

Teaching approach

I was a teacher before I became a mathematician. I earned my B.A. in education studies in 2012 and then served as a Fulbright English Teacher in Indonesia, where I taught in crowded, sixty-person classrooms lacking in textbooks. This experience led me to develop the following creative approach to teaching:

1. I combine traditional blackboard lectures with images, videos, and frequent group work.
2. I design challenging problems and encourage students to work together to solve them.
3. I check in with students and listen to their feedback, in order to build a supportive environment where students can excel.

In the following sections, I describe how I have applied my approach as a mathematical mentor and teacher, and I conclude with future teaching plans.

Mathematical mentoring

In summer 2020, I coordinated New York University's research summer program in applied mathematics. I established a lecture series for the student participants and facilitated weekly group meetings where students could discuss research progress and share ideas with one another. I made special efforts to visit the students that were struggling in the program and helped them strategize about what could realistically be accomplished during the summer. At the end of the summer, one student wrote,

"Rob once talked to me for almost two hours and helped me to think about my formulations. This meeting with Rob turned out to be very helpful in terms of his suggestions for me to present my model more properly."

Two years later, I became a mentor in Caltech's summer program for incoming students from under-represented or marginalized backgrounds. I mentored two students, Thanhthanh and Felipe, and guided them in their first research project simulating self-avoiding walks (SAWs). I encouraged Thanhthanh and Felipe to collaborate with each other and develop a compelling end-of-the-summer presentation. They grew in their skills over the summer and delivered a well-structured, persuasive presentation that illustrated why simulating SAWs is difficult and why SAWs have remained mysterious despite fifty years of numerical and mathematical investigations.

Mathematical teaching

In spring 2023, I designed and taught a graduate advanced topics course titled "Monte Carlo methods for scientific computing". I anticipated a small enrollment, since advanced topics courses in my department typically have 5–10 students. However, the enrollment far exceeded my imagination, as the course attracted 48 undergraduate and graduate students from mathematics, geophysics, and neuroscience, among other fields.

In response to the varied goals and backgrounds of the students, I decided to use a nontra-

Robert J. Webber

✉ rwebber@caltech.edu • 🌐 rwebber.people.caltech.edu

ditional class format. I treated the class as a “choose-your-own-adventure”, where computationally inclined students could practice coding Monte Carlo algorithms and mathematically motivated students could learn to analyze Monte Carlo error. On Tuesdays, I gave blackboard lectures, and I presented images and videos of Monte Carlo methods in action. On Thursdays, I distributed problems sets with 3–4 coding problems and 3–4 math problems. Students were free to choose whichever problem(s) seemed most interesting. They worked on the problem(s) with their classmates for 70 minutes and presented solutions during the last 15 minutes of class. Complete course notes, presentations, problem sets, and selected solutions are available from [my website](#).

Future teaching plans

As a faculty member, I will continue serving as a research mentor and teacher of Monte Carlo methods, while also branching out to teach other applied and computational math classes. Since I have taught in front of large classrooms (60–600 students) during my time in Indonesia, I would be open to teaching large undergraduate classes. I am well-prepared to teach any courses in linear algebra, scientific computing, or probability theory. I will teach these courses in my characteristic style, which emphasizes group work and exercise-based learning, and I will listen carefully to students in order to build a supportive environment. My priority is encouraging students to have fun so they can feel relaxed and learn at their highest capacities.

Robert J. Webber

✉ rwebber@caltech.edu • [rwebber.people.caltech.edu](https://www.rwebber.people.caltech.edu)