning that accompanies varied approaches to education.

Laurie Fathe  
George Mason University

**Assessment: Using the SALG Website to Implement the SENCER-SALG Instrument**

*Bannon 241*

(This session repeats an earlier one.)

In this session, participants will be shown how to collect their SENCER-SALG pre- and post- data through the SALG website. The purpose of the SENCER-SALG will be described and participants will be given an introduction to the overall structure of the website. The presentation will afford participants and opportunity to “walk through” the process of using the site. Participants will be able to see the data for all students collected through the SALG site, as well as other data they can access from the site. Lessons learned from previous usage will be discussed. As the SENCER-SALG is still being developed and improved, input into the development process will be solicited and discussion will be encouraged

Sue Lottridge  
James Madison University

Tim Weston  
University of Colorado, Boulder

**Structural Reforms to Support Innovation: An Administrator-Focused Discussion**

*Bannon 332*

This seminar-style session will find us discussing how administrators can support innovations and science reform on our campus. We will ask and discuss the following questions: What were some of the successful strategies administrators have used to support the faculty who are innovators? How can the P&T system—as well



as other aspects of the recognition and reward system—be structured to encourage faculty (including new faculty) to try new approaches? How can we earn support from chairs and senior faculty who help set the tone in a department? What’s the role of assessment and evaluation in all this? How can SENCER help?

Using the experience and ingenuity of the participants, we will develop a set of recommendations and practices that would encourage, support, and sustain the energy and enthusiasm required for innovation.

Karen Oates  
Harrisburg University of Science and Technology

Pete Facione  
Loyola University—Chicago

### **Portfolios for Many Applications**

*Bannon 333*

(This session will be repeated.)

This workshop on “Portfolios” will investigate the flexibility of the portfolio format for describing and documenting many academic functions, i.e. course portfolio, teaching portfolio, student portfolio and administrative portfolio. The session will illustrate how the three basic components of the portfolio structure—what, why and how well—can be adapted to serve various needs of faculty, students, administrators and others interested in quality and accountability.

Formats for these various types of portfolios will be briefly presented followed by discussion and development of portfolio components customized to suit the needs and interests of the participants.

Monica Devanas  
Rutgers University

### **Science As Story Telling in Action: The Web, the Brain, and Society**

*Daly Science 202*

The presenter has written that “science has the potential to be what we all collectively need as we evolve into a world wide community: a nexus point that encourages and supports the evolution of shared human stories of exploration and growth, an evolution in which all human beings are involved and take pride. For this to happen, we all need to work much harder to not only reduce the perception of science as a specialized and isolated activity of the few but to make it in fact the product and property of all human beings.”

SENCER's objectives are relevant beyond college and university classrooms, and efforts to achieve them depend not only on what goes on in colleges and universities but also in the wider social and political contexts within which academic institutions are embedded. This session will encourage consideration and discussion of the broader prospects and problems of making science "the product and property of all human beings." Illustrative materials will be drawn from experiences with the Serendip website and the Bryn Mawr College Center for Science in Society, as well as from biology and the neurosciences.

Paul Grobstein  
Bryn Mawr College

### **Quantitative Reasoning** *Engineering 318*

As part of general education, most colleges and universities require that students take one or more courses designed to help them learn to do quantitative reasoning. What is meant by "quantitative reasoning"? How is such reasoning developed and assessed? What approaches are institutions using to enhance students' abilities to do quantitative reasoning? What's the evidence that this is working or not working? What can be done to improve the situation? How does SENCER fit into this?

The facilitators will engage participants in examining these questions in both individual institutional contexts and the broader picture of evolving approaches.

David Ferguson  
Stony Brook University

Mariah Birgen  
Wartburg College

### **Civic Engagement: The Classroom and the Campus as a Civic Space** *Bannon 334*

(This repeats an earlier session.)

What do we mean by civic engagement? The SENCER ideals will be used and a model for organizing SENCER courses will be presented as a springboard for discussing the many possibilities and ideas that are contained in the idea of "civic engagement." Confronted with the job of organizing a course and a classroom, how can we think about how our choices can determine what kind of civic space we create? This loosely-moderated session is designed to solicit members' experiences, thoughts, and recommendations for how we can make SENCER courses "models" of the kind of civic engagement we desire in the larger world.

Also open for discussion is the somewhat more challenging question of how to make campuses authentic civic spaces, a matter of special relevance to SENCER aspirations, given SENCER's emphasis on issues that can be said to cause "multidisciplinary trouble." What are the cultural practices and norms that we need to consider, well beyond C.P. Snow's still thorny dichotomies?

David Burns

National Center for Science and Civic Engagement (NCSCE)

### **Reinventing Myself as a Professor: The Catalytic Role of SENCER**

*Daly Science 201*

This session will provide an opportunity for participants to discuss with Terry McGuire his "SENCER Backgrounder" whose title is the title of this session. In the backgrounder (available on line and in the CD-ROM to be distributed at SSI 2005), the author describes the "drunkard's walk" that he has traveled since first attending the SENCER Summer Institute. While doing so, he enumerates the many effects that work with colleagues at the Institute and other faculty have had on his teaching.

Perhaps most of all, what has changed for the presenter is his view of, and relation to, his students. In essence, it has now become important to McGuire that all his students do "A" work and that they really learn what the course aims to teach. In the session, he will discuss how his changed view and the strategies he has adopted to improve learning by majors have now produced results that are inspiring to him as a teacher and deeply gratifying for students.

While the presenter will offer some suggestions and conclusions that participants might find useful, the overall goal is to provide an opportunity for others to talk about their own experiences and to join in the process of reinvention.

Terry McGuire  
Rutgers University

### **Consultations**

During this concurrent session time slot, a cohort of model developers and SENCER core faculty will be available for specific consultation

## **2:45—4:00            CONCURRENT SESSIONS VI**

### **Community Partnerships: Working with Museums, Libraries and Other Institutions**

*Arts and Science 133*

In this session, which could be seen as a follow-up to the Monterrey Aquarium fieldtrip, the development of academic relationships between degree-granting organizations and non-traditional partners will be discussed. Recognizing the mutual benefit to the institutions and students, the presenter will identify ways to develop and implement appropriate credit-bearing learning opportunities in environments and venues beyond higher education.

The examples of Columbia University and the American Museum of Natural History and with George Mason University and the Smithsonian Institution will be used as case studies.

Tom Wood  
George Mason University

### **Service-Learning and the Sciences: Successes, Challenges, and Practical Problem-Solving**

*Bannon 237*

This interactive session is designed for faculty who understand the basics of how to incorporate service-learning into science and other courses and want to hear the successes and challenges about service-learning in the sciences from their peers. The format includes a roundtable discussion for participants to share their “stories” about service-learning. In addition, this session will enable participants to brainstorm new and creative ways to implement service-learning in their courses, to identify and solve some of the problems that those implementing service learning sometimes encounter, and to gain a better understanding of how to overcome challenges in order to experience more success with their courses.

Lynn H. Leavitt  
George Mason University

### **Financing SENCER and Other Science Reforms**

*Bannon 236*

(This repeats an earlier session.)

The session will provide an overview of NSF programs and funding opportunities, including the new programs on assessment. The current status of application success rates will also be discussed.

In place of the usual approach of offering a “catalog” of program possibilities, the presenter will ask participants to identify specific ideas they have for projects requiring support. With that sense of “need” in mind, the presenter will identify specific program support possibilities, where they exist.

Particular emphasis will be paid to how NSF programs can be accessed to support SENCER campus innovations. SENCER has a goal of increasing assistance in adaptation and innovation at the campus level, with the view to disseminating local innovations as part of the continuing national program of SENCER.

Myles G. Boylan  
National Science Foundation

## **Nine Steps to Designing a SENCER Model in About an Hour**

*Bannon 238*

(This repeats an earlier session.)

This exercise is to help individuals and teams imagine and design SENCER model learning communities (LCs), courses, and/or other curricular programs that foster civic engagement by teaching “through” multidisciplinary, complex, civic issues “to” basic science and mathematics, or other subjects and disciplines, for that matter.

Based on *Designing a Learning Community in an Hour* heuristic developed by Jean MacGregor and Barbara Smith (see <http://www.evergreen.edu/washcenter/LCHour.shtm>), this intense, highly-interactive session will enable participants to form groups, brainstorm possible themes, choose a target student population and “topic,” establish desired learning outcomes, identify needed resources, brainstorm and catalog implementation issues, and make a poster summarizing the proposed model to share with others.

Ellen Goldey  
Wofford College

## **Getting Noticed for the Good Work You Do: Taking Your Work to the Rest of Your Institution, or How to Succeed in Innovation**

*Bannon 241*

Faculty who do curricular innovation associated with projects like SENCER are smart, insightful educators. They also tend to be significantly ahead of their peers and their administration in their educational approaches. If they do not consciously and actively work to inform, engage, and influence the people who make academic decisions in their departments, units, and on their campuses, then the potential broader impacts of their work will never be realized.

This session will help faculty members identify the “pressure points” on their campuses, and use those to achieve good outcomes. Participants will design a plan to insure that others on their campus learn about their work, and provide a means for them to adapt/adopt useful aspects of SENCER courses. Topics addressed in the sessions will include effective ways to communicate, enlisting administrative support, using external validation to influence your peers, and gathering and presenting data to document the success of your project.

Laurie Fathe  
George Mason University

**Two-Year Schools, STEM Education, and SENCER: Continuing the Discussion**  
*Bannon 332*

(This session is designed to continue the discussions begun on Saturday and to give opportunities for those interested in the goals outlined below to join the discussion.)

Two-year schools are playing an increasingly important role in providing affordable access to quality education for almost half of all students attending public institutions of higher education in the United States. Quality teaching is the primary responsibility of faculty in two-year schools, and thus those who teach in them maintain a strategic position at the forefront of educational reform. Despite the opportunity to be a catalyst for change, we are often forced to work under the administrative rules created by four-year institutions, a system in which we provide little to no input. Course transferability is but one of the many issues involved in efforts to successfully revitalize the STEM curriculum; other issues include workload hours, reward structure and compensation, support for innovative efforts, availability of teaching and laboratory resources, and assessment. Regardless the limitations, two-year schools can provide an integral foundation for engaging students in STEM education, and faculty can provide leadership through developing innovative, inquiry-based, civically-oriented, STEM curriculum.

The session will primarily involve an open discussion among participants on the key issues facing two-year schools, especially those related to STEM education and SENCER. Our objectives in this session are the following: 1) to clearly articulate strengths, weaknesses, opportunities, and threats facing our schools, in order to better prepare for the future; 2) to create a set of suggested practices and policies that can act as a catalyst to support and sustain future innovations in STEM education, including curriculum changes influenced by the SENCER ideals; 3) to create a network of educators whose mission is to support the efforts of our colleagues in two-year institutions to become leaders in science education, scholarship and research, to promote seamless science and math education at all levels, and to support the development of meaningful learning experiences for all our students.

Theo Koupelis  
University of Wisconsin—Marathon

Brian Hagenbach  
Holyoke Community College

Dennis Lehman  
Harold Washington College

## **Portfolios for Many Applications**

*Bannon 333*

(This repeats an earlier session.)

This workshop on “Portfolios” will investigate the flexibility of the portfolio format for describing and documenting many academic functions, i.e. course portfolio, teaching portfolio, student portfolio and administrative portfolio. The session will illustrate how the three basic components of the portfolio structure—what, why and how well—can be adapted to serve various needs of faculty, students, administrators and others interested in quality and accountability.

Formats for these various types of portfolios will be briefly presented followed by discussion and development of portfolio components customized to suit the needs and interests of the participants.

Monica Devanas  
Rutgers University

## **Science Education and Civic Engagement: An International Journal**

*Bannon 334*

This session describes the launching of a new peer-reviewed professional journal that is inspired by the SENCER project. The journal will serve as a forum for publishing creative work at the interface of science education and civic engagement. Contributions will focus on using unsolved, complex civic issues as a framework to develop students’ understanding of the role of scientific knowledge in personal and public decision making, along with examining how such knowledge is embedded in a broader social and political context. Since many pressing issues are not constrained by national borders, we encourage perspectives that are international or global in scope. Submissions will be organized under the following categories: Topical reviews; research articles; science education and public policy; project reports; points of view; teaching and learning; and reviews of books and media. During the session we will review the goals of the journal and the process for submission of manuscripts. We also welcome suggestions on how this journal can best serve the needs of the SENCER community, reach a broad readership, and make a significant contribution to the scholarship of teaching and learning

Trace Jordan  
New York University

Richard Keeling  
National Center for Science and Civic Engagement (NCSCE)

## **Making the Case for SENCER**

*Daly Science 201*

The SENCER initiative introduces a framework of science education reform that connects science and civic engagement by teaching "through" complex, capacious, and unsolved public issues. But some science educators and others may not share the view that this is an approach worth pursuing. What might you do if you think SENCER is a good idea but you need to promote it to other faculty? How would you support your view that SENCER is a good idea if other science faculty members argue that it is not science? Or, perhaps you are charged with responsibility for the curriculum but you're not a scientist: how do you evaluate competing claims about what should be taught? Or maybe you have doubts about all this yourself. These and other issues of implementation will be the topics of this session. The facilitators will lead a discussion, solicit similar experiences from participants, and help the group work together to develop strategies for building support for SENCER courses back at your home campus.

Terry McGuire  
Rutgers University

Garon Smith  
University of Montana

## **All About SENCER: What Faculty Surveys and the SENCER-SALG Tell Us About Reform Practices**

*Engineering 325*

This session will present results from the SENCER-SALG from 2003 to 2005, and from 2005 faculty surveys. More than 5000 students have taken the SENCER-SALG, and over 50 SENCER faculty responded to surveys and interviews. The results show a wide range of courses in different disciplines and institutions, and instructors who have diverse learning objectives, instructional methods and student outcomes. The presenters will also discuss differing ways in which civic content is integrated into SENCER courses by faculty, and challenges faced in implementing and sustaining new or revised courses. Additionally, the presentation will describe how specific instructional practices and content (and other variables such as class size) are associated with patterns of student responses to the SENCER-SALG.

Tim Weston  
University of Colorado, Boulder

Heather Thiry  
University of Colorado, Boulder



## **“With Friends Like These....”: Dealing with Resistance to Innovative Pedagogies**

*Engineering 318*

What do you do when some of your best students seem to be resisting your efforts to employ new pedagogies? How can you reduce the risks for your students (and yourself) that come from teaching “unscripted problems” in non-traditional ways? What can be done to increase the likelihood that a SENCER course will help and not hurt the students who complete it when it comes time to transfer credits and/or establish a pre-requisite for another course?

These and other questions will form the basis for this informal discussion session that will identify, discuss and catalogue strategies for reducing the risks that come with shifting from teaching to learning and from “taking” not “doing” STEM courses. (For background reading, participants are referred to the two part article “With friends like these...” in the May and June SENCER E-newsletters.)

David Burns

National Center for Science and Civic Engagement (NCSCE)

Paul Grobstein

Bryn Mawr College

## **Opportunities for Innovative Transnational Collaborations**

*Arts and Sciences 134*

SENCER and the National Center for Science and Civic Engagement have pursued a number of projects to increase opportunities for scholars and students, in the US and around the globe, to work with one another, to conduct research, to share teaching strategies and materials, and to assess learning. While there is enormous rhetorical support for “globalizing” the curriculum and science education, the pathways and financial support needed to support international collaborations on a robust and durable scale are more elusive.

The purpose of this session is to explore opportunities for successful transnational collaborations, examining what is available for a range of institutions and a variety of missions, such as teaching, research, outreach, development, cultural exchange, etc.

By reviewing projects recently undertaken and currently underway that have explored and implemented the SENCER approach to undergraduate science education and using lessons learned to suggest strategies for the future, the presenters will focus on: development of collaborations, ways of financing collaborations, and the “nuts and bolts” of how to manage collaborative activities at the institutional level.

Karen Oates  
Harrisburg University of Science and Technology

Kyle Riley (*Class of 2005*)  
Iowa State University

Ardith Maney  
Iowa State University

Butsiko Chkartishvili  
Tbilisi State University

Ia Zhavania  
Institute of Physiology Georgian Academy of Science

**How Campus-Based Work Becomes a Nationally Featured SENCER Model**  
*Daly Science 202*

In this informal session, the general editor of the SENCER Model Series will meet with participants interested in learning more about how SENCER models are chosen and how to have one’s own work considered as a featured model. Suggestions/nominations for models will be solicited and feedback on model format, usefulness, and potential for expanded use will also be welcome.

Eliza Reilly  
National Center for Science and Civic Engagement (NCSCE) and Franklin and Marshall College

**Consultations**

During this concurrent session time slot, a cohort of model developers and SENCER core faculty will be available for specific consultation with individuals and teams. A list of consultants available during Concurrent Session II will be distributed in the homeroom sessions.

**Planning SENCER Regional Symposia**

(Rooms to be announced; Attendance by Invitation Only)

**A Note on the SENCER Regional Symposia and Planning Efforts** During this Concurrent Session VII, a series of meetings will be held to plan follow-up activities to be undertaken in the months following SSI 2005. In essence, these meetings will allow us to plan the next series of regional symposia that bring together faculty and administrators to serve a variety of purposes.

The SENCER Symposia serve as reunions to afford SENCER alumni the opportunity to report and reflect upon their projects, to orient and recruit new faculty and campus teams to the SENCER work, and to make recommendations to the SENCER national office for program improvements and enhancements.

Each team will be asked to designate one person to participate in a regional planning committee. The Alumni and Advanced Representative homerooms will also decide among themselves who will be attending the Symposia Planning meetings and who will be free to attend the scheduled Caucus Sessions.

We welcome your interest and help in planning the SENCER Symposia; by all means, be sure to let your “homeroom teacher” know of your interest in these sessions.

As of this writing, the proposed regional groupings for US participants are as follows:

- I. States of Alaska, California, Hawaii, Montana, Oregon and Utah
- II. States of Florida, Georgia, North Carolina and South Carolina
- III. States of Wisconsin and Minnesota
- IV. States of Illinois, Indiana, and Iowa
- V. State of New Jersey
- VI. State of New York
- VII. State of Pennsylvania
- VIII. States of Kentucky, Maryland, Virginia, West Virginia
- IX. States of Connecticut, Maine, and Massachusetts
- X. States of Ohio and Michigan

(These grouping may change to reflect the recommendations of participants. They were made with cognizance of prior participating SENCER teams who would be included in the planned regional symposia.)

## **The SENCER Caucuses: Opportunities for Developing and Enriching Courses and Programs Focused on New Complex, Capacious, Civic Issues**

**A Note on the SENCER Caucuses** We are initiating the “Caucus” sessions this year as a new strategy in our faculty and program development project. Up to now, we have identified “models” that we believe embody the SENCER ideals and have held them up for others to adjust and modify to suit their students’ own needs and circumstances. We will continue to do so, using our “Model of the Month” section of the SENCER E-Newsletter, our regional meetings and our other outreach efforts.

The Caucuses, however, represent a new effort to facilitate the development of faculty affiliations, collaborations and working groups. We hope that these caucuses will lead to the application of SENCER ideals and materials to new topical areas and themes (such as obesity, asthma, global health, “the STEM of democracy), as well as to challenges—both administrative (as in the case of assessment or articulation with high schools or transfer institutions) and intellectual (as in the case of application of brain science to classroom activities, or the expansion of the SENCER program into engineering). In other cases, as in CURE-Chem, both thematic (“pharmaceuticals in the water supply”) and administrative/intellectual issues (linking community-based research efforts together) share the foreground.

Below, you will find listed the Caucuses being proposed for SSI 2005. Two things need to be mentioned up front:

(1) You should attend a session that interests you. You are not committing to doing any more than participating in a conversation by doing so. We hope and fully expect that these conversations will lead to productive activities. You will decide if you wish to pursue any of what is discussed.

(2) The Caucus topics chosen, scheduled, and described below are just a few of the potential topics around which caucuses might be productively formed. If you would like to propose a caucus topic, by all means do so, and we will schedule a room for your meeting and announce what you are doing in our Daily Newsletter in the edition to be distributed in homeroom on Monday, August 8<sup>th</sup>. Please see Lynn Leavitt, the newsletter editor, or Patti Simon, to get your session listed. If you have any questions or want to discuss your idea, the SENCER staff will be pleased to speak with you.

After we get a chance to review the work of and suggestions from the Caucuses, the SENCER National Office will take steps to support the development work in the coming year.

### **SSI 2005 Caucus: Global Health**

*Arts and Sciences 133*

Health is affected by almost every human activity. Examining human health across both time and geographic space reveals wide variations in health burdens on communities. New knowledge and technologies have greatly advanced medicine and health care, yet global access and implementation patterns defy a simple developed world vs. developing world analysis.

The globalization of microbes is almost complete and brings with it stigmatization and fears of contagion. This session will bring together faculty interested in addressing how to infuse global health issues across the curriculum and ways to get students to identify health issues in their own part of the globe.

Sherryl Broverman  
Duke University

Patti Simon  
National Center for Science and Civic Engagement (NCSCE)

Bill Bennett  
National Center for Science and Civic Engagement (NCSCE)

### **SSI 2005 Caucus: The STEM of Democracy**

*Bannon 236*

This informal session will bring together participants who are interested in developing courses and programs that teach “to” mathematics, science, engineering, technology and social sciences through the broad range of topics implicit in democratic governance, including elections and voting, representation, taxation, the upcoming 2010 census, apportionment, the rationalization of benefits, entitlements, and obligations and other issues. Participants will explore themes and possibilities for jointly and collaboratively developing academic programs.

Mariah Birgen  
Wartburg College

David Burns  
National Center for Science and Civic Engagement (NCSCE)

### **SSI-2005 Caucus: Pre-Service Teacher Education and SENCER in High Schools**

*Bannon 237*

This informal session invites participants who have a particular interest in or experience with improving undergraduate teacher education to come together to discuss how SENCER projects can be effectively applied to teacher education and to brainstorm possible models and projects that will better connect college science teaching to the challenges and needs in primary and secondary education. The organizers of the session hope to have the group brainstorm answers to such questions as: What would “SENCER in the high schools” look like? What resources would it take to develop new high school connections? How can these ideas be applied internationally?

Cindy Klevickis  
James Madison University

Karen Kashmanian Oates  
Harrisburg University of Science and Technology

### **SSI-2005 Caucus: CURE-Chem**

*Bannon 238*

CURE-Chem, the Center for Undergraduate Research in Environmental Chemistry, has been proposed as a URC (undergraduate research center) by NCSCE to the NSF for possible support. In essence, CURE-Chem would organize a consortium of institutions committed to engaging undergraduate students early in their academic careers in an authentic research projects involving the assessment of the presence of pharmaceuticals in various water supplies. The data from the several sites will be organized to constitute an extensible, longitudinal database. Faculty from institutions who have made initial commitments to participate in CURE-Chem are urged to attend this orientation and planning session. Interested faculty who would like to pursue possible involvement in the project at some future time are also invited to participate.

Amy Shachter  
Santa Clara University

### **SSI-2005 Caucus: Obesity**

*Bannon 241*

With every passing day we are told about the “growing problem” of obesity and, with the release of each study charting the incidence of obesity in the US population, we see a plethora of proposals for regulation, litigation, medication, and prevention. The science on obesity is complex and incomplete, encompassing biology, chemistry, genetics, and psychology, to name just a few disciplines whose insights will be required to deal with the health and other consequences of this “epidemic.” Concern about weight and body-size issues is a major campus student preoccupation, even among those whose BMIs are not suggestive of problems. Several SENCER teams and collaborators are designing courses that deal with obesity and the matrix of other issues (nutrition, eating disorders, culture, smoking and alcohol use) connected with it, including public policy, marketing, regulation, and law. This session will enable those interested to work together and plan collaborative activities for the year ahead.

Phillip Mason  
Fairmont State University

Jake Harney  
University of Hartford

### **SSI 2005 Caucus: Engineering in the General Education Curriculum**

*Bannon 332*

Engineering is arguably one “place” where science and civic questions get negotiated, yet few undergraduates, save those who plan to major in engineering, ever encounter engineering as a discipline (way of sorting out and solving problems) or as an enterprise at the heart of economic development and globalization. What can be done about this? Can SENCER courses teach “through” some vexing civic problems to basic engineering? What would it take to the “E” back in—or in for the first time—

STEM education for undergraduates? This session will encourage participants to consider these questions and others they think are worthy of pursuit and to begin to plan SENCER courses for engineers and non-engineers.

Mary Juhas  
The Ohio State University

Ardith Maney  
Iowa State University

### **SSI 2005 Caucus: Issues of the Brain**

*Bannon 333*

Brain science, cognitive science, neuroscience...all developing fields, crossing traditional disciplinary boundaries, considering new issues, raising new questions, attracting more study, and possessing great potential value to those interested in improving learning. And, of course, these areas of inquiry and research are not without controversy. Whether interrogating traditional notions of free will and determinism (at the high end of abstraction), or raising issues about how to construct learning environments that are sensitive to human differences (at the classroom level), there's a lot to be learned here. This session will encourage participants interested in these issues to share what is being done and to think about whether these subjects might become the central narrative of a SENCER course for undergraduates.

Paul Grobstein  
Bryn Mawr College

Richard Keeling  
National Center for Science and Civic Engagement (NCSCE)

### **SSI 2005 Caucus: CASA**

*Bannon 334*

The National Center for Science and Civic Engagement is interested in developing CASA, a Consortium for the Assessment of Student Achievement. Initially, CASA would be comprised of a small cohort of cooperating faculty committed to adopting a set of pre- and post- learning assessment protocols while, at the same time, employing a suite of in-class assessment and tutorial aids. The protocols would assess changes in intellectual sophistication, learning of canonical science content, and civic engagement. In addition, CASA members would identify specific opportunities to gauge knowledge transfer in subsequent courses. The emphasis will be on achievement as an end and not assessment as an end. We would use this as a pilot experience that could potentially be expanded into a larger project. This session is designed for those who would to learn more about potential participation in the CASA project to begin this Fall.

Terry McGuire  
Rutgers University

## **SSI 2005 Caucus: Asthma**

*Daly Science 201*

Asthma is one of several nasty, complex medical problems that involve a host of issues including particulate emissions, sanitation and air quality, environment, and stress, to name just a few. Asthma is also a leading cause of absenteeism in the public schools, posing challenges in classrooms and for those responsible for school management. The epidemic of asthma is another example of a medical issue that was once thought to be pretty much in hand that is now mutated into a major public health problem. Several SENCER colleagues are involved in exploring the development of SENCER courses and campus-community programs focused on asthma. This session will review some of the science that asthma will help us teach and will explore how faculty can work together to develop resources, supplement each other's work, and create a model featuring asthma. Because of the special impact of asthma on the schools, there is also special interest in including primary and secondary school teachers, as well as those college students who would to pursue careers in education, in this effort.

Dennis Lehman  
Harold Washington College

Marion Fass  
Beloit College

**5:30—8:00**

**FAREWELL DINNER**  
*Tent in Mission Gardens*



**TUESDAY, AUGUST 9, 2005**

**7:00—9:15**                    **CONTINENTAL BREAKFAST AND TEAM TIME**  
*Club Regent*

**9:30—11:30**                  **CLOSING PLENARY**  
*Club Regent*

**“Science Education Matters: To You, To Our Students, and To the Future of Democracy Itself”**

Bill Bennett, presiding

**A View from the National Science Foundation**

Myles Boylan  
National Science Foundation

**Reflections on the Accomplishments of SENCER’s Members**

Karen Oates  
Harrisburg University of Science and Technology

**Next Steps: Opportunities to Move Forward**

David Burns  
National Center for Science and Civic Engagement (NCSCE)

**Your Views, Visions for the Future, and Concluding Comments**

Richard Keeling, facilitating  
National Center for Science and Civic Engagement (NCSCE)

**11:30**                            **INSTITUTE ADJOURNS**

**POST-INSTITUTE WORKSHOPS**

**1:00—5:00**

**NSF Grant Writing**  
*Cupertino*

SENCER aims to encourage a substantial cohort of our participants to successfully apply for NSF direct support for adaptation and implementation of SENCER courses and programs. This workshop responds to interests and needs expressed by faculty and administrators associated with SENCER and is designed to help achieve SENCER’s national dissemination goal. Participants will receive a briefing on NSF grant reviewing protocols. Then, using real examples, participants will score CCLI applications. De-briefings will permit a review of salient features of a good

application and identify common mistakes. Questions about NSF grant opportunities will be fielded. Participants who are interested in becoming NSF grant reviewers themselves will have the opportunity to learn more about these opportunities.

Myles G. Boylan  
National Science Foundation

**Special Session on Using NSF's FASTLANE System**

*Cupertino*

Immediately following the NSF Grant Writing Workshop, interested participants are invited to attend a demonstration on using NSF's on-line application and reporting system, FASTLANE. This is an especially important session for first-time NSF applicants and institutions that have never applied for NSF support.

Chuck Gahun  
SENCER National Office

**Forging International Partnerships: Sharing Approaches and Activities, Solving Problems Collaboratively, and Achieving Shared Goals for Undergraduate Education on Your Campuses**

*Belvedere Room*

This workshop focuses on all aspects of international partnerships, including who should be involved, activities that enhance institutional internationalization missions, and communication and intercultural skills needed to facilitate close working relationships needed to accomplish program goals. This multi-part workshop asks for active involvement from US and international participants about initiatives already underway or just getting started on their campus in collaboration with partners in other countries. People who already have experience with international partnerships, as well as those interested in getting collaborations or partnerships started, are invited to participate. First, we will hear about ideas generated from the sessions and discussions held at this year's SENCER Institute. Then, participants will work in small groups on concrete tasks associated with setting up and running cross-cultural research, learning, outreach, and development partnerships among higher educational institutions, research institutes, government agencies, NGOs, etc. Time is also set aside for small groups to work together with current or potential partners on collaborative activities to be pursued on their home campuses and talk about their activities with SENCER faculty who have experience with international partnerships.

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