M300.3—Fundamental Concepts of Mathematics  
Spring 2019 Syllabus

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Course web page: [http://ext.math.umass.edu/300](http://ext.math.umass.edu/300) The web page will be used to post assignments, make announcements, and provide resources (readings, links, etc.) You should check it frequently.

Office hours: To be announced (in class and on the course web page). In addition to my scheduled office hours, you can always make an appointment in class or by e-mail. And you can stop by my office at any time; if I'm there and not busy, I'll be happy to talk to you then and if I am too busy to talk, we can set up another time.

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**Course description:** Math 300 is an introduction to rigorous, abstract mathematics. In lower-level courses like calculus, the emphasis is on applying theorems and formulas to solve specific, often numerical, problems. More advanced math classes are concerned with developing the theorems and formulas and solving general classes of problems. In particular, it's important to know why those theorems and formulas are true. In mathematics, the way we know a statement is true is by giving a proof of it, and this course is about learning what a proof is, how to read, create, and present proofs, and how to tell a correct proof from an incorrect one.

In many ways, this is like learning a language. We need to learn the grammar (logical deduction) and vocabulary (sets, functions, and other basic structures), but it also helps to have something to say. So we will also study some important and beautiful mathematics along the way. Starting with explicit axioms and precisely stated definitions, we will systematically develop basic propositions about integers and modular arithmetic, induction and recursion, real numbers, infinite sets, and such other topics as time allows.

There is a required 1-credit co-seminar in which you will meet in a smaller group with the TA.

**Course structure and policies** Attendance at both class and the co-seminar is required; participation in class and the co-seminar is expected and will count as part of the grade. There will be reading assignments as well as homework to
submit. It is expected that you will have done the reading before the class at which it will be discussed and will submit homework on time. Homework to be collected in class will be due at the start of class.

There will be two midterms each counting 20% of the course grade and a (cumulative) final counting 25% of the grade. Quizzes will be 5% of the grade and I will drop the lowest quiz grade. Homework will count 25% of the grade and participation will be 5%. If you will be unable to complete an assignment on time or will miss an exam or quiz, it’s your responsibility to notify me as soon as possible before the due date or exam. Note that sending me an email does not automatically excuse late work or a missed exam. And, since email is not a completely reliable medium, if you send me an email and don’t get an acknowledgment in a day or so, you should try to reach me by some other method.

When you get stuck on a problem (and you will get stuck from time to time), I encourage you to seek help from me, your TA, your classmates or other students. Many times talking with someone else will help you see a new way to approach a problem which you hadn’t seen before. I especially recommend that you work with your fellow students in groups. But, if you work on a problem with someone else, you should make sure that you can explain the solution by yourself. Remember that during tests, you will have to rely on your own understanding of the material. Here are the rules for collaborating on homework problems:

• You must list the names of all the people with whom you discussed a specific problem. If you used other sources (such as books) in working on a problem, besides class notes and the textbook, you must list those sources as well.

• You must write up your own solutions independently.

Part of what you will be learning in this class is how to communicate mathematics to other people, so your homework will be graded on clarity as well as correctness. Doing your homework will usually be (at least) a two-step process, where you first work out how to do it, and then rewrite your solution, getting rid of any false starts or unnecessary steps.