THE COMPASS PROJECT
www.berkeleycompassproject.org

Berkeley
UNIVERSITY OF CALIFORNIA

Building Modeling Skills and Developing Science Identity in Physics Freshmen

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What is Compass?

The Compass Project is an **APS award-winning**, **student-founded** and **student-run** organization in the physical sciences at UC Berkeley.

Its goal is to **support and retain students** (especially those traditionally **underrepresented**) by creating a **unique, diverse environment** that blends teaching, learning, mentoring, leading, and community building.

Among Compass undergrads, 45% are women, 30% are URM, and 20% are first-generation college students. 90% have graduated with or declared a STEM major.

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Components of Compass

- Freshman course sequence
  - Summer Program
  - **Introduction to Modeling** (Fall)
  - Introduction to Measurement (Spring)
- Transitioning to Berkeley Physical Science (for transfer students)
- Frontiers of Physics (for upper-division students)
- Mentoring Program
- Research Lecture Series
- Office Hours
- Leadership in Compass

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Introduction to Modeling

Structure:
One 2-hour class/week for 14 weeks, 16-20 freshmen, 2 instructors.
Course content includes:

- a unit on model-building via the **ray model of light**
- an **independent research project**
- weekly **self-evaluations** and related discussions

Goals:
Remove barriers to persisting in STEM & build research skills by developing:

- an understanding of the **nature of science**
- a **science identity** as a member of a community of practice
- a **growth mindset**

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Nature of Science

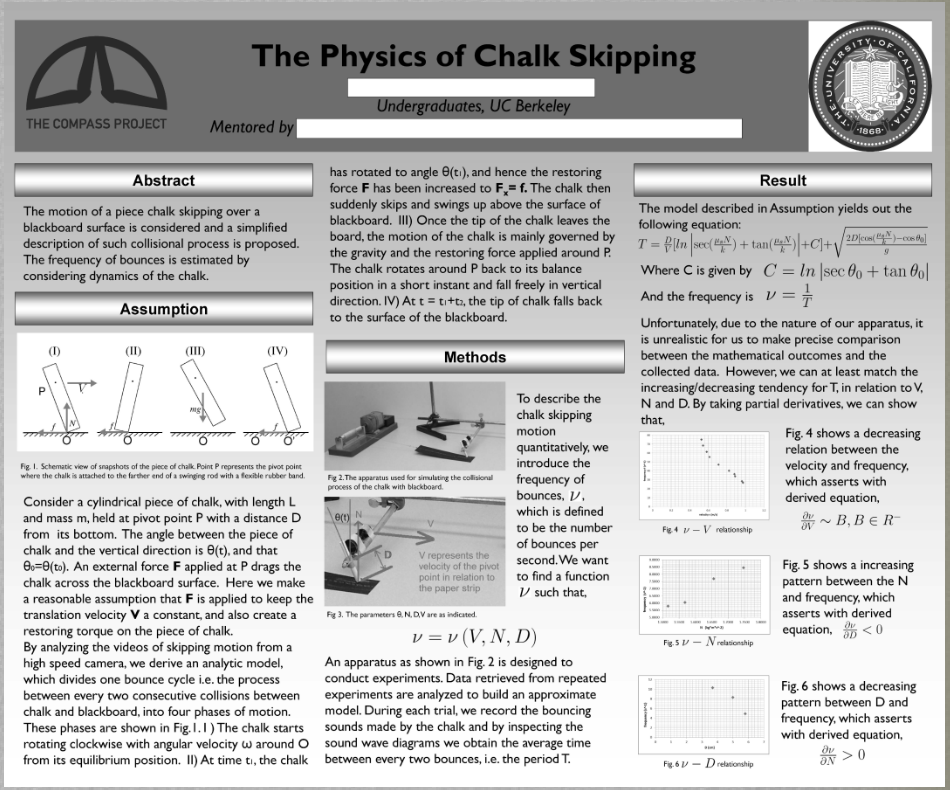
Ray model of light:

- Through small-group discussion, experimentation, and class-wide consensus-building, students develop a model for light propagation.
- Students reformulate their ideas about the "scientific method" based on their experiences studying light.
- This process helps students understand what models, how to construct them, and how to use them to answer questions.

Science Identity

Independent research project (2nd half of semester):

- Students form 2-3 person teams supported by a graduate student research advisor.
- Choose and answer a question (e.g., how does chalk skip on a blackboard) with model-building and experiments.
- Present results through a paper and a poster



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Growth Mindset

Two components:

- Readings and discussions on the nature of intelligence, failure, and success
- Weekly self-evaluations based on rubric (example below), with written instructor responses

Skill	Questions to ask yourself	Beginning	Developing	Succeeding
Persistence	• What do you do when you're frustrated? • Do you independently pursue understanding?	I tend to try one or two things. I give up more easily than I should.	I try to stick with things, but I sometimes feel unsuccessful. Sometimes I seek new approaches to help.	I look for new ways to think about the problem. I find a way to persist when appropriate.
Self-compassion	• When you're having difficulty with something, how do you feel about yourself? • Do you make productive use of failure?	I have trouble with feeling like a failure, and these feelings often make me feel like giving up. I'm my own worst critic.	I am sometimes overly critical of myself. I tend to ignore feelings of failure rather than using them to improve.	I acknowledge my difficulty, but I don't let it define how I feel about myself. I act kindly towards myself and view failure as an opportunity for self-improvement.

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Thanks!

More questions?
Come see me at my poster at the PERC poster session.

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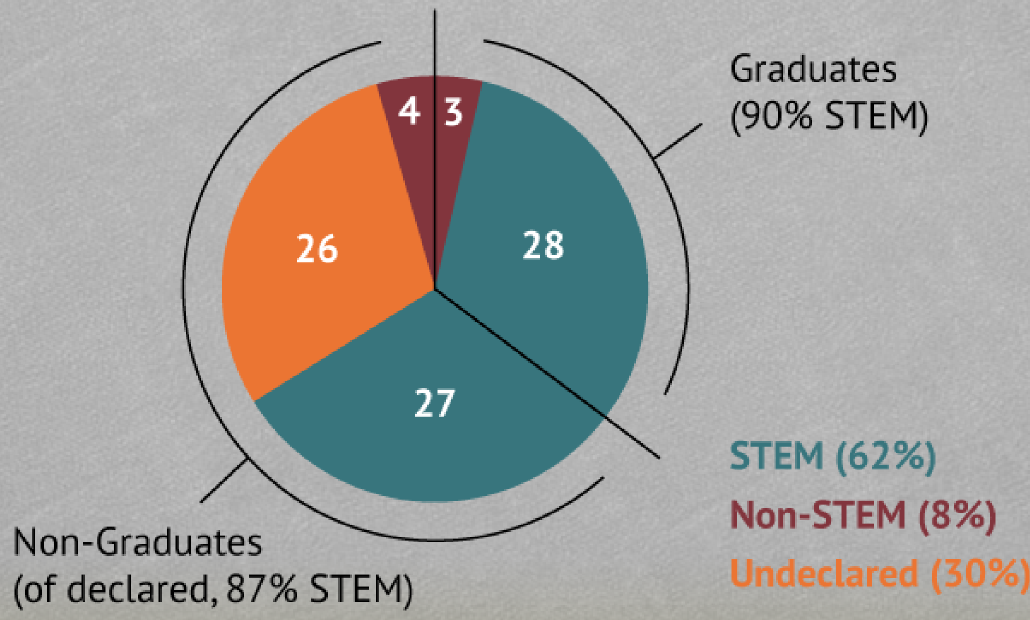
Demographics & Retention

	Compass (%)	Physics Dept (%)
Female	45	16
Chicano/Latino	26	7
African American	5	0.5
Native American	1	0.5
First Generation	19	N/A



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