

Teaching at UCLA

I have been a Teaching Assistant (TA) for lower and upper division courses as well as a Teaching Assistant Consultant (TAC). The latter position is awarded to experienced TAs with a strong record of past instruction. The TAC teaches and develops the curriculum for MATH 495 – the course instructing first year TAs in effective teaching techniques – and participates in a quarter-long campus-wide seminar on pedagogy through the Office of Instructional Development. In 2014 I was awarded a Distinguished Teaching Award from the UCLA Mathematics Department based on evaluations from students and faculty. In my classroom I focus on developing problem solving, technical communication, and programming skills, while mentoring my students, particularly those underrepresented in STEM fields.

Problem Solving. In teaching problem solving skills, I employ Polya's techniques from his classic book *How to Solve It*. For example, visualization can be a powerful tool in Group Theory, where the material can seem abstract but is capturing something visual (symmetries of objects). As a TA for Group Theory, I had the students make equilateral polygons and use them to understand multiplication in dihedral groups. I also brought in toothpicks and gumdrops so that students could make their own dodecahedra and understand their symmetries – something students remembered months later during evaluations. Another technique that Polya stresses is the importance of reflecting on past work. In Group Theory, I required students to self-evaluate their homework by ranking how well they believed they answered each question. This did not affect their grades, but it forced them to reflect on their work and learning process while helping me write “helpful comments on every homework assignment” (student evaluation).

Technical Communication. A central goal of my classes is for students to learn technical communication skills, both written and oral, formal and informal. As one of my evaluations noted, “she encourages student participation and students interacting actively with each other.” For example, I developed a worksheet for the first discussion section of Integration and Infinite Series that immediately catalyzes mathematical student discussions. The worksheet (available at www.math.ucla.edu/~jaclynlang/) asks students to sketch graphs of standard functions, evaluate limits, recall trigonometry, and remember rules for derivatives, exponents, and logarithms. Students not only answer each question, but name a person with whom they solved it. (The same name cannot appear more than four times.) Thus, students discuss mathematics while reviewing the prerequisite material for the course. This activity allows me to meet the students and gauge the background of the class. The informal communication skills that students develop through such activities is useful in any career involving technical teamwork. I know my students learn to value communication skills because their evaluations call me a “great communicator.”

Programming. As computers become more powerful and ubiquitous, programming skills are becoming critical in many disciplines and careers. Math courses are a natural place to introduce students to the basics of programming, and computational problems can lead to student research. As a Calculus TA, I used the open source software Sage to supplement the numerical analysis material in the course. Students wrote simple programs in Sage Math Cloud that implemented numerical integration techniques and error bounds. Sage Math Cloud is well suited for assignments and classroom activities. Students add me as a collaborator, and I can give feedback directly on their code. Furthermore, some of my research projects involve computations in Sage. By bringing Sage into the classroom, I can offer interested students opportunities to deepen their knowledge by conducting research with me or working on Sage development projects.