Professional Development Program

ADVANCING EFFECTIVE, INCLUSIVE SCIENTIST & ENGINEER EDUCATORS

ISEE
Institute for Scientist & Engineer Educators

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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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 2020 PROGRAM INCLUDES THESE ELEMENTS

ISEE INQUIRY INSTITUTE

4-day workshop for all participants
April 4-7, 2020 – Monterey, CA

ISEE DESIGN INSTITUTE

2.5-day workshop for all participants at one of the following locations:
April 24-26, 2020 – Houston, TX
May 1-3, 2020 – Santa Cruz, CA

APPLY ONLINE   isee.ucsc.edu/programs/pdp

Fee Waivers and Travel Support Available!

APPLICATION DEADLINE for Design Team Leaders: November 13, 2019
Acceptance notification for Design Team Leaders: November 20, 2019*

APPLICATION DEADLINE for new participants**: December 12, 2019
Acceptance notification for new participants: January 15, 2020*

* All applicants will be notified if they have been accepted and the status of any financial support request made to ISEE by this date.
** Returning participants who cannot be a Design Team Leader should apply by the new participant deadline.

For more information please contact:

pdp@ucsc.edu

(831) 459-4507

ADDITIONAL INFORMATION

To find out more about the Professional Development Program visit our website: https://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 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 highly encourage returning participants to step into the role of Design Team Leader.

ISEE offers a Certificate of Completion in Inclusive Inquiry STEM Education. 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.

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. In 2020 major support for the PDP comes from UCSC and the National Science Foundation (AST#1743117).

Chapters may have additional funding sources. ISEE is continually raising funds, so participants should still apply even if they do not fit the above funding sources. Please contact your institutional Chapter Lead or Lisa Hunter (lhunter@ucsc.edu) if you have questions about funding sources.

PDP ALUMNI
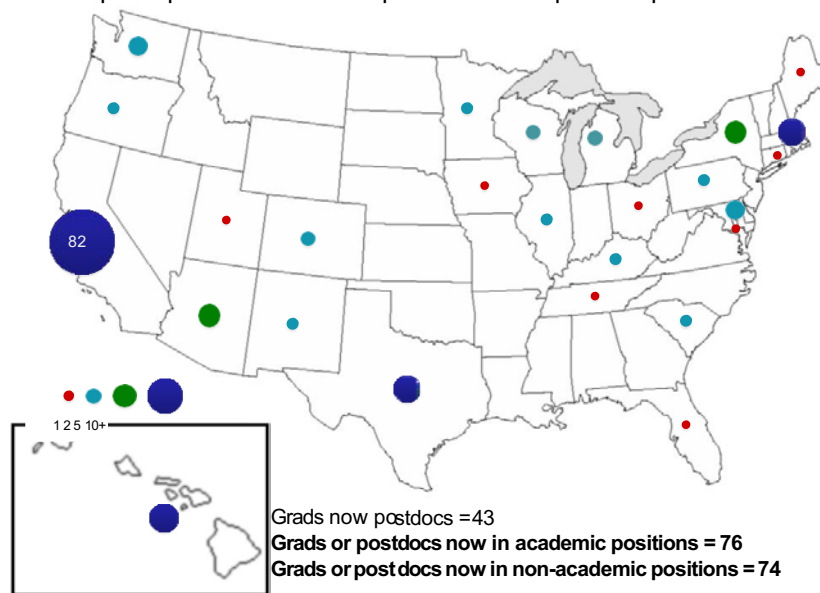
PDP PARTICIPANTS GET JOBS

"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..."

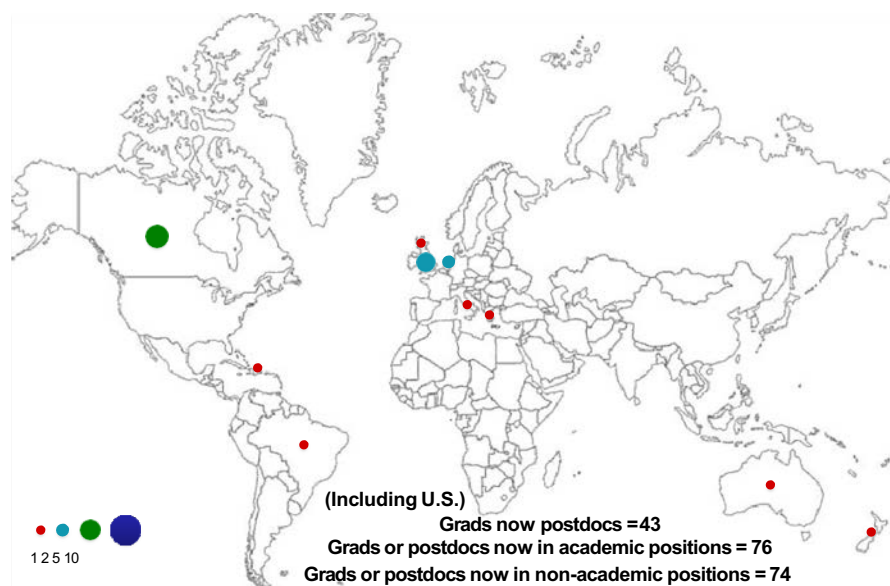PDP participants advanced to professional or postdoc positions in U.S.

Grads now postdocs = 43
Grads or postdocs now in academic positions = 76
Grads or postdocs now in non-academic positions = 74

OVER 140 PDP ALUMNI HAVE MOVED INTO STEM CAREER POSITIONS

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.

(Including U.S.)
Grads now postdocs = 43
Grads or postdocs now in academic positions = 76
Grads or postdocs now in non-academic positions = 74

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: https://isee.ucsc.edu/programs/pdp/teams/index.html
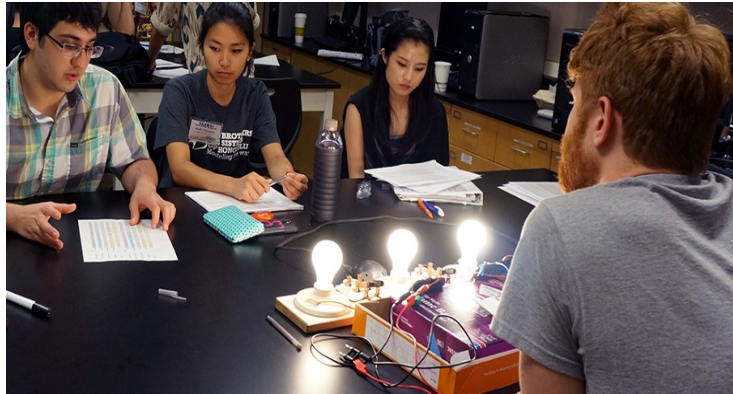
ISEE has grown to include a range of Chapters across the U.S. and internationally.

Chapter Leads 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 PDP Program Manager Nicholas McConnell (njmcconn@ucsc.edu).

Santa Cruz Chapter
Primary contact: Rafael Palomino (rpalomin@ucsc.edu)

Akamai-Hawaii Chapter
Primary contact: Austin Barnes (isee.austinbarnes@gmail.com)

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

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

Michigan State University Chapter
Chapter Lead: Devin Silvia (dsilvia@msu.edu) and Saul Beceiro Novo (beceiro@msu.edu)

New York City Chapter
Chapter Leads: Emily Rice (emily.rice@csi.cuny.edu) and Greg Bryan (gbryan@astro.columbia.edu)

Pasadena Chapter
Chapter Lead: Gwen Rudie (gwen@carnegiescience.edu)

South Carolina Chapter
Chapter Lead: Steve Rodney (srodney@sc.edu)

UC Berkeley Chapter
Chapter Lead: Jessica Lu (jlu.astro@berkeley.edu)

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

UC San Diego Chapter
Chapter Leads: Quinn Konopacky (qkonopacky@ucsd.edu) and Shelley Wright (saw@physics.ucsd.edu)
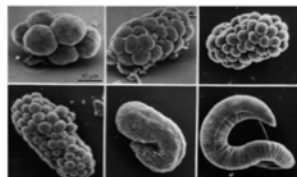
UT Austin Chapter
Chapter Lead: Caitlin Casey (cmcasey@utexas.edu)

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.
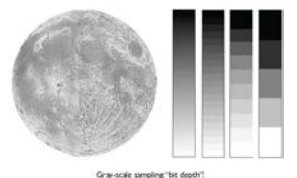
Activity Name	Audience & Location	Brief Description Of Activity & Learning Goals
Central Dogma of Molecular Biology	Preparation for Research Experiences (PREP) UCSC Summer Research Institute	Using the worm as a model organism, students design experiments to learn about how the integrity of a gene influences 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 Gray-scale sampling "bit depth".	Technical Short Course Akamai-Hawai'i 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.

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 Learning Works" discussion
- Inquiry activity and discussion (Light & Shadow or Digital Images)
- Equity and Inclusion workshops
- Introduction to "Backward Design"
- Learning goals: content, STEM practices
- 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

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. A PDP inquiry activity typically spans 4-6 hours, and often takes place in an ISEE affiliated program or special course. In some cases PDP team members have opportunities to work with students throughout a course.

INDEPENDENT DESIGN TIME

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

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.

Cycle diagram

* Annual Cycle Begins Here

Reflective Community of Scientist and Engineer Educators

- Inquiry Institute
- Design Institute
- Independent Design Time
- Facilitation Workshop
- TEACH
- Reflect & Report