Math 347 - Fundamental Mathematics: Syllabus

University of Illinois at Urbana-Champaign

Fall 2018

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Lecture:	MWF 3:00-3:50 pm
Office Hours:	Th 4-5 pm or by appointment

Learning Goals:

- engage in an active learning experience and self-learning parts of the material;
- develop the habit of working with peers and discussing proof ideas before writing them down;
- grasp the essential differences between abstract mathematical subjects and previous mathematical knowledge;
- achieve a good level of proficiency in self-learning and proof writing to be in condition to succeed in further mathematics classes (e.g. Elementary Real Analysis and Intro to Abstract Algebra);

Objectives: The main goal of this course for students is to master the ability to write precise and good proofs. The content used to achieve these goals is first a brief study proof techniques, which are then extensively applied to different areas of mathematics. The course is naturally split into three parts:

1) introduction to basic set theory, proof methods, notably induction and a discussion of the concept of cardinality;
2) a study of the real numbers, i.e. an introduction to real analysis;
3) an introduction to elementary number theory, i.e. a discussion of modular arithmetic.

Structure: There will be two different types of lectures alternated every week, unless an assignment is taking place. The first type is a usual lecture where we might also discuss some exercises. The second type is a flipped classroom, that is, students will be given a reading assignment before the class and on that day they will come and start working on a worksheet. This is going to be a collaborative group activity where students learn from each other.

Textbook: *Mathematical Thinking: Problem-Solving and Proofs - Second Edition*, John P. D'Angelo & Doubles B. West. Note: Since half of the classes involve the students reading the material before coming to class it is important that you have a copy of the book.

Assignments:

- **Homework. (30 %)** *There will be 10 assignments each covering a chapter and an extra review one.* In a class whose goal is to learn to write proofs this is arguably the most important assignment. You should devote a lot of care to preparing your homework. We encourage group discussion of the exercises but each person should have their own write-up of the solutions/proofs.
- **Participation. (10 %)** *Twice during the semester in groups the students are going to present a problem on the board.* All students in the group should contribute to the presentation. The students should divide themselves in groups of not more than 4 people and each group will have 20 minutes to present on the assigned day.
- **Midterms. (30 %)** *Three in-class tests each covering a section described in the objectives.* Mark your calendars for the following dates: **October 5th, October 29th and December 12th.**
- **Final. (30 %)** *This is a two-hour exam, which covers the material of the whole course.* Mark your calendar: **December 20th at 8:00 am.**

No make-up exams. Rubrics for the specific assignments will be presented later.

Lesson Plan Summary: *A more detailed class by class summary is in the file Lesson Plan and will be constantly updated.*

Material	**Duration**	**Assessments**		
Chapter 1	3 Lectures	HW 1	Participation 1	Exam 1
Chapter 2	3 Lectures	HW 2		
Chapter 3	3 Lectures	HW 3	Participation 2	
Chapter 4	4 Lectures	HW 4		
Chapter 13	4 Lectures	HW 5	Participation 3	Exam 2
Chapter 14	4 Lectures	HW 6		
Chapter 5	4 Lectures	HW 7		Exam 3
Chapter 6	4 Lectures	HW 8	Participations 4/5	
Chapter 7	4 Lectures	HW 9		

Class Policy:

- Class attendance and punctuality are very important, please make sure to follow those rules.
- You are expected to turn in all the assignments. Late submission will affect the grade, unless it is justified.

University Policy:

- This class is subject to all the rules specified in the university policy and in particular to the Mathematics department policies. You can find the relevant information in the following link: https://math.illinois.edu/resources/department-resources/teaching-policies.
- Students that need special accommodations need to have a letter from the Disabilities Resources and Educational Services. For more information see the website: http://www.disability.illinois.edu.

- Students are required to abide by the University of Illinois's academic integrity policy, which can be found at:
  http://studentcode.illinois.edu/.
  Suspected violations of academic integrity will be reported to the Dean's Office and will likely result in a failing grade in the class and a note in your academic record.
- As any other university obligation this class does not take precedent over the students well-being and health. The university has great resources for anyone in need, more information can be found on:
  http://odos.illinois.edu/community-of-care/.