

Math 2106E: Foundations of Mathematical Proof - FALL 2018

- **Instructor:** Prasad Tetali, tetali-at-math.gatech.edu
- **Time/Location:** MWF 10:10-11:00am; Skiles 271
- **Office hours:** Skiles 132; Thurs 4-5pm, Wed, Fri: 11-noon.
- **Prerequisites:** MATH 1552 (Integral Calculus), MATH 1553 (Linear Algebra)

Recommended Textbook(s) : All are available online!

1. Main textbook: *Book of Proof*, by Richard Hammack (2nd edition, 2013). Link to the site – <http://www.people.vcu.edu/~rhammack/BookOfProof/>

Additional material will be from:

2. *Abstract Algebra: Theory and Applications*, by Thomas Judson (Annual Edition, 2018).
3. *Elementary Analysis: The Theory of Calculus*, by Kenneth A. Ross (2013).
4. *Applied Combinatorics*, by Mitchel Keller and Tom Trotter, 2017 Edition.

Objectives: To help students understand and prove mathematical statements. To help communicate effectively about mathematics with peers, and to develop independent reading of mathematical texts. To help gain mathematical maturity, get acquainted with tools to prepare for more advanced topics in mathematics.

List of Topics:

- (2 lectures) Introduction
 - Logic statements - implications, negations, converses, equivalences and quantifiers
 - Basic Counting - (ordered) lists, subsets of a set, inclusion-exclusion, ...
 - Methods of Proof - direct proof, proof by contradiction, proving the contrapositive, ...
 - More on Proofs - disproofs, existence Proofs and mathematical induction
 - Axioms of set theory, proofs involving sets
 - Relations and Functions - equivalence relation, injection, surjection, ...
 - Cardinality - finite, countable, uncountable
 - Proofs from *The Book!*
 - Towards Analysis - Sequences (lim inf, lim sup), Continuity and Uniform continuity
 - Elements of Group Theory - subgroups, cosets, Lagrange's theorem
 - (3 lectures) Miscellaneous, review and wrap-up
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- **Test 1 (Monday, September 17th)** : in class, closed book, closed notes.
 - **Test 2 (Monday, October 22nd)** : in class, closed book, closed notes.
 - **Test 3 (Friday, November 16th)** : in class, closed book, closed notes.

- **Final Exam on Wednesday, December 12th; 8:00 - 10:50 a.m. in Skiles 271**

No make-up exams are allowed. Relevant (e.g., medical) documentation required in case of any exceptional circumstances.

Grading policy : HWs 15%, Quizzes 5%, Tests 40%, Final Exam 40%

General Grading Scale : Your final grade will be assigned as a letter grade according to the following scale:

- A 90-100%
- B 80-89%
- C 70-79%
- D 60-69%
- F 0-59%

Homework will be assigned on a regular basis, collected and graded. While it is OK to discuss and collaborate on HWs, you must write the solutions on your own - not simply copy from each other.

HWs turned in past the deadline (but within two days past) are penalized by 25%. No HWs are accepted after two days past the deadline.

Academic Integrity: Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>. Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Accommodations for Students with Disabilities: If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu/>, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Other Important Dates:

- Last day to drop the course: October 27, 2018
- Final instructional class: December 3, 2018.
- Labor Day Holiday: Monday, September 3, 2018
- Fall Break: Monday, Tuesday, October 8-9, 2018
- Thanksgiving recess: Wednesday-Friday, November 21-23, 2018.