2016

Professional Development Program

ISEE

Institute for Scientist & Engineer Educators

ADVANCING EFFECTIVE, INCLUSIVE SCIENTIST & ENGINEER EDUCATORS

ABOUT THE PROGRAM

The Professional Development Program (PDP) is a flexible, multi-year program for scientists and engineers at the early stages of their careers, with a primary focus on graduate students. The program is also open to postdocs, faculty members, and other scientists and engineers. Participants in the PDP attend teaching workshops, join a design team, and then teach in a program or course. The PDP focuses on teaching lab-based courses at the college level, but participants learn general teaching strategies that can be applied to a range of teaching venues. PDP participants leave the program as highly trained, innovative, and reflective scientist-educators and engineer-educators, and use their PDP experience throughout their careers.

THE 2016 PROGRAM INCLUDES THESE ELEMENTS

ISEE INQUIRY INSTITUTE

4-day workshop for all participants
March 18–21, 2016 - Monterey, CA

ISEE DESIGN INSTITUTE

2.5-day workshop for all participants
at one of the following locations:
Early April, 2016 - Toronto, Canada
April 15–17, 2016 - Santa Cruz, CA
May 13–15, 2016 - Waikoloa, HI

APPLY ONLINE

Fee Waivers and Travel Support Available!

PRIORITY APPLICATION DEADLINE: December 18, 2015

NOTIFICATION DATE: January 22, 2016

All applicants will be notified if they have been accepted and the status of any financial support request made to ISEE by this date.

For more information please contact:

Lisa Hunter

lhunter@ucsc.edu

(831) 459-2416

ADDITIONAL INFORMATION

To find out more about the Professional Development Program visit our website PDP Description: http://isee.ucsc.edu/programs/pdp/index.html. Here you will also find links to ISEE themes, PDP teaching teams and venues, and frequently asked questions.

The application process for the program includes reviewing and responding to information about the PDP, including telling us about your interests in relation to our themes, ensuring that our approach aligns with your goals, the types of teaching teams that are of most interest to you, reviewing ISEE funding sources and priorities (see below), and estimating expenses for participation. We encourage returning participants to also consider the role of Design Team Leader.

ISEE offers a Certificate of Completion in Teaching Innovative Laboratory Experiences. The Certificate acknowledges the successful design and teaching of an inquiry laboratory experience. Participants in the Professional Development Program may apply for certificates after completing all PDP requirements, including required workshops, teaching experience, team debrief, and submission of a teaching report and lesson plan with applicant's individual components and revision.


CERTIFICATE OF COMPLETION

in

Teaching Innovative Laboratory Experiences

Presented to

Tiffani Quan

For successfully designing and teaching a laboratory experience through the ISEE Professional Development Program.

July 22, 2010

ISEE

ISEE FUNDING SOURCES & PRIORITIES

ISEE manages a range of funding sources and collaborates with others to support participants from many locations, and in many disciplines. Below is a list of current funding commitments:

- NSF Astronomy grant supports astronomy graduate students and postdocs nationally (AST#1347767; PI: L. Hunter).
- Howard Hughes Medical Institute grant supports UCSC graduate students and postdocs to teach in UCSC "demonstration labs" as part of a project to transform introductory biology, chemistry, and physics (52008112, PI: P. Koch).
- Air Force Office of Scientific Research grant supports participants who will teach in the Akamai PREP short course (FA95501510427, PI: L. Hunter).
- UCSC campus funding funds participants teaching in the WEST program in any STEM discipline.
- Dunlap Institute funds participation of Dunlap affiliated graduate students, postdocs, and professionals.
- Mitchell Institute at Texas A&M supports graduate students and postdocs in astronomy and astrophysics (PI: R. Quadri).
- NSF Astronomy research grant supports University of Hawaii Institute for Astronomy graduate students and postdocs (AST-1518273; PI: J. Lu).
- NSF Astronomy research grant supports UCSC astronomy-related graduate students and postdocs (AST-1412851; PI: C. Max).
- Graduate Assistance in Areas of National Need (GAANN) grant (P200A150100) supports Conservation Biology Fellows at UCSC (PI: R. Mehta; Co-PI: I. Parker).
- Thirty Meter Telescope provides support for the Hawaii Design Institute.

ISEE is continually raising funds, so participants should still apply even if they do not fit the above funding sources. Please contact Lisa Hunter if you have questions about funding sources.

PDP ALUMNI

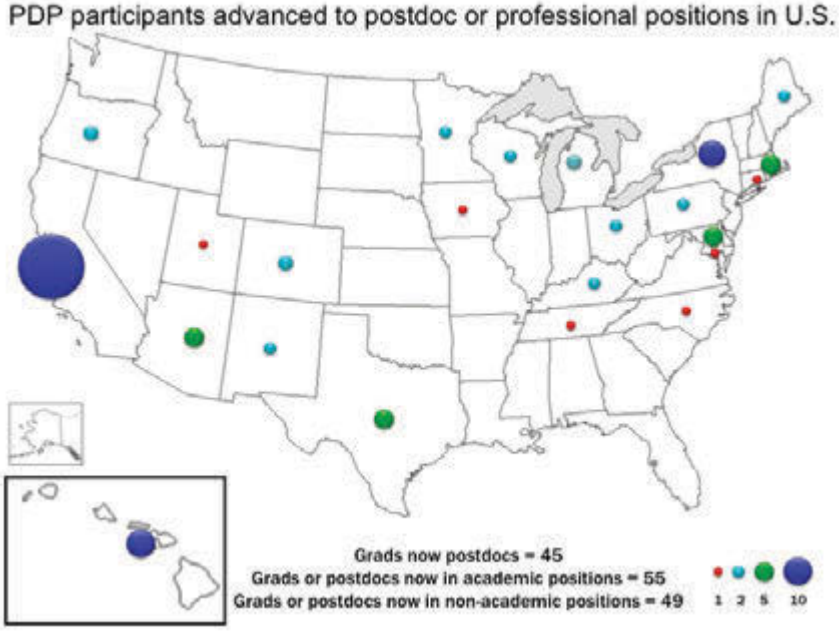
PDP PARTICIPANTS GET JOBS

"The PDP has had the largest impact on my teaching philosophy than anything else in my academic career. The specific values and techniques taught in the PDP were directly cited as a major reason I was chosen for my current faculty position."

"During my interview I had to give a teaching demonstration and discuss inquiry and learner centered models of education. I felt confident doing this as a direct result of my participation in the PDP program."

"I just passed my tenure review … and based on the feedback I received about my teaching and mentoring, there is no question in my mind that I would not have been half as successful without my experiences with the PDP…"

PDP participants advanced to postdoc or professional positions in U.S.



AS OF 2015, AT LEAST 104 PDP ALUMNI HAVE MOVED INTO JOBS

THE PDP IS MEETING A NATIONAL NEED TO BETTER PREPARE Ph.D.s

"Examples of important skills that Ph.D.-level employees typically need, whether they are employed in academia or elsewhere, but for which most new Ph.D.s are ill prepared include project management, leadership, the ability to work in teams, the expertise to address complex interdisciplinary problems, and the ability to teach."

President's Council of Advisors on Science and Technology, 2012

PDP participants advanced to postdoc or professional positions outside of U.S.

WHERE PARTICIPANTS TEACH

PDP participants teach in a range of ISEE affiliated venues that offer supportive environments for innovative teaching and piloting new activities. Venues are often workshops or programs, although experienced PDP participants may also teach in formal courses. The general teaching venues are:

- Undergraduate Research Programs
- Bridge Programs
- Technical Short Courses
- Summer Schools
- College Courses

For further details see PDP Team pages:
http://isee.ucsc.edu/programs/pdp/teams/index.html

ISEE HEADQUARTERS, CHAPTERS, REGIONAL SITES

ISEE has grown to include a range of Chapters across the U.S. and internationally, and continues to expand to new regional sites. Chapter Liaisons and regional contacts work with ISEE to identify appropriate teaching venues, give input on participant selection, and decide on the topical or disciplinary focus for their site. Individuals connected with our sites listed below are invited to apply to the PDP. Other interested people are encouraged to contact ISEE headquarters.

Santa Cruz Chapter
Primary contact: Lisa Hunter (hunter@ucolick.org)

Akamai-Hawaii Chapter
Chapter Liaisons: Jessica Lu (jessica.lu@hawaii.edu) and Austin Barnes (isee.austinbarnes@gmail.com)

Dunlap Institute Chapter
Chapter Liaisons: Michael Reid (mike.reid@utoronto.ca))

UCLA Astronomy & Astrophysics Chapter
Chapter Liaison: Michael Fitzgerald (mpfitz@ucla.edu)

Santa Barbara - CSEP ISEE Chapter
Chapter Liaisons: Arica Lubin (alubin@cnsi.ucsb.edu) and Wendy Ibsen (ibsen@cnsi.ucsb.edu)

Houston Chapter
Chapter Liaison: Jason Porter (jporter@central.uh.edu)

Boulder Chapter
Chapter Liaisons: Seth Hornstein (seth.hornstein@colorado.edu) and Mark Rast (mark.rast@lasp.colorado.edu)

Pasadena, California
Primary contact: Lisa Hunter (hunter@ucolick.org)

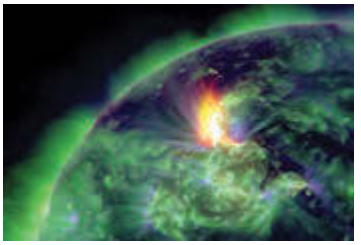
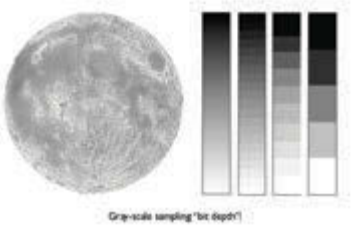
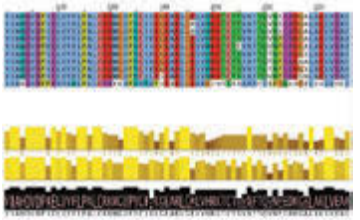
New York, New York
Primary contact: Emily Rice (emily.rice@csi.cuny.edu)

Michigan State University
Primary contact: Devin Silvia (dsilvia@msu.edu)

Texas A&M University
Primary contact: Lisa Hunter (hunter@ucolick.org)

WHAT PDP PARTICIPANTS TEACH

PDP participants all design an "inquiry" activity – that is, one in which learners gain an understanding of scientific concepts by applying cognitive science & engineering research practices. The activity should mirror authentic scientific research or engineering design, and learners should come away with transferable cognitive skills that can be applied in other contexts. A few examples of past activities are included below. Also see the PDP team pages on the ISEE website, http://isee.ucsc.edu/programs/pdp/teams/index.html.

Activity Name	Audience & Location	Brief Description Of Activity & Learning Goals
Central Dogma of Molecular Biology 	Preparation for Research Experiences (PREP) UCSC Summer Research Institute	Using the worm as a model organism, students design experiments to learn about how the integrity of a gene influences physical attributes. Students explain their findings, coordinating results from multiple experiments with findings from literature and databases.
Shining Light on the Sun 	Preparation for Research Experiences (PREP) LASP REU Program Boulder Chapter	Students investigate solar phenomena with lab equipment to model the sun and actual satellite data. They learn about selectively applying theoretical models of radiation processes (specifically black body, emission, absorption lines) to the solar spectrum in order to infer physical properties of the sun.
Digitizing an Analog World 	Technical Short Course Akamai-Hawaii Chapter	Students choose a real-world imaging problem (e.g., tracking wildlife) and figure out optimal sampling rates (resolution) for both the temporal and spatial domains. They learn about digitization, translating a science goal into requirements, and supporting a solution while considering tradeoffs and constraints.
InGENEious Information: A Computational Biology Inquiry 	Biomolecular Engineering 150 Course, UCSC	Testing hypotheses and controlling variables, students mine large genomic databases to predict gene function using homology. They learn how to effectively use and interpret results from computational tools, as well as gaining a deeper understanding of how evolution, mutation, sequence similarity, and gene function are related.
Optimizing Renewable Energy Systems 	Workshops for Engineering & Science Transfers (WEST), UCSC	Students use models of different sustainable technologies to evaluate efficiency of a real world scenario. They learn about optimizing a system for energy efficiency, relating conservation of energy in a system, and power conversion to evaluate and compare efficiencies.

PDP CYCLE of ACTIVITIES

INQUIRY INSTITUTE

Workshops & Team Formation over 4 days

The Inquiry Institute Includes the following:

- "Comparing Approaches: Three Kinds of Hands-On Science" activity and discussion
- "How People Learn" discussion
- Inquiry activity and discussion (Light & Shadow or Digital Images)
- Diversity and Equity workshops
- Introduction to "Backward Design"
- Learning goals; content, practices, attitudes
- Begin working with activity Design Team

Here, participants experience inquiry from the learner's perspective, reflect on that experience, and are introduced to strategies for designing and teaching science/engineering inquiry activities inclusively and effectively.

DESIGN INSTITUTE

Workshops & Design Time over 2.5 days

Participants spend roughly one-half of Design Institute time working directly in their Design Teams planning out and preparing to teach science/engineering inquiry activities. As they work, Design Teams consult with ISEE staff members and participate in relevant workshops, including:

- Practicing "Backward Design"
- Assessing students' explanations of their understandings
- Designing a sequence of activity components

*Annual Cycle Begins Here

Reflective Community of Scientist and Engineer Educators

INDEPENDENT DESIGN TIME

Teams independently continue planning and preparing to teach their inquiry activity up until the scheduled venue. Teaching generally occurs May–November.

REFLECT & REPORT

Design Teams meet after teaching to debrief and evaluate their experience, and each PDP participant completes a Post Teaching Report. These activities help participants evaluate how well their design and teaching worked, in relation to their intended learning goals. It is also a time to reflect on the overall PDP experience.

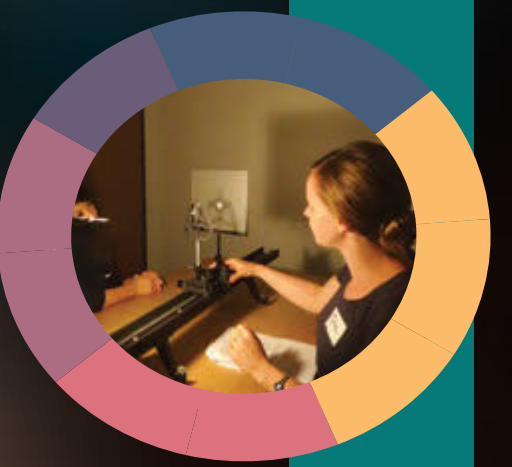
TEACH

PDP participants gain practical experience as they co-teach the inquiry activity they designed with their fellow Design Team members. Teaching experiences may range from fairly short (few hours) to week-long or longer activities. Teaching often takes place in ISEE affiliated programs and special courses.

FACILITATION WORKSHOP

Multiple offerings

Training in facilitation strategies, techniques, and how to effectively progress students toward learning goals is provided at several intervals close to the time of teaching.



ISEE raises funds from a wide range of sources to support participation in the PDP (see "ISEE Funding Sources & Priorities"), and receives core funding from the following units at University of California, Santa Cruz:

- Division of Social Sciences
- Division of Physical & Biological Sciences
- Division of Graduate Studies
- Vice Chancellor for Research
- Jack Baskin School of Engineering

The PDP is part of the Institute for Scientist & Engineer Educators at the Division of Social Sciences, University of California, Santa Cruz

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