UCONN

DEPARTMENT OF MATHEMATICS
Álvaro Lozano-Robledo

MATH 2710 – Transition to Advanced Mathematics – Fall 2024

Navigation:

- Description of the course: MATH 2710
- Instructor Information: Álvaro Lozano-Robledo
- Resources: books, handouts, notes, and links to other resources
- Homework: problems and solutions
- Exams: information about exams and grading for the class
- Schedule: a summary of what was covered when, day by day
- Policy Statements

Description:

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.

Meets: Tuesdays and Thursdays, 9:30-10:45am, at MONT 227

Instructor: Álvaro Lozano-Robledo



Website: http://alozano.clas.uconn.edu/
Office Hours: Mondays 1-2pm (online – find link in HuskyCT or email), Tuesdays 3-4pm (in-person at MONT 233), or by appointment.
Office: Monteith 233.

I'm a Professor of Mathematics. The focus of my research is in number theory, and more concretely in the study of elliptic curves, and other abelian varieties.

Alvaro Lozano-Robledo in action (Shawn Kornegay/UConn Photo)

Resources:

I will be following "Book of Proof" by Richard Hammack. The book is available for free (in PDF format) in the author's website, and can also be purchased in physical form online (e.g., Amazon).

Homework problems and solutions:

Most of what you learn in this course will be the result of working exercises that are designed to reinforce key concepts, develop skills, and test your understanding of the material. There will be textbook exercises due at the end of every other week on lecture material. Some of the exercises are straightforward, others are very complex.

Late homework will not be accepted. Although it should be done daily, it will only be collected once every other week, in class or by email (MONT 233) *__before__* 10:45AM. Homework will only be graded on completion.

You are encouraged to talk with your classmates about the homework. If you have difficulties, do not waste time — get help! Please come to office hours!

Homework assignments. The problems below are suggested exercises. The **problems in bold face** will be collected on the indicated date.

- **Homework 1 (due Thursday, Sep. 12th, by 1:45pm)**
  - Chapter 1:
    - Section 1.1: 14, 16, 20, 26, **32**, 36, 42, 50
    - Section 1.2: 2(b,g), **8**, 14, 16
    - Section 1.3: 2, 6, **10**, 12
    - Section 1.4: 4, **10**, 14, 18
    - Section 1.5: 2(a,b,c), **4(a,b,c)**, 6, 8
    - Section 1.6: **2(a,b,c)**
    - Section 1.7: 6, **8**
    - Section 1.8: **4**, 6
  - Chapter 2:
    - Section 2.1: 2, 4, 6, **10**
    - Section 2.2: **8**
    - Section 2.3: 2, 4, 8, **10**
    - Section 2.4: **2**, 4
    - Section 2.5: 2, 4, **6**, 8
    - Section 2.6: 2, 4, **10**
    - Section 2.7: **2**, 4, 8
    - Section 2.9: 4, **6**, 10
    - Section 2.10: 2, 4, **6**, 10

- **Homework 2 (due Tuesday, Sep. 24th, by 1:45pm)**
  - Chapter 4: **2, 6, 12, 14, 18, 20, 22, 24** (suggested: all other exercises in Ch. 4)
  - Chapter 5: **2, 4, 6, 12, 16, 20, 22, 30** (suggested: all other exercises in Ch. 5)
- **Homework 3 (due Tuesday, Oct. 15th, by 1:45pm)**
  - Chapter 6: **2, 4, 8, 16, 18, 20, 24** (suggested: all other exercises in Ch. 6)
  - Chapter 7: **2, 6, 8, 16, 22, 30, 34** (suggested: all other exercises in Ch. 7)
- **Homework 4 (due Tuesday, October 29th , by 1:45pm)**
  - Chapter 8: **4, 6, 10, 22, 24, 28** (suggested: all other exercises in Ch. 8)
  - Chapter 9: **2, 6, 12, 20, 22, 30** (suggested: all other exercises in Ch. 9)
- **Homework 5 (due Thursday, November 14th, by 1:45pm)**
  - Chapter 10: **2, 4, 8, 10, 16, 18, 24** (suggested: the rest)
  - Chapter 3: **2.2, 3.4, 4.16, 5.10, 6.5 and 6.6, 7.8** (suggested: all others)
- **Homework 6 (due Tuesday, December 3rd, by 1:45pm)**
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Information about exams and grading for your class:

Your grade in the course will be determined by your performance on the two midterm exams, a final exam, and your lecture grade. The lecture grade consists primarily of homework and class participation. Your entire grade is out of 550 points (see below):

Here you will find information about midterms and exams.

- FIRST EXAM: Thursday, September 26th, in-class.
  - Covers Chapters 1, 2, 4, 5 (set theory, logic, direct proofs and contrapositive proofs).
- SECOND EXAM: Thursday, October 31st, in-class.
  - Covers Chapters 6, 7, 8, 9 (contradiction, proving conditional statements, proofs involving sets, disproof)
- **FINAL EXAM: TBA. (Check the final schedule at the registrar's website.)**
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The final exam will cover material from the entire course, but there will be an emphasis on material covered after the second prelim. No calculators are allowed on exams.

Grade: The grading will be based on Prelim 1 (100 points), Prelim 2 (125 points), the final exam (175 points) and a lecture grade (150 points). The lecture grade will be based on homework and class participation.

WARNINGS:

1. If you cannot take an exam at the scheduled time, **you MUST let your instructor know BEFORE the exam**; you will almost certainly get an 'F' on an exam if you miss it for any reason and then try to explain later.
2. Incompletes will be given only under exceptional circumstances and then only to students who have a passing grade on a substantial part of the course. Do not expect to be granted an incomplete simply because you have fallen behind in the course.

Schedule:

- Week 1. Sets
- Week 2. Logic
- Week 3. Direct proof
- Week 4. Contrapositive proof
- Week 5. **Exam 1**. Proof by contradiction
- Week 6. Proving non-conditional statements
- Week 7. Proofs involving sets
- Week 8. Disproof
- Week 9. Mathematical induction
- Week 10. **Exam 2**. Counting
- Week 11. Relations
- Week 12. Functions
- Week 13. Proofs in Calculus
- Week 14. Cardinality of sets.

Policy Statements:

Policy Against Discrimination, Harassment and Related Interpersonal Violence
The University is committed to maintaining an environment free of discrimination or discriminatory harassment directed toward any person or group within its community – students, employees, or visitors. Academic and professional excellence can flourish only when each member of our community is assured an atmosphere of mutual respect. All members of the University community are responsible for the maintenance of an academic and work environment in which people are free to learn and work without fear of discrimination or discriminatory harassment. In addition, inappropriate amorous relationships can undermine the University's mission when those in positions of authority abuse or appear to abuse their authority. To that end, and in accordance with federal and state law, the University prohibits discrimination and discriminatory harassment, as well as inappropriate amorous relationships, and such behavior will be met with appropriate disciplinary action, up to and including dismissal from the University. Additionally, to protect the campus community, all non-confidential University employees (including faculty) are required to report sexual assaults, intimate partner violence, and/or stalking involving a student that they witness or are told about to the Office of Institutional Equity. The University takes all reports with the utmost seriousness. Please be aware that while the information you provide will remain private, it will not be confidential and will be shared with University officials who can help. More information is available at equity.uconn.edu and titleix.uconn.edu.

Statement on Absences from Class Due to Religious Observances and Extra-Curricular Activities
Faculty and instructors are expected to reasonably accommodate individual religious practices unless doing so would result in fundamental alteration of class objectives or undue hardship to the University's legitimate business purposes. Such accommodations may include rescheduling an exam or giving a make-up exam, allowing a presentation to be made on a different date or assigning the student appropriate make-up work that is intrinsically no more difficult than the original assignment. Faculty and instructors are strongly encouraged to allow students to complete work missed due to participation in extra-curricular activities that enrich their experience, support their scholarly development, and benefit the university community. Examples include participation in scholarly presentations, performing arts, and intercollegiate sports, when the participation is at the request of, or coordinated by, a University official. Students should be encouraged to review the course syllabus at the beginning of the semester for potential conflicts and promptly notify their instructor of any anticipated accommodation needs. Students are responsible for making arrangements in

advance to make up missed work.

For conflicts with final examinations, students should contact the Dean of Students Office. Faculty and instructors are also encouraged to respond when the Counseling Program for Intercollegiate Athletes (CPIA) requests student progress reports. This will enable the counselors to give our students appropriate advice.

About Students with Disabilities

The University of Connecticut is committed to protecting the rights of individuals with disabilities and assuring that the learning environment is accessible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, please let me know immediately so that we can discuss options. Students who require accommodations should contact the Center for Students with Disabilities, Wilbur Cross Building Room 204, (860) 486-2020 or http://csd.uconn.edu/.

Emergency Management on Emergency Preparedness

In case of inclement weather, a natural disaster, or a campus emergency, the University communicates through email and text message. Students are encouraged to sign up for alerts through http://alert.uconn.edu. Students should be aware of emergency procedures, and further information is available through the Office of Emergency Management at http://publicsafety.uconn.edu/emergency/.

Back to the top

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