M300.1—Fundamental Concepts of Mathematics  
Spring 2020 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: Mondays, 11-12, Thursdays 11-12, and by appointment. You can always make an appointment in class or by email. (I may need to adjust this schedule later in the semester; changes will be announced in class and posted here.) You’re also always welcome to look for me in my office; if I’m there and not busy, I’ll be happy to talk to you and if I am busy, we can make an appointment for another time.

TA: Yudong Chai, ychai@umass.edu

**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 understand 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 or sites on the internet) 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.

**Pronouns:** All members of our community have the right to be addressed by the name and pronouns that they use for themselves. Students can indicate their preferred/chosen first name and pronouns on SPIRE, which appear on the rosters. Please let me know what name and pronouns I should use for you if they are not on the roster.

**Accommodation:** The University of Massachusetts Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological, or learning disability on file with Disability Services (DS), you may be eligible for reasonable academic accommodations.
to help you succeed in this course. If you have a documented disability that requires an accommodation, please notify me within the first two weeks of the semester so that we may make appropriate arrangements.

**Academic Honesty:** Since the integrity of the academic enterprise of any institution of higher education requires honesty in scholarship and research, academic honesty is required of all students at the University of Massachusetts Amherst. Academic dishonesty is prohibited in all programs of the University. Academic dishonesty includes but is not limited to: cheating, fabrication, plagiarism, and facilitating dishonesty. Appropriate sanctions may be imposed on any student who has committed an act of academic dishonesty. Instructors should take reasonable steps to address academic misconduct. Any person who has reason to believe that a student has committed academic dishonesty should bring such information to the attention of the appropriate course instructor as soon as possible. Instances of academic dishonesty not related to a specific course should be brought to the attention of the appropriate department Head or Chair. Since students are expected to be familiar with this policy and the commonly accepted standards of academic integrity, ignorance of such standards is not normally sufficient evidence of lack of intent. See [http://www.umass.edu/honesty](http://www.umass.edu/honesty).