Course Map
MA 630 Topics in Advanced Mathematics

This is the Course Map for our entire class. It is a guide that will direct you through each of the course modules. You will also find the instructions within the beginning of each Module of our Canvas Course Site. Before we begin, let's recap on the grading policy:

Assignment	Percentage of Overall Grade
LaTeX Typesetting Test	5%
Quizzes	10%
Homework	40%
Collaboration Boards	10%
Examinations	35%

Modules are the units into which the content of our course is organized. The course contains 4 Modules (including the Orientation Module). The modules are as follows:

- Module 0 - Course Orientation and LaTeX Typesetting
- Module 1 - Logic and Proofs
- Module 2 - Sets and Mathematical Induction
- Module 3 - Number Theory
- Module 4 - Relations and Functions

Course Objectives.

The primary objective of this course is to (re-)introduce students to a wide range of advanced mathematical topics in order to begin study of mathematics at the graduate level.

0. Recall and apply statements of definitions and results in advanced mathematics
1. Prepare mathematical documents using the LaTeX typesetting system
2. Communicate mathematics through presentations and discussions of solutions to problems
3. Write formal, mathematically rigorous proofs
4. Solve computational problems in advanced mathematics

Note: Each Module Objective below is aligned with Course Objectives. Course Objectives are explicitly aligned with Learning Activities or Assignments only when they do not correspond directly to a Module Objective.

Module 0 - Course Orientation and LaTeX Typsetting

Module Objectives:	**Learning Activities**:	**Assignments**:
0. Become familiar with the course structure and layout.	1. Read the Course Syllabus.	1. Complete the LaTeX Typesetting Quiz (CO 1)
1. Prepare a mathematical document using the LaTeX typesetting system (CO 1).	2. Watch the Course Orientation Video.	
	3. Complete a LaTeX Tutorial (CO 1)	

Module 1 - Logic and Proofs

Module Objectives:	**Learning Activities**:	**Assignments**:
0. Recall and apply definitions and statements of results in foundations of mathematics (CO 0).	1. Complete the required reading, watch the Module 1 Lecture Video(s), and read the Module 1 Completed Lecture Notes (MO 0-4).	1. Complete the Module 1 Quizzes (MO 0).
1. Construct and analyze truth tables of propositional expressions (CO 3, 4).		2. Complete Homework 1 (MO 1-4; CO 1).
2. Write negations and other inferences of propositional statements (CO 3, 4).		3. Complete Homework 2 (MO 4; CO 1).
3. Write mathematical statements symbolically using quantifier symbols (CO 4).		4. Participate in the Module 1 Collaboration Board (CO 2).
4. Write mathematically rigorous proofs using a variety of methods (CO 3).		5. Complete Exam 1 (MO 1-4).

Module 2 - Sets and Mathematical Induction

Module Objectives:

0. Recall and apply definitions and statements of results in elementary set theory (CO 0).
1. Determine inclusion relationships among sets (CO 3, 4).
2. Prove statements about sets (CO 3).
3. Use set theory to solve computational problems in mathematics (CO 4).
4. Prove statements using various principles of induction (CO 3, 4).

Learning Activities:

1. Watch the Module 2 Lecture Video(s) and read the Module 2 Completed Lecture Notes (MO 0-4).

Assignments:

1. Complete the Module 2 Quizzes (MO 0).
2. Complete Homework 3 (MO 1-3; CO 1).
3. Complete Homework 4 (MO 4; CO 1).
4. Participate in the Module 2 Collaboration Board (CO 2).
5. Complete Exam 2 (MO 1-4).

Module 3 - Number Theory

Module Objectives:

0. Recall and apply definitions and statements of results involving number theory (CO 0).
1. Prove statements involving divisibility and the integers (CO 3).
2. Solve computational problems in number theory (CO 4).

Learning Activities:

1. Watch the Module 3 Lecture Video(s) and read the Module 3 Completed Lecture Notes (MO 0-2).

Assignments:

1. Complete the Module 3 Quizzes (MO 0).
2. Complete Homework 5 (MO 1, 2; CO 1).
3. Complete Homework 6 (MO 1, 2; CO 1).
4. Participate in the Module 3 Collaboration Board (CO 2).
5. Complete Exam 3 (MO 1-6).

Module 4 - Functions and Relations

Module Objectives:

0. Recall and apply definitions and statements of results pertaining to functions/relations (CO 0).
1. Describe functions/relations in a variety of ways (CO 4).
2. Prove statements about functions/relations (CO 3).
3. Determine whether a function/relation satisfies a given property (CO 3, 4).
4. Solve computational problems involving functions/relations (CO 4).

Learning Activities:

1. Watch the Module 4 Lecture Video(s) and read the Module 4 Completed Lecture Notes (MO 0-4).

Assignments:

1. Complete the Module 4 Quizzes (MO 0).
2. Complete Homework 7 (MO 1-4; CO 1).
3. Complete Homework 8 (MO 1-4; CO 1).
4. Participate in the Module 4 Collaboration Board (CO 2).
5. Complete Exam 4 (MO 1-4).