

EGMT 1520: BUILDING TRUTH FROM SCRATCH (EMPIRICAL & SCIENTIFIC ENGAGEMENT)

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How do we know a claim is true?

This course is a hands-on workshop in making and testing arguments in the context of mathematics. We will generate conjectures from examples, search for counterexamples, and turn ideas into precise statements and proofs. Through problem-solving sessions and math debates, you'll practice evaluating arguments, giving and receiving constructive feedback, and communicating clearly in writing and speech. By experiencing mathematics as a creative process — where patterns suggest conjectures and logical reasoning turns intuition into conviction — you'll develop a practical sense for what counts as evidence in mathematics and how to build reliable conclusions. By the end of the course, you will be able to

- (1) **Define and delimit what constitutes valid mathematical evidence** by distinguishing between examples, counterexamples, conjectures, and formal proofs, while recognizing the limitations of empirical observations.
- (2) **Develop a framework for discerning different types of mathematical knowledge** by exploring how empirical evidence, abstract reasoning, and logical structure work together to shape mathematical understanding.
- (3) **Formulate and communicate mathematical reasoning** by translating intuitive insights into precise statements, evaluating the soundness of arguments, and engaging in constructive dialogue to identify and resolve reasoning gaps.
- (4) **Reflect on the nature of mathematical truth** by examining personal assumptions about certainty, analyzing when and why certain arguments are conclusive, and articulating how purely empirical approaches can both inform and limit our understanding of complex phenomena.