Instructor:	Jonathan "Nate" Wells	**Email:**	wells6@uoregon.edu
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Office hours:	See Canvas page		

Course Description: This course will cover the essential proof techniques used in mathematics, and will survey topics in elementary logic, number theory, set theory, and combinatorics. Emphasis will be placed on the development of mathematical reading and writing skills.

Prerequisites: MATH247 or MATH252 or MATH262.

Textbook: *Mathematical Reasoning: Writing and Proof*, by Ted Sundstrom. An electronic edition is available for free at `http://scholarworks.gvsu.edu/books/9/`

Course Website: Documents, a daily schedule, assignments, and grades will be posted on our Canvas page at `http://canvas.uoregon.edu`

Technology: Most computations in this course can be done by hand, and so no calculator will be necessary. Although not required, you may find it helpful to format your homework using a word processor capable of displaying math equations (ideally, a program like LaTeX, but Microsoft Word also works).

Communication: If you would like to contact me, I can most easily be reached by email weekdays between 10am and 6pm. While I try to answer email as soon as possible, in some cases, I may not be able to respond until the following school day. You are also welcome to stop by my office outside of office hours—I usually have at least a few free minutes to help.

Course Outcomes: By the end of the course, a student should be able to:

1. Construct mathematical conjectures based on observation of specific cases.

2. Evaluate the validity and soundness of a mathematical argument.

3. Collaborate with peers in order to develop, write, edit, and assess mathematical arguments.

4. Organize mathematical proof using a two-column table, line-by-line format, and paragraph format.

5. Distinguish between formal and informal proof.

6. Interpret and use logical structure in the context of proof.

7. Define and use the biconditional and de Morgan's Laws.

8. Identify the contrapositive, converse and negation of a conditional statement, give examples thereof, and use these concepts in proofs.

9. Interpret and use variable quantifiers.

10. Write basic direct and indirect proof, including proofs by contradiction.

11. Find and use counterexamples to demonstrate that propositions are false.

12. Write induction proofs, using both standard and strong induction.

Workload: This course will require daily reading and class attendance, as well as weekly homework assignments. A typical, well-prepared student can expect to devote about 12 hours per week to this course (including time spent in class).

Class Structure: Daily reading assignments (called *Guided Practice*) will be posted on Canvas on Fridays for the upcoming week. Each assignment will consist of a list of learning objectives, print and video resources for you to read and view, and a short list of questions to respond to prior to class. Upon arriving to class on a typical Monday, Tuesday, or Wednesday, we will spend about 10 minutes discussing the Guided Practice. The remaining class time will then be spent working in groups on more difficult problems. You will then formally write-up solutions to a few of these problems and submit them at the start of class on Thursday. Class on Thursday will be slightly different. We might discuss homework problems, review common errors from earlier in the week, present a solution to the class, or rarely, lecture about an important topic.

Grading Criteria: $A = 90 - 100\%$; $B = 80 - 89\%$; $C = 70 - 79\%$; $D = 60 - 69\%$; $F < 60$ (with upper and lower 2% of each division corresponding to $+/-$, respectively).

Your grade in the class will be determined by assessments of your proficiency in each of the *Course Outcomes*, weighted as follows:

1	Homework	10%
2	Class Participation	20%
3	First Midterm	15%
4	Second Midterm	20%
5	Final Exam	35%

Homework: Homework will be assigned weekly and will be collected every Monday at the start of class. Scores will be based on the completeness, organization, and clarity of solutions, in addition to their correctness.

Class Participation: Because of the collaborative nature of this course, it is essential that you strive to attend class every day. But if you aren't able to attend class for any reason, please notify me, as well as your group members, before the start of class. You may miss up to two classes throughout the term without penalty, but more frequent absences will be reflected in your final course grade.

Midterm Exams: Two 50-minute midterm exams will be given during the term: tentatively, the first is scheduled for Thursday, April 27 (Week 4), and the second for Thursday, May 18 (Week 7).

Final Exam: A cumulative, final exam will be given in Peterson 107 on Monday, June 12, from 2:45-4:45 pm. *If you foresee a conflict with the time of the exam, please contact me during the first week of class so that appropriate arrangements can be made. Barring that, the final exam cannot be taken at any other time.*

Accessibility: The University of Oregon is dedicated to creating inclusive learning environments. Please notify me as soon as possible if there are aspects of the instruction or design of this course that result in disability-related barriers to your participation. You may also wish to contact the Accessible Education Center in 164 Oregon Hall at 541-346-1155 or uoaec@uoregon.edu.

Academic Integrity: Students are allowed and encouraged to collaborate on most in-class and homework assignments. However, any work that you turn in for grading must be your own. Exams will be closed book, closed notes, and closed colleague, unless otherwise specified. All written work that references material outside of the textbook should be accompanied by an appropriate citation (APA or AMS format is preferred). The University of Oregon requires that all instances of academic dishonesty be reported, no matter the scope.

Tentative Schedule:

Week	Sections Covered	Week	Sections Covered
1	1.1, 1.2	6	4.1, 4.2, 4.3
2	2.1, 2.2, 2.3	7	5.1, Review, Midterm 2
3	2.4, 3.1, 3.2	8	5.2, 5.3, 5.4
4	3.3, Review, Midterm 1	9	6.1, 6.2, 6.3
5	3.4, 3.5, 3.6	10	6.4, review