

UMassAmherst

Fundamental Concepts of Mathematics, MATH 300.03

SYLLABUS SPRING 2018

Luca Schaffler

LECTURE: TuTh 11:30-12:45 in LGRT 202.

OFFICE: LGRT 1434 **EMAIL:** lschaffler@umass.edu

CO-SEMINAR: W 4:00, 5:30, 6:30 in LGRT 1114 by Gregory McGrath (gpmcgrath@umass.edu).

COURSE MATERIAL: Available on Moodle.

TEXT: Ted Sundstrom; *Mathematical Reasoning: Writing and Proof*, Version 2.1. Available online at <https://scholarworks.gvsu.edu/books/9/> (you can also order a paper copy).

OFFICE HOURS: MTuTh 4:00-5:00, in my office.

COURSE DESCRIPTION: Math 300 is an introduction to rigorous abstract mathematics. In lower-level classes like calculus, the emphasis is on applying formulas and theorems to specific problems. In this class, we will be more concerned with *why* the formulas and theorems are true. We will learn what a proof is, how to read, create, and present proofs, and how to tell a correct proof from an incorrect one. It is like learning a new language: we need to learn the grammar (logical deduction) and the vocabulary (sets, functions, and other basic structures), but it also helps to have something to say, so we will also study some beautiful mathematics along the way. Most of the actual mathematics we will study will concern the behavior of different classes of numbers: natural numbers, integers, rational numbers, real numbers, modular arithmetic, and (if time permits) the surprising things that happen when you count infinite sets.

TOPICS: Propositional logic and quantifiers. Methods of proof: direct proofs, proofs by contradiction, proof by induction. Elementary set theory. Functions: injections, surjections, bijections, inverse functions. Equivalence relations and equivalence classes. Elementary number theory: divisibility, congruence, greatest common divisor, the Euclidean algorithm. Cardinality: finite sets, countable sets, uncountable sets.

PREREQUISITE: There is a prerequisite of Calculus II, MATH 132, with a grade of C or better.

ATTENDANCE POLICY: PROMPT, COMPLETE ATTENDANCE is expected at all classes. Please attend the ENTIRE class; this to preserve an effective learning environment for all students. Professional courtesy toward your instructor and your classmates is expected. You will be responsible for all the materials delivered in class and your final letter grade can be affected by it.

TEST DATES: There are two midterms and a final. The first midterm is on Thursday February 22 from 7:00 pm to 9:00 pm in LGRT 202. The second midterm is on Friday April 6 from 7:00 pm to 9:00 pm in LGRT 202. The comprehensive final exam is scheduled for Thursday May 3 from 1:00 pm to 3:00 pm in LGRT 123.

CALCULATORS AND FORMULA SHEETS POLICY: There is no required calculator for the course. You will NOT be allowed to use a calculator on exams. Absolutely no formula sheets, class notes, etc. will be allowed during final and midterm exams.

GRADING: 30% of your grade will come from the homework. 20% of your grade will come from each of the two midterms. The remaining 30% will come from the final exam. The grading scale will be:

90 – 100 A, 85 – 90 A-, 80 – 85 B+, 75 – 80 B, 70 – 75 B-, 65 – 70 C+, 60 – 65 C, 56 – 60 C-, 53 – 56

D+, 50 – 53 D, 0 – 50 F. (For example, if your final score is 90, your grade will be A, not A-.)

HOMEWORK RULES AND GUIDELINES: Homework will be due on Thursdays at the start of lecture, unless otherwise stated. Late homework will not be accepted, but I will drop your lowest homework grade.

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 are stuck on a problem and seek help from someone else, you should make sure that you can reconstruct the argument 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:

- I. You must list the names of all people with whom you discussed each specific problem.**
- II. You MUST write your solutions completely 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 understandability 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.

MAKE-UPS: There is a list of officially allowed reasons for missing a midterm or the final in the academic regulations (<https://www.umass.edu/registrar/sites/default/files/academicregs.pdf>). Apart from these reasons, make-ups are not allowed. There are no make-ups for missed homework.

ELECTRONIC DEVICES POLICY: *You are expected to turn off your cell phone or set it to mute/silence BEFORE you enter class—every class.* Furthermore, if you use your cell phone *in any manner* during class (e.g. text messaging, games, etc.), you will be dismissed from class and will forfeit any points you might have earned in that class period. If you use your cell phone *in any manner* during a test, you have violated the academic honesty policy. (This policy also applies to LAPTOPS, IPODS, IPADS and all other electronic communication and/or data storage devices.)

REMARKS, NO CLASS MEETINGS AND OTHER DATES: Questions are encouraged at all times. Please contribute as a positive member of this learning community. See the 2017-2018 Academic Calendar for holidays and important deadlines. (<https://www.umass.edu/registrar/calendars/academic-calendar>)

ACADEMIC HONESTY POLICY: All academic work must meet the standards contained in the Academic Honesty Policy (www.umass.edu/honesty/). Students are responsible for informing themselves about those standards before performing any academic work. This policy defends the academic integrity of all student work, and will be uniformly applied to all students in the class.

ACADEMIC ACCOMMODATION: If you have a documented (learning) disability, you should contact the Disability Services. (<https://www.umass.edu/disability/>)

DISCLAIMER: The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary. It is the responsibility of the student to seek clarification of the grading policy and/or course requirements and procedures from the instructor.