

**Math 347: Fundamental Mathematics (3 credits)****Course Description**

Fundamental ideas used in many areas of mathematics. Topics will include: techniques of proof, mathematical induction, binomial coefficients, rational and irrational numbers, the least upper bound axiom for real numbers, and a rigorous treatment of convergence of sequences and series. This will be supplemented by the instructor from topics available in the various texts. Students will regularly write proofs emphasizing precise reasoning and clear exposition. Credit is not given for both Math 347 and Math 348.

Prerequisites: Math 231.

Course Content

This is an introduction to mathematical language, rigorous mathematical thinking, fundamental mathematical structures, and methods of proof. Topics include logic, set theory, induction, equivalence relations, functions, number theory, cardinality, and convergence.

Lectures, Labs, Discussions

This course uses the Moodle online system and [Overleaf](#). You will need a stable internet access, sufficient bandwidth and data allowance for using a webcam and microphone on Zoom.

- Lecture: Asynchronous online (four to six hours a week)
- Discussion Sections: Synchronous online on Zoom (four hours a week)
 - Monday/Tuesday/Wednesday/Thursday: 1pm CDT

Proof Portfolio

The proof portfolio is a major assessment which will replace the traditional third midterm in this class. The goal is to give you a chance to showcase some of your best work throughout the semester, and to produce a polished LaTeX document which reflects some of what you have learned during the course

Exams

This course has two midterm tests and a 3-hour final exam. It uses the College of Engineering Computer-Based Testing Facility (CBTF) for its exams: <https://cbtf.engr.illinois.edu>. The policies of the CBTF are the policies of this course, and academic integrity infractions related to the CBTF are infractions in this course.

Other Information

- This course is adapted from recorded lectures by UIUC Professor Scott Ahlgren.
- You will need a hard copy of the required text: [Introduction to Abstract Mathematics](#) (Donaldson and Pantano)