

Syllabus

Math 300

Fall '23

Text: **A Transition to Advanced Mathematics**, 8th edition by Smith, Eggen, St. Andre

Instructor: Jed Herman Office: SCI D 287 eherman@uwsp.edu

Office Hours: M 3:00-3:50, W 3:00 – 4:50, Th 12:00 – 12:50

Office Hours will be available in person and can be made available via zoom on request

Class times & room: Section 01: MWThF 2:00 – 2:50 in Science A112*

*on THREE DAYS in the semester we have to change rooms to A207 due to a scheduling glitch: September 22, October 20, and November 17.

What is this course about?

Math 300 is a *PROOFS* course. It is designed to transition you from computational to abstract mathematics by exploring the basics of logic, set theory, cardinality, and functions. Basically, we will cover most of the first five chapters of the textbook, plus a tiny bit from the sixth chapter.

Math 300 also satisfies the Written Communication in the Major requirement for the Mathematics Major; consequently we will be doing a lot of writing. *What kind of writing in a math class?* you might ask. Well, the answer is... Proofs.

So... what are these dreaded proofs, and why are they important? We have seen them before, in Geometry and Trigonometry and perhaps even Calculus. But why should math majors learn them? Very few students end up writing proofs for a living – why do you need to learn such a complicated and arcane skill?

The answer is simple: proofs represent mathematics at its finest. They are the foundation on which all of mathematics is built. Consider a problem from calculus: find the derivative of $f(x) = \frac{x^2+1}{x-1}$. It's simple enough (*do it now*)... but actually it is not simple at all. Derivatives come from limits, so the correct solution is to take evaluate the limit $\lim_{h \rightarrow 0} \frac{\left(\frac{x^2+2xh+h^2+1}{x+h-1}\right) - \left(\frac{x^2+1}{x-1}\right)}{h}$, which is kind of horrific... but you didn't do that when you found that derivative, did you? (Challenge problem: try to solve that limit...)

Instead, you used a couple theorems to make the work easier. When you leaned them, you called them rules (Quotient Rule, Power Rule, maybe a few others) but they are *theorems*. Theorems are mathematical statements that somebody *proved* – so that everyone else can do stuff easier, or know things that they didn't know before.

Teaching proofs is like showing drivers how cars work. Even if you aren't going to be a mechanic, it still helps to know there are things like spark plugs... and wheels. It helps you be a better driver if you have some idea of the inner workings of a car. Likewise, you will be better at *Doing Mathematics* if you have some understanding of how proofs work.

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Course Learning Outcomes

- Students will be able to recognize classic methods of mathematical proof-writing including induction and proof by contradiction. Students will be able to write correct proofs in a mathematical format.
- Students will be able to read proofs written by someone else and identify whether they are correct or not. If the proof is incorrect, the student will be able to explain what problems it has.
- Students will understand basic set theory, functions and cardinality well enough to write correct proofs about said topics.

Grading

Grading will be based on an overall percentage score, using the following scale:

90%+ A- or better	80%-89.9% B-, B or B+
70%-79.9% C-, C or C+	60%-69.9% D-, D or D+
<60% F	

I reserve the right to adjust the final percentage +/- up to about 2%, based on my assessment of your effort and/or participation in the class and course in general.

Grading for this course will be based on the following rubric:

Homework Assignments and Daily Participation	95
4 Group Quizzes and 2 Major Proofs	95
Class Exam (on chapters 1, 2, 3)	95
Class Exam (on chapters 4, 5, part of 7)	95
Class Final	<u>20 (or 115)</u>
	400

* you should notice the final is not worth as much as other course components (it is 5% of your grade). It is cumulative and should be a good review of the whole semester. But Finals Week can be really stressful, so I prefer a “low stakes” final to a “high stakes” one, if that makes sense.

You should also see the alternate value next to the final (115 points, or 24% of your course grade). If you do well enough on the final (this will be discussed later in the semester), it can be used to replace one Class Exam – so you can bomb an exam and still recover.

- *Can we replace the the homework score?* Maybe. You have to earn at least 40% of the points in a category to be able to replace it – so if you blow off homework, then you are out of luck.
- *What about the quizzes?* If you earn at least 40% of the points AND your group members report that you really did try on all the quizzes, then it could be your replace score. This means if you skip the last quiz or just phone it in, you can't replace the quiz score.

Canvas Grading:

Canvas provides a useful location to submit assignments and record grades. It even has an automatic feature to “total” the assignments stored on it, producing some sort of misshapen “Grade” which students sometimes think is related to their course grade. It is not. **DO NOT LOOK AT THE CANVAS COURSE TOTAL AND EXPECT IT TO REFLECT YOUR ACTUAL COURSE GRADE.** When we get towards the end of the semester I will add a few columns to the Canvas grades which show where you stand.

Participation

You are expected to come to class and participate in whatever we are doing that day. Some days we will work in small discussion group on math problems, some days will be more like a traditional lecture, punctuated with prompts and questions. Actively participating is a part of your course grade!

I realize, however, that some students are not very comfortable talking in front of peers. To help with this, there will be discussion boards on Canvas to allow you to post your questions, thoughts, and comments. There will be one board per chapter; posts *with actual content about the relevant material* can count as part of your course participation. These can be original posts or responses to the posts of others.

You are expected to attend class every day. That said, things happen – people get sick, unexpected things happen. If you miss class, you should let me know what is going on (email is best, but in an emergency you can contact the [Dean of Students office](#), 715-346-2611). Note that you will be responsible for the missed material AND for the missed participation time (see previous paragraph about Canvas discussion posts).

Important: missing an exam or group quiz day will only be allowed in exceptional circumstances and will require ACCEPTABLE DOCUMENTATION as to the reason for the absence.

Missing an exam will only be allowed in the most dire of circumstances and will require ACCEPTABLE DOCUMENTATION as to the reason for the absence.

Workload

This course has a reasonably heavy workload. In general, I will expect an average of about 2 to 3 hours of outside work for every hour spent in the classroom! This means that you will need to do about 8 to 12 hours PER WEEK of outside class time for this course. A lot of this time will be spent reading and re-reading the text, and working and reworking some proofs in order to get them better. Some weeks might be easier, some might be harder – this is an average.

Weekly Homework:

Proofs requires thought, multiple attempts, and time in order to reach real mastery. Unfortunately, in-class discussions and exams do not offer enough time to try things out – so something else is needed. One part of this is weekly homework, generally due on Mondays. These will be graded partly on effort but also on the accuracy of the work and correctness of the answers.

You will turn your homework in on Canvas – scan or take pictures of your work and upload it to the appropriate place. Please try to write clearly and in an organized manner – basically, *write it as if you wanted someone to read it!* For some people, that might mean doing the work on a scratch copy and then writing it out again; for others, that might mean typing it out. Don't ignore these assignments – they are a significant part of your grade!

Canvas discussion boards are also set up for each week, for students to post questions and/or answers to questions about the problems. One last bit: your work is your work. Working with others is good, but simply copying their work is not.

Major Proofs:

Some proof forms are so important that every student should be able to use them. There are several, but this semester two will be highlighted for special assignments (in addition to normal weekly homework). You will work on the proof, write it up clearly, and submit it within the time allowed. I will read your work and give feedback on your first draft; you will then use the feedback to submit a new (improved, hopefully) version. These proofs will be explained in more detail as the semester progresses.

Exams and Quizzes

Quizzes and Exams are noted on the course schedule, though it is possible they may have to be adjusted due to unforeseen events (this is very rare). Exams are worth 95 points; the final is worth 20 points (or 115 – see grading). The final will be cumulative for the whole semester.

Quizzes are assigned in groups (chosen by the instructor). Each group member gets the same grade – the sum of all scores on problems. Each student in the group must do at least one of the problems – so it is in the interest of all students to CHECK EACH OTHERS' WORK!

Groups will be assigned on Canvas, on Thursdays, and the problems are due the following Monday. There will be a Canvas Discussion Board for you to discuss the problems with your fellow group members, post work and partial solutions, and the like; there will be an assignment where the actual work is submitted.

Discussion Boards

There will be discussion boards on Canvas where you can post comments and questions and potentially answer the questions posted by others about the homework. Making a post with mathematical content (asking or answering a question, for example – more than “I agree” or “that seems wrong”) can earn extra credit.

The boards will be monitored after the fact. That is, you will post directly to the board, and I will monitor (semi-weekly). Postings are never anonymous and must not contain inappropriate (foul, rude, hostile) language. Violation of this rule may constitute academic misconduct (see below).

Academic Misconduct Policy

I expect you to complete the coursework for this course. Failure to complete an assignment will result in zero points awarded for that assignment. Late assignments may lose points, at the discretion of the instructor. Also see the following link:
<http://www.uwsp.edu/admin/stuaffairs/rights/rightsChap14.pdf>

Student Rights and Responsibilities

All students are expected to know the UWSP student responsibilities found on the Dean of Students webpage. Information on Academic Concerns is available at <https://www.uwsp.edu/dos/Pages/stu-academic.aspx>. Information on Conduct Concerns and on Personal Concerns are also available on the Dean of Students site.

Inclusivity and Accommodations

It is my intent that all students from diverse backgrounds and perspectives be served by this course, that students' learning needs be addressed both in and out of class, and that the diversity brought by everyone in this class be viewed as a resource, strength, and benefit. It is my intent to present materials and activities that are respectful of diversity. I encourage you to make suggestions to this end. Please let me know ways to improve the effectiveness of the course for you personally, or for other students or student groups.

If you have experienced a bias incident (an act of conduct, speech, or expression to which a bias motive is evident as a contributing factor regardless of whether the act is criminal) at UWSP, you have the right to report it using this [link](#). You may also contact the Dean of Students office directly at dos@uwsp.edu.

UWSP is committed to providing reasonable and appropriate **accommodations** to students with disabilities and temporary impairments. If you have a disability or acquire an impairment or injury during the semester and you need assistance, please contact the * Disability Resource Center as soon as possible, in room 108 of the Collins Classroom Center (CCC), at 715-346-3365, or at DATC@uwsp.edu. You may also want to visit their website, [Disability Resource Center \(DRC\) - University of Wisconsin-Stevens Point \(uwsp.edu\)](http://www.uwsp.edu/drc).