

# THE NATIONAL ACADEMIES

*Advisers to the Nation on Science, Engineering, and Medicine*

## NATIONAL ACADEMIES SUMMER INSTITUTES ON UNDERGRADUATE EDUCATION IN BIOLOGY Special Session for MARC Curriculum Improvement Planning Grant Recipients

<http://www.AcademiesSummerInstitute.org/marc/>

January 7-11, 2005  
Chaminade • Santa Cruz, California

The National Academies is organizing a special session of the Summer Institute (SI) on Undergraduate Education in Biology focusing on integrating quantitative sciences into the biology curriculum and enhancing the participation of underrepresented minorities in sciences. This special session will assist Minority Access to Research Careers (MARC) U\*STAR institutions that have received a Phase I curricular improvement administrative supplement for curricular improvement in the quantitative sciences. The SI special session will help these thirteen (13) institutions to prepare curriculum improvement implementation grant applications by providing experience with research-based pedagogies and curricular materials, sparking questions for participants as to which strategies might be relevant for their setting, and helping them integrate assessment into all stages of their proposed implementation. Participants will leave the SI special session with an introduction to and experience with active learning, authentic assessment of learning, diversity of students and how they learn, and mechanisms for adapting existing materials and pedagogies to meet local needs. They will also have an outline for their implementation grant application and a network of similarly-committed educators from MARC institutions and elsewhere.

### Participant Teams

Each MARC institution should select an interdisciplinary team of three (3) faculty members. Each team should include individuals from *both* the life sciences and a more quantitative science discipline (*e.g.*, mathematics, computer science, physics, chemistry, engineering). Team members should be those well-positioned to work on the integration of the life and quantitative sciences on individual campuses. The team would work together at the SI special session as well as on campus to implement what they learn and to incorporate those ideas and lessons into their Phase II proposal.

Program Directors should forward the names, titles, and contact information for their institution's participants to [afagen@nas.edu](mailto:afagen@nas.edu) (complete contact info below) by **Monday, November 22, 2004**.

### Schedule

The MARC Institute will begin on the evening of **Friday, January 7, 2005**, with a welcome keynote and opening mixer. Participants should expect to arrive by 6:00 p.m. PST.

Institute sessions will be interspersed with structured time to work on proposals and free time during Saturday, Sunday, and Monday. Sessions will run from morning through evening with informal interactions extending into the night; all participants, including those local to the area, are encouraged to stay at the Chaminade retreat (see below).

The Institute will conclude on the morning of **Tuesday, January 11, 2005**, with all activities completed by lunchtime.

## Institute Program

Consistent with the focus of the MARC curricular improvement supplement, the MARC Institute will emphasize the integration of the quantitative sciences into undergraduate biology curricula. Within the context of the themes of active learning, assessment, diversity, and adaptation, speakers and facilitators will have expertise and relevance to MARC goals for curriculum improvement in the quantitative sciences: quantitative biology, enhancing students' quantitative skills in the life sciences, inclusion of biological concepts in other disciplines, encouraging independent interdisciplinary study in the life sciences, and increasing the number of underrepresented minority students in biomedical graduate research programs and biomedical research careers.

A mix of presentations and activities at the Institute will be designed to provide background and context on some of the major efforts and advances in undergraduate science education and that respond to important challenges (*e.g.*, large classes, lack of student engagement, deficient quantitative skills). Specific examples with demonstrated effectiveness will be highlighted, and facilitators will be encouraged to discuss the process of change as well as the revised materials and teaching strategies themselves. Issues of institutional change and grantsmanship will also be addressed including the role of resources, facilities, and personnel and the need for leadership to overcome institutional inertia. The varied series of presentations and discussions will stimulate participating institutions to consider institutional challenges and curricular objectives specific to their setting and to design research questions that could serve as the basis for their curriculum improvement implementation grant application.

Early on, the Institute will include an introductory forum to introduce participants to the purposes of the workshop and relevant terminology. Establishing a common vocabulary will facilitate conversation among all participants and facilitators. Then there will be a series of presentations, demonstrations, and discussions over the next 3+ days based around the themes of active learning, authentic assessment of learning, diversity of students and how they learn, and mechanisms for adapting existing materials and pedagogies to meet local needs. Participants will not only hear about and experience a variety of teaching strategies and curricular materials, but will have the opportunity to engage speakers and facilitators—as well as each other—in conversation and discussion about the relevance of those topics to their own institutional setting. A set of activities will be provided to enable participating teams to think about their implementation proposal; many of the facilitators will be available to assist participants and discuss issues of curriculum improvement in more detail. Resources will continue to be available to participants via the MARC Institute website and by electronic and other means of communications in the months immediately following the special session.



### Background on Summer Institute

Acting on a key recommendation in the 2003 NRC report *Bio2010: Transforming Undergraduate Education for Future Research Biologists*,<sup>1</sup> the Summer Institutes engage university faculty in an intense and highly interactive series of presentations, discussions, and activities modeled after Cold Spring Harbor Laboratory research courses, which have played a historic role in shaping modern research in biology.<sup>2</sup> Through this mix of activities, participants learn about current research on undergraduate education and how to apply it to their own classes. Educational innovators share teaching methods and lessons that encourage students to learn—as scientists do—through active problem

<sup>1</sup> National Research Council. (2003). *Bio2010: Transforming Undergraduate Education for Future Research Biologists*. Committee on Undergraduate Biology Education to Prepare Research Scientists for the 21<sup>st</sup> Century. Washington, DC: National Academies Press. <<http://www.nap.edu/catalog/10497.html>>

<sup>2</sup> <http://meetings.cshl.edu/>; L. Roberts, *Science* 250, 496-498 (1990); P.W. Sherwood, *Genetics* 157, 1399-1402 (2001); M. Susman, *Genetics* 139, 1101-1106 (1995).

solving and discussion. Faculty members participate in institutional teams so that support, conversation, and joint efforts in teaching and learning will continue on the home campus. The Summer Institutes encourage participants to approach teaching as they do their research.<sup>3</sup> The Summer Institutes encourage practical changes in undergraduate biology education across the country and develop a community of scientists committed to high-quality undergraduate education. The Institutes will also help to spur research in biology education and dissemination of educational innovation. The National Academies Summer Institutes are already having success at transforming undergraduate biology education at some of the nation's top research institutions.<sup>4</sup> Participants in the MARC special session will become part of the growing network and community of participants in the Summer Institutes. Additional information about the Summer Institute may be found at <<http://www.AcademiesSummerInstitute.org/>>.

### **Chaminade Hotel and Conference Center**

The MARC Institute will be held at the beautiful Chaminade retreat in Santa Cruz, California. Built high on a bluff overlooking the Pacific Ocean, Chaminade's mission-style buildings command a panoramic view of Monterey Bay and the Santa Cruz Mountains. Comfortable accommodations compliment its secluded grounds.



Chaminade provides luxurious, state-of-the-art conference facilities, and spacious guest rooms with feather beds, plush duvets, and high-speed internet access. Chaminade also averages 300 sunny days a year and has plenty of ways to enjoy it. Guests of Chaminade can enjoy a relaxing swim in the pool, rejuvenating exercise in our fully equipped executive fitness center, a rousing game of tennis or volleyball and miles of nature trails for meandering hikes. Golf enthusiasts will enjoy easy access to numerous championship courses in the area and the very close Santa Cruz Beach and Boardwalk offers wide open beaches, cool surf and world class family entertainment. The Spa at Chaminade offers several packages designed to rest and renew the body and mind. All meals will be provide by Chaminade's four-star kitchen and during our stay we will get to experience the Friday Night Seafood Buffet, Saturday A La Carte Night, Sunday Champagne Brunch.

Chaminade is located 45 minutes from the Norman Y. Mineta San José International Airport.

Additional information about the Chaminade retreat may be found at <<http://www.chaminade.com/>>.

### **Financial Information**

The Summer Institute MARC special session is supported by Contract No. N01-OD-4-2139, Task Order #157, between the National Academy of Sciences and the National Institutes of Health. There is no registration fee or other expenses expected to be borne by participating faculty nor their institutions.

In accordance with U.S. government guidelines for travel reimbursement, economy-class airfare, lodging, meals, personal mileage, and other allowable expenses will be reimbursed to participants by completion of a Travel Expense Report to the National Academies. Additional information about making travel arrangements will be provided to participants.

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<sup>3</sup> J. Handelsman, D. Ebert-May, R. Beichner, P. Bruns, A. Chang, R. DeHaan, J. Gentile, S. Lauffer, J. Stewart, S.M. Tilghman, and W.B. Wood. (2004). "Scientific Teaching." *Science* 304(5670, 23 April), 521-522.

<sup>4</sup> W.B. Wood and J.M. Gentile. (2003). "Teaching in a Research Context." *Science* 302(5650, 28 November), 1510. W. Wood and J. Gentile. (2003). "Meeting Report: The First National Academies Summer Institute for Undergraduate Education in Biology." *Cell Biology Education* 2(4, Winter), 207-209. W.B. Wood and J. Handelsman. (2004). "Meeting Report: The 2004 National Academies Summer Institute on Undergraduate Education in Biology." *Cell Biology Education*, in press.

## About the National Academies

The National Academy of Sciences was established by Congress in 1863, with a charter signed by President Abraham Lincoln, to provide independent scientific and technological advice to the government and nation. Today, the Academy complex includes three honorary societies that elect new members to their ranks each year—the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine—and the National Research Council, the operating arm that conducts the bulk of the institution's science policy and technical work.



The group portrait by Albert Herter, in the Academy's Board Room, depicts President Abraham Lincoln signing the charter of the National Academy of Sciences, on March 3rd, 1863. Herter based his painting, made in 1924 for the dedication of the Academy Building, on that historic event. In his apocryphal scene, Senator Henry Wilson, who introduced the bill establishing the Academy, and the group founders look on. **Founding Members** (Left to right): Benjamin Peirce, Alexander Dallas Bache (first president of the Academy), Joseph Henry, Louis Agassiz, President Lincoln, Senator Wilson, Admiral Charles Henry Davis, and Benjamin Apthorp Gould.

These nonprofit organizations provide a unique public service by working outside the framework of government to ensure independent advice. They enlist committees of the national's top scientists, engineers, and other experts—all of whom volunteer their time to study specific concerns. The National Academies provides advice in several different forms: written reports reflecting the consensus reached by an expert study committee, symposia and convocations engaging large audiences in discussion, and proceedings from workshops on issues of interest. For more information, please visit <http://www.nationalacademies.org/>.

The Board on Life Sciences provides advice to government and the scientific community on the biological sciences and their impact on society. The Board maintains expertise in and understanding of the full spectrum of life science disciplines, from molecular genetics to ecology. This enables it to deal with issues of both basic sciences (*e.g.*, knowledge gaps, research priorities, needed investments) and the higher-level policy concerns that flow from or build on the basic science. With the help of hundreds of biologists and other experts, the Board serves as a focal point for examining a wide range of technical and policy topics. Past reports of the Board have focused on many issues including biomedical research and policy, genomics, biotechnology, biosecurity, biological forensics, and biology education and workforce issues. In addition to the MARC Winter Institute, other current Board projects include developing guidelines for embryonic stem cell research, developing standards and policies for decontaminating public transportation facilities affected by exposure to harmful biological agents, and identifying opportunities for fostering the independence of new investigators in the life sciences. For more information about the Board, please visit <http://dels.nas.edu/bls/>.

## Contact Information

Please do not hesitate to contact us with any questions or concerns:

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Information about the MARC Institute will be posted to the Institute website:  
<http://www.AcademiesSummerInstitute.org/marc/>.