

MATH 250

SPRING 2017

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Office Hours: MWTh 3:45-5:00; additional hours posted weekly.

Course Content: Mathematics 250 is a survey of basic mathematics with a focus on proving. The course will cover elements of the propositional calculus, the predicate calculus, and techniques of proof (including mathematical induction); sets and the set-theoretical development of basic mathematical objects (relations, functions, operations); and brief introductions to the fields of combinatorics, number theory, group theory, and analysis.

Textbooks: *Foundations of Analysis* by Edmund Landau; *How to Prove It* (2nd edition) by Daniel J. Velleman. Additional materials will be posted on Canvas.

Course Goals: The overall goal is to prepare the student for higher mathematics as well as possible in a semester. If you do take higher mathematics courses, I would appreciate feedback about how well this goal was met. At the end of the course, the student should achieve the following process goals:

1. Read and apply a complicated definition.
2. Produce an example of a thing defined.
3. Read and understand proofs.
4. Understand what needs to be proved in a statement.
5. Apply various strategies for proving a statement.
6. Create simple proofs; to write a proof cogently.

And the student should achieve the follow content goals:

1. Understand the propositional and predicate calculi.
2. Know the basic definitions in the fields of set theory, number theory, group theory, and analysis.

Coursework: Problems will be assigned and collected for credit. To receive full credit the work must be correct, well-written, and done *alone*. The student will have the opportunity to revise and resubmit their work. Students may not always receive the same problems.

Homework exercises will also be assigned; these are for the benefit of the student and will not be submitted for a grade. Sometimes the student will have to prepare a proof for presentation in class; this is an important component of the student's class participation.

Tests: Two tests will be given, one before spring break and one after. These will be scheduled at at time convenient for all members of the course. A cumulative final exam will be given at 2pm on Tuesday, May 2.

Grading: The student's final course grade will be based, in part, on their performance on two tests (15% each) and a cumulative final exam (20%). The bulk of each student's grade (40%) will be based on

proofs submitted from the assigned problems mentioned above under Coursework. In addition, each student will be graded based on class participation (10%), requiring the student to actively participate in asking and answering questions, as well as occasionally presenting content and solutions in class.

Final grades will be based on the following ranges: 90.0-100% A, 80.0-89.9% B, 70.0-79.9% C, 60.0-69.9% D, 0-59.9% F. Plus and minus grades will be assigned based on final grade distributions within each whole letter grade.

Course Outline: Approximately four weeks will be spent on chapters I and II of *Foundations of Analysis* and chapters 1–3 of *How to Prove It*; this represents the content of the first test. Following this, approximately four weeks will be spent on chapters 4–7 of *How to Prove It* and chapters III and IV of *Foundations of Analysis*; this content will be assessed on the second test. The last three weeks of the course will be spent on additional topics in algebra and analysis.

THE HONOR CODE OF OXFORD COLLEGE APPLIES TO ALL WORK SUBMITTED FOR CREDIT IN THIS COURSE. BY SUBMITTING SUCH WORK, YOU PLEDGE THAT WORK WAS DONE IN ACCORDANCE WITH THE RULES STIPULATED ON THE WORK OR IN THIS SYLLABUS.

IN PARTICULAR, NOTE THAT ONLY THE RESOURCES LISTED UNDER TEXTBOOKS ABOVE ARE TO BE USED IN THE COMPLETION OF ASSIGNED PROBLEMS. INTERNET RESOURCES AND “HINTS” FROM ANY INDIVIDUAL—OTHER THAN THE INSTRUCTOR—ARE FORBIDDEN.