Math 307, Introduction to Proof, Spring 2021

Class Time:	MTuWF 9:30-10:30am
Zoom meeting:	`https://uoregon.zoom.us/j/91237712229` passcode: `math307`
Instructor:	Dr. Marcin Bownik
E-Mail:	`mbownik@uoregon.edu`
Zoom office:	`https://uoregon.zoom.us/j/7414672099`
Office Hours:	M 10:30–11:30am, W 12–1pm, and F 10:30–11:30am, or by appointment
Textbook:	*Mathematical Thinking: Problem-Solving and Proofs*, D'Angelo and West

1. **Course outline.** There are two main—and quite different—objectives in this course.The first is to introduce students to the language and structures surrounding modern mathematical proof. Symbolic logic, quantifiers, set theory, functions, and induction are some of the topics in this area. Perhaps it is fair to call this *the mechanical part* of mathematical proof. The second objective is to help students become better at the problem-solving aspect of finding and creating proofs. Perhaps we can call this *the non-mechanical part*. The course covers most of the chapters 1–8 and 13–14 of the textbook.

2. **Learning Outcomes.** Students completing this course should be able to
   (i) Interpret and use logical structure in the context of proof. Define and use the biconditional and de Morgan's laws. Identify the contrapositive, converse, and negation of a conditional statement, give examples, and use these concepts in proofs.
   (ii) Interpret and use quantifiers $\forall$, $\exists$, and $\exists!$
   (iii) Write basic proofs, including proofs by contradiction.
   (iv) Find and use counterexamples to demonstrate that statements are false.
   (v) Write induction proofs, including strong induction.

3. **Exams.** There will be two midterm in-class exams on Wed. 4/21 and Wed. 5/12, and a final exam on Fri. 6/11, 10:15am–12:15pm.

4. **Workload.** Weekly homework, reading, and class attendance. An average well-prepared student should expect to spend about 12 hours per week on this class (including time spent in class), but there will be a lot of variation depending on background and ability. MWF meetings are in the lecture format. On Tuesday we have a discussion class.

5. **Homework.** Homework problems will be assigned every week and be due on Wednesday on the material of the previous week. No late homework will be accepted. In general, students may find homework problems in this course to be difficult and challenging. You should expect to spend a long time to do some of the problems. This is perfectly normal and expected. Hard work and practice with homework problems are essential in succeeding in this course.

6. **Grading.** The grading distribution will be as follows:

Homework:	20%
Each of the Midterm Exams:	20%
Final Exam:	40%