Myungsin Cho

Teaching Statement

My central goal as an educator is to help students think mathematically–to frame problems, reason with definitions, and connect methods to broader ideas. I emphasize understanding through concrete example before memorization: once a student understands the meaning of a definition, the associated techniques follow naturally. I want students to see mathematics not just as a collection of rules, but as a coherent way of reasoning.

For instance, I frame calculus through the unifying theme of approximation. What may seem to students as separate topics can instead be seen as parts of a single theme, offering coherence and intuitive insight into the subject's central properties. This approach reduces the pressure to memorize isolated formulas and highlights the larger narrative of the subject. As a result, students tend to engage more actively when they recognize how the pieces fit together.

Large-Lecture and Applied Contexts

Most recently, I am teaching Analysis and Optimization at Columbia University, a large-lecture course taken mainly by students in applied mathematics and other STEM fields. Unlike proof-based analysis courses, this class emphasizes applications and computation. I prepare lectures around a cycle of concepts $\rightarrow$ example $\rightarrow$ practice, using carefully chosen examples that draw from economics, engineering, and social sciences. Because students arrive with varied preparation, presenting abstract ideas through concrete situations keeps the material accessible while still highlighting the reasoning behind the formulas.

Although the course syllabus is departmentally coordinated, I design my lectures independently rather than following the textbook line by line. I find that this flexibility allows me to tailor explanations and choose applications that resonate with students' backgrounds. I also design homework problems myself rather than assigning them directly from the textbook. By aligning problem sets closely with the themes of my lectures, students gain a stronger sense of continuity and are better able to consolidate what they have learned in class. My own undergraduate training in engineering has been an asset here: I am familiar with how STEM students think about technical problems, and I can translate mathematical concepts into problem-solving approaches that feel natural to them. This experience has strengthened my ability to manage large and diverse classrooms while maintaining clarity and coherence in the lectures.

Adapting to Different Learning Environments

My teaching spans institutions with very different student populations. At Indiana University, I taught Calculus I as the primary instructor for a section of about 70 students. With wide variation in preparation, I used short quizzes, carefully designed homework assignments, and structured review sessions to build confidence and strengthen core understanding. Students responded especially positively to the homework, noting in evaluations that it helped them connect lecture material with practice. The withdrawal rate in my section was about *10% lower than the departmental average*, one of the lowest among twelve instructors that semester. Teaching evaluations also showed that my scores were consistently about *10% above the departmental average across most categories*, with students frequently mentioning clear explanations and an approachable class atmosphere.

At Seoul National University, I served as a TA for a calculus course with students who generally had stronger preparation. Although the content was similar, I adjusted my approach: instead of focusing on review and confidence-building, I emphasized justification and comparison of methods. I encouraged students not only to solve problems but also to explain why their solutions were valid and how they related to alternative approaches. Short, structured discussions helped students develop habits of reasoning and proof. During this time, I received a *Lecture and Research Scholarship*, awarded in recognition of both strong teaching performance and research potential. By shifting emphasis–confidence and practice at IU, rigor and articulation at SNU–I learned to adapt pedagogy to local contexts while keeping active participation central.

Mentoring and Individualized Support

I place high value on mentoring and individualized guidance. Through the *Directed Reading Program* at Indiana, I worked with undergraduates on advanced topics ranging from algebraic topology to category theory. I set weekly milestones, asked students to produce short write-ups, and encouraged them to present their findings accessible formats. These projects often gave students the confidence to enroll in graduate-level courses the following semester. The process of setting goals and receiving regular feedback helped them transition into more advanced work and develop independent learning skills.

I also view office hours and one-on-one conversations as essential for supporting students who might otherwise feel left behind. I make a point of encouraging them individually, whether by checking in before class, clarifying that all questions are welcome, or reaching out if a student seems to be struggling with coursework. While not framed as formal initiatives, these small gestures help create a more inclusive and supportive classroom environment.

Assessment and Feedback

I view assessments as part of the learning process rather than as one-time events. To encourage growth, I allow students to revisit and correct mistakes on exams, awarding partial credit for thoughtful revisions. This practice shifts the focus from performance to improvement and helps reduce the pressure of high-stakes testing. In addition, I sometimes design extra-credit assignments tailored to individual needs: enrichment projects for students who want to explore beyond the syllabus, or additional practice problems for those who need to strengthen their foundation. By keeping assessments flexible and responsive, I aim to support each student's progress while maintaining clear academic standards.

Courses I Can Teach

I am prepared to teach a wide range of undergraduate and graduate courses, including:

- Lower-division and core undergraduate: Calculus sequence, Linear Algebra, Differential Equations.
- Advanced and major-related: Abstract Algebra, Topology, Real Analysis, Algebraic Topology, Homotopy Theory (selected topics).
- Service and applied: General education math (e.g. Math of Decision and Beauty), applied courses for STEM fields (e.g. Analysis and Optimization), and flipped or virtual formats

This range reflects both my teaching experience and my flexibility in meeting departmental needs.

Conclusion

For many students, my class may be their last formal encounter with mathematics. I want them to leave with confidence in their abilities, a clear grasp of key ideas, and an appreciation of how mathematics connects to the world around them. For mathematics majors, I aim to help them develop habits of proof and reasoning that prepare them for advanced study and research. Whether in a large applied lecture or a small reading group, I see teaching as the work of guiding students toward the reasoning that makes mathematics both rigorous and meaningful.

Course evaluations and DRP presentation slides are available at my website (link)