MATH2710 – Transition to Advanced Mathematics

Section 2 (6304) meets Tuesday/Thursday from 3:30pm – 4:45pm in Monteith 112

Section 3 (6305) meets Tuesday/Thursday from 12:30pm – 1:45pm in Monteith 420

Instructor: Ben Lantz

Email: Benjamin.Lantz@uconn.edu

Office: Monteith 405

Office Hours

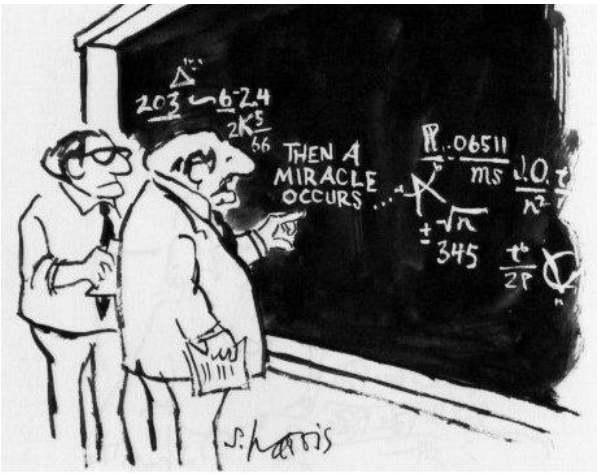
Tuesday 2:00 pm – 3:15 pm

Thursday 11:00am - 12:00 pm and

2:00 pm – 3:15 pm

Friday 11:00 am - 12:00 pm

Or by Appointment (contact me via email)



"I think you should be more explicit here in step two."

Course Description

This course is designed to prepare students for more theoretical upper division math courses. At this point in your math careers, you may have had to tackle very abstract and theoretical concepts in a course, but from this point forward many math courses are purely theoretical. This is a challenging change, and it requires a foundation of ideas in order to move forward. This course's purpose is to lay the foundation for you to better understand theoretical and abstract math concepts. Furthermore, the course will focus on proofs and proof structure, and you will begin to learn how to become sophisticated and professional math writers.

To me, this is when math really becomes interesting. Oftentimes, we will not have clear cut answers to problems (unlike the Calculus sequence) and there will be a lot of variability in how someone could approach a problem. The focus of this course is rarely on the "answer", but more so in the process of getting to the answer. This is the course that made me start to fall in

love with math. Moreover, this is the course whose material I use more than any other course I have ever taken. I am very excited to help you through this foundational course.

Syllabus TL;DR

- We have class two days a week in which we have traditional lecture mixed with group work.
- Each week you have a weekly worksheet (45% of your grade) due on Gradescope (use entry code YDNNZB to access) on Tuesdays at 11:59 pm. This is the core of course.
- Each week you will have a small Good Math Practice Tast (GMPT) (10% of your grade) due (usually) on Thursdays at 11:59 pm.
- Late work is accepted throughout the entire semester at a 10% penalty.
- There will be three midterm take home exams tentatively scheduled to start on Feb 19th, Mar 25th , and Apr 25th. (3x15=45% of your grade)
- There is no Final Exam in this course.
- The book we are using is "Book of Proof" 3rd edition by Richard Hammack, available for free to download at https://www.people.vcu.edu/~rhammack/BookOfProof/
- If you ever have a question or if anything arises throughout the semester, please email me at Benjamin.Lantz@uconn.edu. I am good at returning emails and can help with whatever you need.

Topics Covered

Weeks 1-2: Set Theory (Cartesian Product, Subsets, Power Sets, Union/Intersection/Difference/Complement, Indexed Sets)

Weeks 3-4: Logic (Conditional Statements, Truth Tables, Logical Equivalence, Symbology, Negation)

Weeks 5-6: Conditional Proofs (Direct Proofs, Contrapositive Proofs, Contradiction)

Weeks 7-8: Non-conditional Proofs (Biconditionals, (Non) Constructive Proofs, Existence and Uniqueness, Proofs with Subsets and Equality, Counterexamples, Disproof)

Week 9: Induction (Induction, Strong Induction, Fundamental Theorem of Arithmetic)

Week 10: Relations (Equivalence Relations, Equivalence Classes, Partitions, Integers mod n)

Week 11: Functions (Injective/Surjective/Bijective Functions, Function Composition, Inverses)

Week 12: Ideas in Calculus (Triangle Inequality, Limits, Sequences)

Week 13: Cardinality and Number Theory (Countable and Uncountable Sets, Divisibility, Division Algorithm, Prime Numbers, Euclidean Algorithm

Week 14: Number Systems (Real Numbers, Axioms of Real Numbers, Rational Numbers, Complex Numbers, Polar Form, Euler's Formula)

Expectations

We will be going over highly abstract ideas in this course that are sometimes difficult to grasp. You are expected to struggle and not immediately catch on to these abstract ideas. You will be using these ideas for the rest of your mathematical careers and the goal is to gain a base level of understanding of these topics.

It is expected that you will work with others during class and outside of class. Please use each other as a resource when learning abstract materials. Also know that my job is to help you learn, and you should reach out to me early and often with any questions over material, the course, and with any concerns that may arise. Please know that office hours are for YOU, and you should use this resource as much as you would like. You do not need to make an appointment during normal office hours, please feel free to drop in unannounced (even if just to say hi or to ask a quick question).

You are expected to attend class each and every class day. We will always be going over new material, all of which is important and fundamental to learn. You should expect to dedicate a large portion of time (4-8 hours per week) outside of class to homework and understanding material.

It is expected that homework and exams will be done with a high level of professionalism, written/typed neatly and completely.

Prerequisites

Math 1132, 1152 or consent of instructor. Not open to a student who has passed Math 2143.

Textbook

"Book of Proof" 3rd Edition by Richard Hammack, available for free to download at https://www.people.vcu.edu/~rhammack/BookOfProof/.

Academic Integrity

Cheating is prohibited in all aspects of the course. Cheating includes, but is not limited to, communication with other students during an exam, asking other students to complete your

coursework, and copying or soliciting solutions from the internet. UCONN and I both take academic dishonesty very seriously; any academic dishonesty will result in severe consequences.

Please see the university policy at the end of the syllabus for more information on Academic Integrity.

Lecture Notes

I will post detailed outlines of lecture notes for class each day, but there is no substitute for coming to class. Please use the outlines to help prepare for lecture or to help supplement your notes.

Class Cancellation Policy

If for some reason in-person class must be cancelled (snow day, I am sick, etc.), I will send an email as soon as I am able and if given enough time, we will try to hold class via Webex.

Communication

Please communicate with me often. I am available for questions about material at any time and I am very good at responding to emails quickly. Furthermore, please use the drop-in office hours at any time. You do NOT need to make an appointment for these times.

If you need to miss class, an assignment, or miss an extended period of time, please communicate with me. I do not need to know any personal details of what is going on in your life, but I can work with you to come up with a plan on how to overcome any obstacles that may be present.

Communication is KEY! Please reach out early and often with any questions or concerns.

Late Policy

All homework (Weekly Worksheets and Good Math Practice Tasks) will be accepted for late credit at a 10% penalty for the rest of the semester. Completion of the homework is particularly important, and I want to incentivize doing the homework as much as possible. That being said, falling behind with homework can be very difficult to come back from. Please do not rely on the late policy, but rather use it as a safety net in case anything were to happen throughout the semester.

Assessment and Grading

The course grade will be based on homework via Weekly Worksheets (45%), Good Math Practice Tasks (10%), and three Take-Home Midterm Exams (3x15% = 45%). Grades will be consistently maintained in the HuskyCT gradebook (you should always have a general idea of what your grade is in the course).

Weekly Worksheets (45% of total grade)

Each week there will be a weekly worksheet due on Tuesday at 11:59 pm on Gradescope (use access code YDNNZB to access) going over the material from the previous week. A pdf (renamed with your last name first (e.g., LantzWS01.pdf) should be uploaded to Gradescope before the deadline. These worksheets should be a central focus of time spent outside of class. These problems will be graded as if they were exam problems, and I will try to offer as much feedback as I can. Feedback will be given directly on Gradescope in a timely manner (before the beginning of the next week). Late worksheets will always be accepted for a 10% penalty after the due date up until Tuesday April 30th at 11:59 pm.

Good Math Practice Tasks (GMPT) (10% of total grade)

Each week there will be a small task that you are asked to complete by Thursdays at 11:59 pm (usually).

These tasks are aimed to work on behaviors that will be helpful to become better mathematicians. You may find that you are already doing some of these behaviors and so there will be nothing more to do for these tasks. These tasks are not meant to be time consuming, but I believe that they are an important part of the structure of the course.

These assignments will be due on Thursdays at 11:59 pm (usually) and late credit will be awarded with a 10% penalty up until April 30th at 11:59 pm.

Take-Home Exams (15% each for 45% of total grade)

There will be three take-home midterm exams tentatively scheduled to start on Monday February 19th (covering Chapters 1, 2, and 4), Monday March 25th (covering Chapters 5-10), and Monday April 25th (covering Chapters 11-13, Number Theory, and Number Systems). You will be given a few days to complete the exam. The exams will consist of problems like those on the homework. If you are unable to complete the take-home exam in the time allotted for whatever reason, you must communicate with me. No Late submissions will be accepted

without communication. I will try to work with you if something comes up, but this is only possible if you communicate with me.

Final Exam

There is no Final Exam for this course.

Grading Scale

Letter grades will be assigned using the following scale:

A	:	93.00% and above
A-	:	90.00% - 92.99%
B+	:	87.00% - 89.99%
B	:	83.00% - 86.99%
B-	:	80.00% - 82.99%
C+	:	77.00% - 79.99%
C	:	73.00% - 76.99%
C-	:	70.00% - 72.99%
D	:	63.00% - 69.99%
D-	:	60.00% - 62.99%
F	:	59.99% and below

Letter grade cutoffs may be lowered if deemed necessary (although this is not likely and should not be expected).

Policy on Academic, Scholarly, and Professional Integrity and Misconduct (ASPIM)

https://policy.uconn.edu/2023/07/11/academic-scholarly-and-professional-integrity-and-misconduct-aspim-policy-on/