MATH 2710 – Section 001
Intro. to Advanced Mathematics
Fall 2024

Instructor:
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Office: MONT 411

Meeting: Tu/Th 11:00 am - 12:15 pm in MONT 314

Drop-In Help Hours – please stop by!
Tues 9:30-10:30 am in MONT 411
Thurs 2:30-3:30 pm in MONT 411
Fri 9-10 am online via WebEx (link in HuskyCT)
or by appointment (email me if you cannot come at the above times)

Text: No required text. PDF course notes and problems provided via HuskyCT.

Email: I welcome your questions and other thoughts via email anytime. I may not read or respond to your email right away, but I will try to get back to you by the end of the following business day.

Prerequisites: Math 1132Q or 1152Q. May not be taken for credit after passing MATH 2143. May not be taken out of sequence after passing MATH 3150, 3210, 3230, 3240, 3260, 3270, 3330, or 3370.

Goals & Expectations: Basic concepts, principles, and techniques of mathematical proof common to higher mathematics. Logic, set theory, counting principles, mathematical induction, relations, functions. Concepts from abstract algebra and analysis. Students intending to major in mathematics should ordinarily take this course during the third or fourth semester. Students wishing to use MATH 2710 or 2710W as a prerequisite for later MATH courses need to earn a "C" or better.

As this course also serves as a bridge to upper-level proof-based math courses, it will be heavily focused on mathematical argumentation and language.

Logic, reasoning, and proof are the cornerstones of mathematics. The material you will encounter in this class might feel quite different from what you are used to from calculus. This may throw you off at first, because you will be looking for numbers and won't find many! But, one way to thus see this course is as a fresh start, if you struggled in more computational math courses.

Assessment of Learning Objectives:

By the end of the course, students will be able to complete the seven learning objectives listed in the table below:

Course Learning Objective	Assessment(s)
1. Interpret and employ mathematical language and notation of basic set theory, functions, and basic number theory	Problems, presentations, responses to presentations, final portfolio, group work
2. Analyze a mathematical definition and construct examples and non-examples	Problems, responses to presentations
3. Determine if a given statement is true or false, including by example analysis	Problems, responses to presentations
4. Review mathematical arguments to distinguish between valid and invalid logic and identify and correct errors in reasoning	Problems, presentations, responses to presentations, group work

5. Select and apply a variety of proof techniques to produce a sound mathematical argument using an appropriate method for the task at hand	Problems
6. Convey sound reasoning in mathematical language with proper English grammar	Problems, presentations, responses to presentations, group work, final portfolio
7. Defend an argument to others both orally and in writing	Problems, presentations, group work

Face Coverings and Illness: To ensure a safe learning environment, masks/face coverings are always welcome in classrooms. Please join me in welcoming your peers and instructors to wear face coverings properly as needed in the classroom.

It is especially important for you to stay home if you are feeling ill. Please contact me ASAP via email if you need to miss class due to illness or other personal reasons.

Participation and Climate: Each student in this class is vital to the success of the classroom community, which is why it is important that we all respect each other, carefully consider one another's ideas, and value each other's contributions. I am very serious about helping to create a classroom environment in which anyone feels free to ask questions, raise concerns, make mistakes, celebrate successes, and so on. You are expected to behave courteously and respectfully to your classmates and to me, but please do not stop yourself from asking a question because you fear it will sound stupid or obvious. We are all here to learn together, which means we will struggle often.

Grading Policy: Your graded work will be returned to you in a timely manner, usually within a week. If you believe there is a grading error, please work with me ASAP to resolve it. Each problem will be marked with:

- **S: success –** you've got the concept and I have no notes or only minor notes
- **R+: success after presentation –** This is S-quality work, but was submitted after the presentation on this problem. You may include it in your portfolio and count it towards your S/R+ problems, but it does NOT count towards the minimum number of S problems in each chapter.
- **R: please revise –** something important is still missing but you're on your way. **Resubmit within 1 week of original submission.**
- **N: not assessable -** you're missing the overall concept and should go back and maybe start fresh in your understanding of the concepts

Homework: You will submit solutions each week to a few of the Problems (NOT Exercises) from the course notes. You may rewrite solutions as many times as you want to achieve an "S"; however, a maximum of six submitted new problems per week are allowed. You should submit problems as soon you complete them; you do not need to (and should not) wait to have all your problems for the week completed. Problems submitted after they have been presented can receive at most a grade of "R" (will be designated as "R+" if they were completed at an "S" level). After your receive a grade of R or N on a problem, you should revise and resubmit within one week.

Problems and revisions turned in after we have completed the following chapter will not be graded. For example, once we finish chapter 2 in class, I will no longer grade submissions from chapter 1. Limited exceptions may be granted – please let me know if you need to request an extension.

Presentations: You will present solutions to several homework problems throughout the semester. Some of these will be in class, while others will be posted in VoiceThread, via HuskyCT. You will be provided a rubric for these presentations, a sign-up sheet to volunteer to present problems in advance, and your group will support you during class to polish your solution before you present. If your presentation is not successful the first time, then you may try again during the following class.

When presenting, keep in mind that your audience is not me, your instructor. Your audience is your classmates, and so your presentations must be aimed toward your peers, to ensure that they understand and are

convinced of any claims you are making. You are expected to present your work with both a visual and audio aspect; i.e., describing and explaining aloud the written work that is seen on camera or written on the board. **Note: you must be present for discussion in class the period immediately after posting a VoiceThread presentation for discussion to receive an "S".**

Captions for VoiceThread presentations are automatically generated but may not be accurate. When presenting, please watch your presentation with captions, then click the "CC" button that appears when you hover over your initials in the left sidebar and click "Edit Captions" to **edit your captions for accuracy**.

Class Time: Each day in class, we will spend time listening/responding to a few students' online and in-person presentations of their proposed solutions to homework problems. After resolving all questions and suggestions on that day's presentations, you will work in groups on problems and exercises as you prepare for the next set of presentations and/or to submit your homework problems.

Responses to Presentations: You are expected to be present for (in-person) and watch (online – before class) **all** of your classmate's presentations, and to actively participate in discussion about **many** of your classmates' presentations both in-class and online. Please respond regularly to others' proposed solutions by asking clarifying questions and making constructive suggestions to improve the mathematical correctness, completeness, and communicative quality of the solutions. You will be provided a rubric for these responses. Note that **for VoiceThread online presentations, you must be present for the in-class discussion** following the presentation to discuss your comment to get credit.

Grading: At the end of the term, you're going to submit a Final Portfolio and Letter Grade Reflection, where you will tell me how you did and thus what grade you earned in the course, based on the following rubric we're going to create together.

You can use any work throughout the course (revised homework solutions, notes from presentations, other completed work) as evidence in this discussion. I will probably agree with you, because you know yourself, your work, and your understanding pretty well. If I don't, we'll talk about it.

Letter grade	Description of **minimum requirements** for work and participation
A	
B	
C	

D	
F	Did not demonstrate understanding and participation at the level of any other letter grade

The distinctions of "+". within each letter grade will be based on "extra" achievements such as more presentations and/or homework problems. If you have achieved all but one level in a given category (and that level is still at the requirement for the grade level immediately below it), you will receive the "-" grade for that letter.

Notes:

1. Writing and rewriting are a key part of your learning and success in this class. I expect that many of your first attempts won't be perfect and will need revision, but that by addressing the comments I give you, you will learn.
2. Do not expect to be able to read the notes, and math in general, like a novel. It could take you an hour to parse one sentence – that is normal in math.
3. This course will require proactivity. It will be important to set your own deadlines, and frequently check your progress against the criteria outlined here to ensure that you are keeping up pace.
4. I understand that things can come up. I just ask that you keep me in the loop as to if this is what's going on in your life. Email me to check in if I won't see you or hear from you on a day we have class or in a week where you were supposed to present. I can be flexible given the circumstances, but if I don't know your situation I'll just be following the guidelines set out in this syllabus.

How to Succeed in this Course: According to the University, 3-credit course requires a *bare minimum* of 6 hours of work per week outside of class to pass. For a higher grade, you should consider nearly doubling this. Below are the kinds of things you'll need to do outside of class:

- Read through the notes and work through the exercises on your own in preparation for in-class discussions with your group
- Solve problems on your own to the extent you are able
- Compose final drafts of the problems you have already solved
- Frequently revise problems previously submitted which have not yet earned an "S" or "R+"
- Prepare and post your presentations on VoiceThread, or prepare for your in-class presentations
- Watch and comment on classmates' presentations on VoiceThread

Diversity, Equity, and Inclusion: In learning, we embrace diversity of race, gender, sexual orientation, ability, background, age, beliefs, ethnicity, and other visible and non-visible categories for the benefits that diversity of thought, expression, and experience offer to ourselves and to our local and global communities.

As your instructor, I aim to create an inclusive learning environment in this class and in the university as a whole by taking a strengths-based approach that encourages students to identify and leverage their strengths to address complex problems. Discrimination will not be tolerated. By joining this classroom community you are committing to taking a growth mindset, which means we will work together to learn from each other and be more compassionate.

Academic Integrity: Please respect your and others' work and academic experience. You are expected to turn in and present work that reflects your own understanding of the topics. Therefore, your writing should not bear resemblance to that of any other student in the course or to any other sources used, and any ideas used for which any other party had a share in developing should be cited as such.

You may use any citation format – for example, a parenthetical at the end of your solution: "(I worked with Jaime from my group on #4)," or, "(I got the idea for my solution to #2 from 3Blue1Brown on YouTube: https://www.youtube.com/watch?v=P2LTAUO1TdA&t=2s&ab_channel=3Blue1Brown)."

The University of Connecticut policy on Academic, Scholarly, and Professional Integrity and Misconduct can be found here: https://policy.uconn.edu/2023/07/11/academic-scholarly-and-professional-integrity-and-misconduct-aspim-policy-on/

Frequently Asked Questions:

Q: When are homework problems due?

A: Specific problems are not listed with due dates, but in general I will not grade problems submitted after we have completed the following chapter in class. You should plan ahead to submit problems before their presentation dates, and complete and submit all revisions within one week after the presentation in class.

Q: What is the difference between an S, an R, and an R+?

A: An R does not count towards any of your course requirements. You will need to revise and resubmit your work to get credit. An R+ counts for any course requirements, except the number of S problems per chapter. An S counts towards your number of problems or presentations for all course requirements. You can get an S by submitting a correct, complete, well-communicated solution before the problem is presented in class, or of a problem that will not be presented in class.

Q: What is my current grade?

A: The list in the table above for each grade is a list of minimum requirements for each grade at the end of the semester. You must complete ALL listed requirements to earn the letter grade (with the exception of a minus grade, which is earned when only one category is only one level lower). For example, if you meet all requirements for an A except for one category, which is at the C-level, then your grade according to the table is a B-. If more than one category falls below the D-level threshold, then your grade is an F.

Q: Will I lose points for late work?

A: There are no points in this class, so you cannot lose points for late work. However, the timing of your submissions will affect how they are counted in your final grade as follows:

1. Work submitted after the problem is submitted in class will not be eligible for an S grade
2. Work submitted after we have completed the following chapter in class will not be graded
3. You should always submit 3-6 problems each week to stay on track for your end-of-semester goals

Tentative Schedule of Topics
Live updated course schedule

Week 1	Propositions and Truth Tables
Week 2	Conditional Statements
Week 3	Quantifiers
Week 4	Direct Proof and Proof by Contrapositive
Week 5	Proof by Contradiction, by Cases; Proving Equivalence
Week 6	Sets and Set Operations
Week 7	Proofs with Sets
Week 8	Relations
Week 9	Equivalence Relations
Week 10	Functions; Proving Existence and Uniqueness
Week 11	Proofs with Functions, Inverses, and Composition
Week 12	Proof by Induction
Week 13	Division and Modular Arithmetic
November 23-30	**Thanksgiving Recess – No Class**
Week 14	Proofs in Calculus
Final Exam week	
December 10	**Final Portfolio Due**

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