



A Community of Scientists and Educators: The Compass Project at UC Berkeley

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◆ Abstract

The Berkeley Compass Project is a self-formed group of graduate and undergraduate students in the physical sciences at the University of California, Berkeley. Its goals are to improve undergraduate physics education, provide opportunities for professional development, and increase retention of students from populations underrepresented in the physical sciences. For undergraduate students, the core Compass experience consists of a summer program and several seminar courses. These programs are designed to foster a diverse, collaborative student community in which students engage in authentic research practices and regular self-reflection. Graduate students, together with upper-level undergraduates, design and run all Compass programs. Compass strives to incorporate best practices from the science education literature. Experiences in Compass leave participants poised to be successful students, researchers, teachers, and mentors.

◆ Values / Principles

- Supportive Community
- Innovative Pedagogy
- Identity as Scientists
- Student Ownership
- Professional Development
- Equity and Inclusion

◆ Summer Program



The Compass Summer Program is a one- or two-week residential program for incoming freshmen with declared interest in the physical sciences. It takes place immediately before the start of UC Berkeley's fall semester.

During the program, 16 to 20 incoming students come together with a set of instructors to explore a broad, challenging question, such as "How do wind turbines work?". The curriculum has an emphasis on model building, experimentation, and problem solving. The classroom setup facilitates group work, collaboration, and hands-on activities.

A group of 4 to 6 graduate students plan and execute the program. In so doing, the instructors explore the education literature and gain experience designing a curriculum. This is a unique opportunity for students to have complete control over a classroom and the freedom to experiment with innovative pedagogy.

“Having Compass and its community as a first-year student at a large university helped me find my way and transition to Cal.”
-Compass Undergraduate

“Teaching for the summer program was one of the highlights of my time at Berkeley. Designing a course from the ground up is a challenge, but watching the students engage with the material was exciting!”
-Compass Graduate Student

◆ Acknowledgments

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◆ Courses

Compass' courses encourage students to engage with concepts and activities central to the process of learning science and performing successful research.

A **research methods course** provides students with the opportunity to design, implement, and present a research project of their own choosing, in a manner designed to bridge the gap between introductory coursework and practical research.

A **transfer students course** supports incoming juniors as they navigate unfamiliar academic expectations, develop new study groups and friendships, and learn to get around Berkeley.

Compass courses allow students to practice communicating their results by giving talks and presenting posters to the broader Berkeley physics community. Students can be proud of the process and their accomplishments, because the projects are designed around authentic scientific practices.



“I feel like now I need to understand stuff, not just learn a bunch of formulas for the test. And Compass puts you in an environment where you have to learn how to think with a science-y brain.”
-Compass Undergraduate

“My teaching experience and work with the Berkeley Compass Project has given me the tools and techniques to construct classrooms consistent with my values.”
-Compass Graduate Student

◆ Leadership



“As a result of my work with Compass, I feel much more prepared to take on the management responsibilities that are an integral part of a career in science, and for which direct training is rarely provided.”
-Compass Graduate Student

Both inside and out of the classroom, Compass is entirely student run. Students secure funding, moderate meetings, plan retreats, recruit new members, and communicate their activities to the broader physics community. Compass students do more than fill existing leadership roles, they advocate for changes in the program and adapt the program to the changing needs of the community.

Compass has been a resource for developing similar programs at other institutions. In 2015, the Access Network was formed to bring together six STEM education programs with core values aligned with those of Compass. This NSF-funded network will provide resources and opportunities for collaboration between these programs.

◆ URL

<http://www.berkeleycompassproject.org>

