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Search Committee
Department of Mathematics
Rutgers University
Hill Center, Busch Campus
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To the Search Committee:

I am a Ph.D. student in algebraic number theory at UCLA studying with Haruzo Hida. I will be graduating in June 2016 and would like to apply for the Assistant Professorship and the Hill Assistant Professorship beginning in the Fall of 2016, as posted on the MathJobs website.

In my thesis, I study images of Galois representation associated to Hida families of modular forms. I prove that, in the non-CM case, the images of such Galois representations are appropriately large, an analogue of a classical theorem by Ribet and Momose. One of the key steps is a lifting theorem, which I prove using a combination of deformation theory and automorphic techniques. For more detailed information, please see my research statement. I would be excited to work with the number theorists at Rutgers, particularly Stephen Miller and Jerrold Tunnell.

While at UCLA, I have been a successful teacher, both in the classroom and while working with individual students. I was honored to receive a Distinguished Teaching Award in 2014 from the UCLA Mathematics Department, based on evaluations from students and faculty members.

My application consists of the AMS cover sheet, my curriculum vitae, and my research and teaching statements. In addition, it includes letters of reference from my advisor, Haruzo Hida, and from Jacques Tilouine, Chandrashekhar Khare, and Olga Radko. Dr. Radko's letter addresses my teaching experience. Please let me know if any of these items is not accessible or if I can provide any further information. Thank you for your consideration.

Sincerely,

Jaclyn Lang

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.