TEACHING STATEMENT

Maria Gorlatova
mariaag@princeton.edu
Associate Research Scholar
Princeton University

It is a pleasure and a privilege for me to be educating the next generation of professionals. The highlights of my education-related contributions to date include mentoring more than 30 high school, undergraduate, and Masters students of diverse backgrounds, preparing a range of educational materials in corporate settings, and contributing to innovation in education by designing new approaches to engaging undergraduate students in interdisciplinary research [1]. As a faculty member, I look forward to not only teaching and mentoring students, but also to helping senior students hone their own mentorship skills, supporting and championing programs that help students of different levels develop as impactful professionals, and further contributing to innovation in education.

I would like to teach undergraduate and graduate courses in **computer networks**, **mobile, distributed, and embedded systems**, **distributed algorithms**, **wireless communications**, **data analytics**, and **security and privacy**. I would like to design and teach new graduate or advanced undergraduate courses in the areas of *the Internet of Things* and *Fog and Edge computing*, such as The Internet of Things and Cities of the Future, Networking Everyday Objects with the Internet of Things, and Adapting Machine Learning and Optimization Algorithms to Fog Computing.

Mentoring

I take pride in helping students develop to their fullest potential. I already *mentored more than 30 high school, undergraduate, and Masters students* from Columbia University and Princeton University Electrical Engineering, Computer Engineering, and Computer Science programs, as well as visiting and co-op students from 8 other universities in North America, Europe, and Asia. Firmly committed to *fostering a culture of inclusive collaboration*, I proactively recruit students with a range of backgrounds, including female and minority students (who represent approximately 50% of the students I mentored). I also involve students from under-served communities in my research. For instance, via a Columbia University partnership with Harlem Children Society, I mentored 2 high school students from economically disadvantaged inner-city New York neighborhoods. My mentees co-authored multiple papers in top venues, such as ACM SIGMETRICS, IEEE Transactions on Mobile Computing, and IEEE Journal on Selected Areas in Communications. The majority of the students I mentored joined top technology companies (e.g., Intel, Oracle, Microsoft, AT&T) and Ph.D. programs of top universities (e.g., Imperial College London, MIT, CMU). My mentees' recognitions include a *Columbia University Electrical Engineering Research Award* (given to one graduating senior who demonstrated outstanding accomplishments in research), a *CRA-W Grace Hopper Celebration Research Scholar Award*, and an *ACM SenSys Best Student Demonstration Award*.

As a mentor, I work individually with each student to understand and agree upon the specific skills and experiences the student needs to develop the most, and to select specific projects and project elements that are most relevant to the student's near-term and long-term career goals. For instance, an undergraduate student interested in a career in research would benefit from presenting her work at a research-oriented event, while a Masters student aiming to join a top technology company would benefit more from learning to solve challenges of practical large-scale systems. I establish the expectations of continuous week-by-week progress in student's work, and meet with the student regularly to discuss the progress. In such one-on-one meetings I make sure to discuss not only the specific technical challenges at hand, but also the broader context of the work within the field. I also give the student an opportunity to ask questions pertinent to his or her specific career track and stage. As a faculty member, in addition to mentoring students of all levels, I will also work with my Ph.D. students to help them hone their mentorship skills (e.g., by providing them with opportunities to mentor undergraduate and Masters students, and offering continuous guidance on their mentorship attitudes and approaches).

I proactively champion opportunities to help wider groups of students in developing foundational professional skills, including communication, teamwork, and team leadership. For example, at Columbia University I organized a mini-workshop where undergraduate students improved their communication skills by presenting the outcomes of their summer projects to an audience of approximately 100 incoming graduate students of different backgrounds. I also chaired the 2012 ACM MobiSys Ph.D. Forum, which provided a supportive environment for Ph.D. students

to discuss their research with the leaders of the field. Within the department and via the classes I will teach, I will encourage students to take advantage of the professional development opportunities available on campus and in the local community (e.g., via local meetups), and will identify and introduce opportunities needed but not yet available (e.g., workshops and seminars on technical writing, project management, and teamwork; opportunities for students to present their work to broader audiences; opportunities to contribute to technical blogs and wikipedia articles). I will also continue to champion initiatives that help Ph.D. students further develop as scientists, such as student workshops, shadow TPCs, and summer schools in specialized topics.

Teaching

Developing educational materials has been an integral part of my industry positions, including my Senior Strategy Consultant position at IBM and my Engineering Program Manager position at D. E. Shaw Research. For example, at IBM I developed and led training sessions for advanced data analytics toolsets we developed, and regularly explained concepts from computer science and statistics to non-technical professionals, such as senior leaders of sales and legal business units. At D. E. Shaw Research, serving as a liaison between the engineering team and the non-technical teams, I developed in-depth explanations of ASIC design decisions, technology roadmaps, supercomputing power and cooling solutions, and software trade-offs. I presented these materials to multiple groups consisting of different members of legal, finance, and human resources D. E. Shaw Research teams, as well as external parties (e.g., subcontractors, potential business partners).

My corporate teaching experience helped me develop a set of guiding principles that I will incorporate in structuring and teaching university courses. For example, I will make sure that the students understand why course material is important to master (e.g., by stressing the importance of the examined techniques for future classes and the role of the techniques in professional practice). I will also make sure that the students learn continuously, rather than cram for the exams (e.g., by providing weekly problem sets and conducting weekly quizzes), and will ensure that the students have access to materials explaining core concepts of the class in a range of ways (e.g., different visualizations, simulations, video lectures, podcasts). I will also proactively ask students for early feedback on course content and structure, and will provide continuous quantitative feedback on the students' progress in the class.

Innovation in Education

I see numerous opportunities to contribute to innovation in education, including:

- Developing new multi-disciplinary boundary-crossing curricula in technical fields related to my research,
- Using emerging technologies to improve educational outcomes, and
- Developing new methods for engaging diverse groups of students in educational activities.

A specific area of innovation in education that I already started examining is innovation in *project-based learning*. As part of my Ph.D. research, I developed approaches for providing students with project-based learning opportunities within large-scale research efforts. Over 11 semesters, we *engaged more than 50 high school, undergraduate, and Masters students in more than 115 inter-disciplinary research projects*. The projects exposed students to various disciplines in Electrical Engineering, Computer Science, and Applied Physics. Some of the approaches we used to facilitate student learning were real-world system development constraints and regular cross-group meetings. Over 80% of the students we surveyed to evaluate the effectiveness of our approaches indicated that participating in this large-scale research effort made them a better engineer or computer scientist, and over 70% of the students said that contributing to the effort *improved their ability to function on multidisciplinary teams more than any other activity in their academic career*. Our experience, unique in its scale, demonstrated the feasibility of engaging diverse groups of junior students in large-scale research efforts, and suggested best practices for such engagements [1]. In my future work I will explore several additional project-based learning approaches for fully engaging students of different backgrounds, including first-generation college students, geographically distributed student groups, and mature students that are retraining for a career in a different field.

REFERENCES

[1] M. Gorlatova, J. Sarik, P. Kinget, I. Kymissis, and G. Zussman, "Project-based learning within a large-scale interdisciplinary research effort," in *Proc. ACM Conference on Innovation and Technology in Computer Science Education (ACM ITiCSE'13)*, July 2013.