

TEACHING STATEMENT

SUBHADIP CHOWDHURY

I consider teaching and communicating math an integral part of my life. It always fills me with great joy to witness a classroom full of students make the transition from being doubtful and confused to confident and knowledgeable on a topic, or to help a colleague gain an appreciation for a new and abstract concept. The 2019-2020 academic year marks my sixth year as the instructor of record for a range of pure and applied/interdisciplinary undergraduate Mathematics courses at Bowdoin College and at the University of Chicago, both at introductory and advanced levels, all with great feedback. I have also mentored a diverse group of high school and undergraduate students through *independent study* sessions and REUs, trained students for *Olympiads* and *Putnam*, and have participated in various outreach activities specifically geared towards first generation college students and minority groups.

ACTIVE AND INCLUSIVE CLASSROOM. From the first day of lecture, I constantly monitor the classroom dynamic to ensure that no one feels isolated and that I pay equal attention and provide honest helpful guidance to both the capable and the less experienced students. By familiarizing myself with their backgrounds and interests through an introduction form, I carefully form small groups that complement each others' strengths and weaknesses. I start planning early to craft rigorous in-class *worksheets* that encourage students to make necessary efforts to discuss, analyze, and discover the relevant results themselves; often this involves working in groups, parallelly on their assigned blackboard. This allows me to engage with every students, understand their needs and modify the instructions on the spot accordingly. Students have found this an integral part of their learning process and always responded very enthusiastically in their feedback: "*[he] was engaging, excited, and patient. He sought class participation from everyone and helped people reach an answer and understanding as necessary.*"

DEVELOPING APPLICABLE SKILLS. To make sure that my students are able to demonstrate skills for applying the textbook knowledge to solve complex real life problems in a diverse team environment, I have carefully designed several relevant and practical group projects that act as an extension to their assignments. For example, my students learned the geometry of rotary engines and rocket propulsion in multivariable calculus. In linear algebra, they applied the theory behind Google's page rank algorithm to network flows and learned basics of cryptography. In ordinary differential equation, students analyzed the hysteresis of Spruce Budworm population and found the best kick-flow regimen of caffeine consumption. Some students have used words like '*quest*' and '*adventure*' to describe these projects in their feedback. They liked that it "*...slightly strays away from class - keeps things interesting*" and found the experience satisfying and enjoyable.

COMMITMENT TO DIVERSITY. It is important to me that each student is treated as an individual, that multiple perspectives, experiences, and identities are valued and promoted. To adapt the style and content of my teaching that reflect their diversity, I have taken steps

like promoting *visual learning* for non-native English speakers, spending extra times with struggling or special-needs students, and in general, create more heterogeneous contents using real life examples from all facets of our society. Students have found my colorful mathematical drawings and physical cues one of my biggest strengths during lectures.

I am fortunate to possess the unique experience of teaching a group of academically talented incoming first-year students at UChicago through the *Chicago Academic Achievement Program* (CAAP), many of whom were first-generation college students or from low-income communities. More recently, I have participated in the *Bowdoin Science Experience*, an orientation program designed towards students from groups underrepresented in the sciences and currently help organize a weekly *Study Group* for students of color in Math, CS and Physics. More details on these and my other outreach efforts can be found in my *Diversity Statement*.

TEACHING BEYOND THE CLASSROOM. I firmly believe that the process of teaching is not confined to the classroom and it is important to keep curious minds busy by engaging them in intellectual reflections and allowing them to find connections to their own interests. I have done independent study courses with Economics students interested in game theory and about optimization techniques for asset revenues, with Computer Science students interested in machine learning, and have mentored several summer *REU* participants. In each case, I also helped them learn mathematical writing and coached them on their presentation skills. A detailed list of these are available in my CV.

I have experience in training high school students for the *Indian National Mathematical Olympiad* and am currently co-organizing a *Problem Solving Seminar* where we work on Math ‘puzzles’ in an effort to teach important mathematical strategies in a fun setting and train more enthusiastic students for the *Putnam Competition*. Several times over the last years, I have given invited talks in student seminars, participated in panel discussion with undergrads regarding grad school and higher studies, and given colloquium style talks in front of my peers. Through these, I have tried to expose the student community to interesting nonstandard mathematical ideas in an effort to destigmatize math education. Students have regularly praised my availability, enthusiasm, and willingness to help them both in and outside the classroom: “[he] goes out of his way to explain things, and even beyond his role as an instructor, he cares about his students.”

FORMATIVE ASSESSMENT POLICIES. I believe, as a professor, my main focus is not to deliver content, but rather focus on the process and help the students realize their own potential. As such, I have always prioritized rewarding academic growth of a student throughout the course over raw examination scores. Although there are weekly quizzes and two midterms, students get opportunities to make up partial grades, by taking follow-up tests or redoing particular questions to show that they correctly identified their mistakes. In higher-level courses, I sometimes give take-home exams and occasionally require a final Presentation to encourage students to learn effective communication of Math ideas. I have found that the average student performance has gone up when I allow them to demonstrate their abilities in a less constrained environment. Students have often praised my fair grading policy despite moderately hard exams.

INTEGRATION OF TECHNOLOGY. With the abundance of freely available personalized online content in the 21st century, one of my goals as a teacher is to prepare students to become self-regulated learners. By *curating a list of course-specific online contents* as part of the lecture and assignments, and by making them accountable to their use of resources in form of a cover sheet, I believe to have improved their ability to discern useful information from fraudulent or irrelevant ones.

Incorporating several Mathematica and Octave labs into my curriculum have helped students visualize abstract ideas more easily, observe simulated experiments, understand how to implement the theoretical algorithms in a practical time-efficient way and explore the limitations of computing technologies at the same time.

Finally, *by maintaining an online forum via Blackboard*, I have helped them keep track of their own performance and engage in productive debates more confidently. I have found that the seamless integration of digital and computational tools have significantly lowered the barrier of intimidation and allowed students more control over their learning paces, leading to more time for direct interaction during lecture.

CREATING A SUPPORTING ENVIRONMENT. As a way to improve my students' experience and ensure proactive participation, I always strive to create an environment where they feel comfortable to take risks and learn from mistakes. This includes affirming constructive criticisms and recasting negative ones, which empowers them to see criticism as opportunities for advancement, not instances of personal failing. One of my students wrote: "*[he] is just fantastic at instilling a love for math...His good sense of humor always made lectures more fun.*"

In a complimentary direction, I conduct *anonymous student surveys* every three-to-five weeks and try to continually improve myself based on their suggestion. Through weekly teaching seminars at Bowdoin College, the *MAA mentoring network*, and *Bowdoin Teaching Triangle* program, and other pedagogical workshops, I have gained new insights about best teaching practices by following advice from more experienced colleagues.

FUTURE GOALS. I have been and always will be very passionate about teaching. Building upon my current experience, I have many specific ideas that I wish to incorporate into my role as a future instructor. Some of them include: developing AR/VR or role-playing-games into the classroom, similar to RTTP, to innovate and transform STEM instruction with new forms of representations and teaching using discovery learning methods and experiment with bolder pedagogical ideas. Finally, by bringing in a wide variety of perspectives, I hope to impact and get support from my peers in designing approaches towards broader, more widely applicable, and more memorable learning.