

71935 Section 001

10:20 – 11:20 AM Monday, Wednesday, Friday

Swart 013

“Mathematics is the tool specially suited for dealing with abstract concepts of any kind and there is no limit to its power in this field.” - Paul Adrien Maurice Dirac, 1902-1984

This class is intended to help you make the transition from using mathematics as a tool (making calculations, finding numerical answers) to discovering and creating mathematics (finding and proving theorems, determining whether a mathematical statement is true, explaining why). Much of the power of mathematics lies in abstraction—the ability to work with the underlying common principles behind numerous, seemingly unrelated problems. We will focus on logic, reasoning, and proof, along the way learning more about a number of essential mathematical structures, including sets, functions, relations, and integers, from an abstract point of view. One of the objectives of this course is to prepare you for more advanced courses (such as abstract algebra and real analysis) by helping you to begin to acquire mathematical sophistication.

Instructor Information

Name: Linda Eroh

Office: 124 Swart

Office Hours: 11:30-12:30 AM Mon., Wed., Fri.; 9:10-10:10 AM Tues. Thurs. Swart 124

Feel free to drop by at other times. No appointment is needed.

Office Phone: 424-7343

Cell Phone: 920-379-9529 (It is OK to call this number, but please no calls 10 pm to 6 am.)

E-mail: eroh@uwosh.edu

Course Information

Required: Chartrand, Polimeni, and Zhang, *Mathematical Proofs: A Transition to Advanced Mathematics*, 3rd edition, Addison-Wesley

Please, no cell phones in class! Turn them off or leave them at home. If you must have a cell phone on (emergency workers, parents of young children), please set it on vibrate.

Prerequisite

Math 172 (Calculus II) with a grade of C or better.

Course Description

Basic properties of functions, sets, and relations presented in various contexts. Emphasis on the precise use of language, the logical structure of mathematical statements, and the structure of proofs. Proof methods include induction, proof by contradiction, direct proof, and the construction of examples and counter examples. Examples may be drawn from various topics such as the integers, rational and real numbers, geometry, calculus, combinatorics, modern algebra and real analysis. Prerequisite: Mathematics 172 with a grade of C or better.

Student Right to Know Act

Students are advised to see the following URL for disclosures about essential consumer protection items required by the Students Right to Know Act of 1990:

<https://uwosh.edu/financialaid/consumer-information/>

Course Objectives

Upon successful completion of this course, a student should be able to

- Engage in mathematical inquiry (e.g. exploration, pattern recognition, problem solving, and making and testing conjectures).
- Use mathematical examples and objects to identify, understand, and conjecture mathematical relationships.
- Understand and correctly use careful, precise mathematical language and terminology to articulate mathematical ideas (e.g. symbol usage, mathematical conjunctions, quantifiers, negations, and conditionals/implication).
- Work with mathematical definitions (e.g. their roles and uses, making meaning from them, and defining).
- Make sense of formal mathematical definitions by generating examples and non-examples.
- Understand axiomatic structure (e.g. the role and meaning of axioms, definitions, conjectures, and theorems).
- Use logic and structure proofs in standard forms (e.g. identify the burden of proof, present counterexamples, and prove by strong induction, weak induction, contraposition, contradiction, or direct proof).
- Understand elementary proof techniques and strategically use them to formulate mathematical arguments.
- Demonstrate familiarity with some well-known and clever proofs (e.g., the proof that the square root of 2 is irrational, the proof that the rational numbers are countable, the proof that the real numbers are not countable)
- Develop a deeper understanding of foundational mathematical ideas (e.g. functions, sets, relations, integers)

Homework

Reading assignments and suggested homework problems for each class period are on the tentative schedule (actual dates may vary but will be announced in class). If at all possible, I encourage you to complete these assignments that night after class, while the class discussion is still fresh in your mind. Homework will usually be collected two class periods after the material is covered, with selected problems graded. You are encouraged to work together on homework, but please write up and turn in your assignments individually. Working together means sharing ideas, asking one another for hints or reassurance, and discussing different approaches. It does *not* mean that one person completes the assignment and then tells or shows the other student the answer. My rule of thumb is that collaboration which increases your learning is acceptable and encouraged; collaboration which hinders your learning is not.

Quizzes

We will also have brief quizzes most weeks, usually on Friday. Quizzes will be given in the last 10-15 minutes of class and will be worth 10 points each. The lowest 2 quiz scores will be dropped. Make-up quizzes are only given if you have a well-documented excuse such as a

medical emergency. If you know you are going to miss a quiz, for instance for an athletic event or field trip, you should arrange to take the quiz early. If you miss more than two quizzes due to circumstances beyond your control, please talk to me as soon as possible.

There may be other types of activities, including written assignments, in-class group work and peer review of written proofs. Such an assignment will be graded as either a quiz or a homework. Details will be announced when the assignment is made.

Exams

We will have 3 exams: 2 midterm exams and a final. Exam 1 is tentatively scheduled for Wednesday, March 4, over chapters 1, 2, and 3. Exam 2 is tentatively scheduled for Wednesday, April 15, over chapters 4, 5, and 6. The final exam is scheduled for Friday, May 15, primarily over chapters 8, 9, and 10 with review questions on chapters 1 - 6. Notice that exam dates are approximate; exact dates and coverage will be announced in class.

Accommodations

The University of Wisconsin Oshkosh supports the right of all enrolled students to a full and equal educational opportunity. It is the University's policy to provide reasonable accommodations to students who have documented disabilities that may affect their ability to participate in course activities or to meet course requirements.

Students are expected to inform instructors of the need for accommodations as soon as possible by presenting an Accommodation Plan from either the Accessibility Center, Project Success, or both. Reasonable accommodations for students with disabilities is a shared instructor and student responsibility.

The Accessibility Center is part of the Dean of Students Office and is located in 125 Dempsey Hall. For more information, email accessibilitycenter@uwosh.edu, call 920-424-3100, or visit the [Accessibility Center Website](#).

Tutoring Resources

The Center for Academic Resources (<http://www.uwosh.edu/car>) can provide one-on-one tutoring for this course at no cost to you.

Drop Date Reminder

The last day to drop is **March 18, 2020**. You will not necessarily get a tuition refund if you drop a class. For information about when you must drop to get a refund, check the Student Financial Services site <https://uwosh.edu/finance-administration/student-financial-services/> .

Late withdrawals are approved very rarely and only when there are extenuating circumstances beyond your control which occur after the drop date. If at any point you are concerned about your progress in the class, please make an appointment to discuss the situation with me.

Grade Distribution

Here is a distribution of the percentage of your final grade determined by each activity. Attendance does not formally count as a percentage of your grade but a large number of unexcused absences could lower it by as much as one letter grade.

Exam 1	20%
Exam 2	20%
Final Exam	20%
Homework	20%
Quizzes	20%

Grading Scale

You are guaranteed at least the grade you earn on the following scale. Notice that the scale is given in percentages and not points. Any score less than 60% is an F.

	87-89.9% B+	77-79.9% C+	67-72.9% D+
93-100% A	83-86.9% B	73-76.9% C	63-66.9% D
90-92.9% A-	80-82.9% B-		60-62.9% D-