

# Teaching Philosophy

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My primary teaching goal is to encourage students to think of math as something to be enjoyed and discovered. I accomplish this by creating a fun and engaging classroom environment, improving student mindset, reaching out to the community to bring math to a wide audience, working to meet the needs of diverse and underserved student populations, and collaborating with other educators to continue to develop the best possible teaching methods for my classroom.

To make classes more engaging for students, I focus on creating interesting activities that students can enjoy while learning new concepts. For example, In the Upward Bound program for first-generation college students, I created an activity called Dot in a Box to help students better understand Euclidean and non-Euclidean geometry (taxicab geometry). In Math for Elementary Teachers at Ohio University and Montgomery College, I had students learn about methods of teaching fractions using art, like Islamic Geometric Patterns (IGP).

Expanding on this approach, in my Calculus 2 Honors course at Montgomery College, I've introduced 3D printing to bridge math, programming, art, and technology. Students create mathematical objects relevant to the material and use software such as Mathematica to create a 3D model, which is then printed in our department. These projects and resources are shared on my GitHub repository. Eventually, students will give an exhibition of their work. Additionally, in my Linear Algebra class, I've developed and created multiple mathematical games, accessible through my website that students play before and after covering class material, such as vector addition, cosine similarity, and games related to permutation matrices. These games encourage active learning and provide a fun way to reinforce mathematical concepts, making abstract theories more tangible and understandable.

One of my greatest priorities as an instructor is helping students improve their mindset. Not only do I want to help students learn about math but I also want to support them in making the right decision when they have a difficult time in life. My own mindset on this subject was profoundly influenced by an experience I had with a young student in a rural area of Kurdistan, Iraq, where one of my students committed suicide at just 15. This tragedy has deeply influenced my approach, leading me to seek activities that are not only mathematically rigorous but also meaningful to students' lives, such as the dateline activity in Precalculus.

Since I began teaching in the U.S. I have surveyed students during the first week of class regarding their attitudes about math. Their responses often express fear and anxiety. I then ask students to write one word on the blackboard that they associate with math. By the end of the first week, they have two assignments: to write a mathematical autobiography and to create a cartoon expressing their feelings about math. These assignments provide insight into my students' mindsets, which I use, along with feedback from quizzes and discussions, to help

them change their perspective on mathematics. Eventually, I tailor extra credit assignments to individual student needs, like reading a book chapter or writing a short paper about a mathematical article.

My interest in teaching math to the public developed from the lack of Kurdish writers discussing math for a general audience. This realization led me to translate and write mathematical articles in Kurdish, eventually writing about the new mathematics curriculum for the Kurdish Regional Government (KRG) in a newspaper and on my blog (<https://birkary.wordpress.com>). My English language blog (<https://igpadventure.wordpress.com/>) explores the creative use of Islamic Geometric Patterns in math education at all levels.

In 2016, I had the honor of interviewing Fields Medal winner Caucher Birkar for a Kurdish newspaper Awene, an experience that allowed me to bridge the gap between Kurdish people and the global mathematics community. Since living in the United States, I have continued to promote mathematics through activities based on Islamic Geometric Patterns, engaging audiences at various venues and levels, from elementary school to undergraduate courses.

I have also worked with programs targeting diverse and underserved populations, using creative teaching methods to convey advanced mathematical concepts. This approach has proven successful in engaging students who might otherwise have limited opportunities to explore their mathematical potential. I am always open to collaborating with other educators

and colleagues to develop more innovative and effective methods for teaching math. This openness has led to a multitude of collaborative projects, many of them interdisciplinary, working with departments like art and math. These collaborative projects include: designing lesson plans that integrate culture, art, and geometry; developing a flipped classroom model for Precalculus; writing a short book with another faculty member for early college students; creating a new course with an art faculty member; organizing a trip to a museum; and inviting other faculty to collaborate on implementing 3d printing into their course.

The central focus of my teaching philosophy is to create an engaging classroom, improve student mindset, and bring math to the community. However, it is also vital that my teaching philosophy continues to grow and develop through interaction with students, experiences in the classroom and with the public, and collaboration with other educators and experts in math education.