Title of Course: MATH 5200: Introduction to Analysis I

Course meeting time and place:
Lecture: 2:30P – 3:20P MWF, 210 MLH

Department of Mathematics: https://math.uiowa.edu/

Course ICON site: To access the course site, log into Iowa Courses Online (ICON) https://icon.uiowa.edu/index.shtml using your Hawk ID and password.

Course Home
The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the policies and procedures for its courses. Graduate students, however, must adhere to the academic deadlines set by the Graduate College.

Instructor: Raúl E. Curto
Office location: 225H MLH
Office hours: Mon: 1:30 – 2:20 in 225H MLH; Wed: 1:30 – 2:20 via Zoom; Thu: 11:00 – 11:50 via Zoom; or by appointment.

Phone: (319)467-0303
E-mail: raul-curto@uiowa.edu

DEO: Professor Ryan Kinser, ryan-kinser@uiowa.edu, 14 MLH

Description of Course
The real numbers, fundamentals of limits and continuity in the context of metric spaces. The Lebesgue theory of functions of one real variable. Grades are based on homework, midterms, and a final exam.

Learning Objectives
The main objective of the course is to introduce the student to the measure theory, integration theory, and the theory of metric spaces that a modern analyst needs to know. Some goals will include a thorough understanding of Lebesgue measure on the real line, the connection of the Lebesgue integral to the Riemann integral, the basic structure of $L^p$ spaces, and the three fundamental theorems in the theory of metric spaces (the Arzelà-Ascoli Theorem, the Baire Category Theorem, and the Banach Contraction Principle).
Textbook/Materials


Material to be covered.

**Chapter 1.** The Real Numbers: Sets, Sequences and Functions

**Chapter 2.** Lebesgue Measure

**Chapter 3.** Lebesgue Measurable Functions

**Chapter 4.** Lebesgue Integration

**Chapter 5.** Lebesgue Integration: Further Topics

**Chapter 6.** Differentiation and Integration

**Chapter 7.** The $L^p$ Spaces: Completeness and Approximation

**Chapter 8.** The $L^p$ Spaces: Duality and Weak Convergence

**Chapter 13.** Metric Spaces: General Properties

**Chapter 14.** Metric Spaces: Three Fundamental Theorems

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**TENTATIVE TIMETABLE** (Subject to change; all changes will be announced in class, posted on the course webpage, or e-mailed to your UI e-mail.)

**Week 1:** 1.1, 1.2, 1.3

**Week 2:** 1.4, 1.5, 1.6

**Week 3:** 2.1, 2.2, 2.3

**Week 4:** 2.4, 2.5, 2.6

**Week 5:** 2.7, 3.1, 3.2, 3.3

**Week 6:** 3.3 revisited, Review for Midterm 1; 4.1

**Midterm Exam 1** (Thu of Week 6) (based on material covered during Weeks 1 – 5)

**Week 7:** 4.2, 4.3, 4.4

**Week 8:** 4.5, 4.6, 5.2

**Week 9:** 5.3, 6.1, 6.2
Week 10: 6.3, 6.4, 6.5

Week 11: 7.1, Review for Midterm 2; 7.2

Midterm Exam 2 (Thu of Week 11) (based on material covered during Weeks 6 – 10)

Week 12: 7.3, 7.4, 8.1

Week 13: 13.1, 13.2, 13.3

Week 14: 13.4, 13.5, 13.6

Week 15: 14.1, 14.2, 14.3

Final Exam (Week 16; date, time, and location TBD, see below) (based on material covered during Weeks 1 - 15)

Academic Honesty and Misconduct
All students in CLAS courses are expected to abide by the CLAS Code of Academic Honesty. Graduate academic misconduct must be reported to the Graduate College according to Section F of the Graduate College Manual.

Student Complaints
Students with a complaint about a grade or a related matter should first discuss the situation with the instructor and/or the course supervisor (if applicable), and finally with the Director or Chair of the school, department, or program offering the course.

Graduate students should contact the CLAS Associate Dean for Graduate Education and Outreach and Engagement when additional support is needed.

Drop Deadline for this Course
You may drop an individual course before the deadline; after this deadline you will need collegiate approval. You can look up the drop deadline for this course here. When you drop a course, a “W” will appear on your transcript. The mark of “W” is a neutral mark that does not affect your GPA. Directions for adding or dropping a course and other registration changes can be found on the Registrar’s website. Undergraduate students can find policies on dropping and withdrawing here. Graduate students should adhere to the academic deadlines and policies set by the Graduate College.

Grading System and the Use of +/-

With criterion-reference grading, students receive grades based on the quality of their work in relation to the criteria defined by the instructor and by the rubrics or models specifying the qualities of each grade. The cut scores (e.g. 90 for A-) will never go up, but they may go down for some exams, and each exam will be treated separately. We will start with:
Final grades will be awarded based on the following ranges:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
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<tbody>
<tr>
<td>A+</td>
<td>97-100</td>
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<tr>
<td>A</td>
<td>93-96</td>
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<tr>
<td>A-</td>
<td>90-92</td>
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<tr>
<td>B+</td>
<td>87-90</td>
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<tr>
<td>B</td>
<td>83-86</td>
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<tr>
<td>B-</td>
<td>80-82</td>
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<tr>
<td>C+</td>
<td>76-79</td>
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<tr>
<td>C</td>
<td>71-75</td>
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<td>C-</td>
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<td>D+</td>
<td>61-64</td>
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<td>D</td>
<td>56-60</td>
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<tr>
<td>D-</td>
<td>50-55</td>
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<tr>
<td>F</td>
<td>&lt; 50</td>
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Grading System: Plus/minus grading will be used. Final course grades will be assessed based on your performance in the following activities:

- 50% 2 Evening midterms (see below)
- 25% Final exam (date, time, and place to be announced)
- 25% Thirteen Homework sets, assigned weekly and due on Mondays at 5:00 pm CST. The three lowest scores will be dropped.

Regular and prompt attendance is required; class participation is strongly encouraged.

All exams are comprehensive unless specified otherwise.

Midterm Exams
Start and end times: 6:30 PM – 8:30 PM 09/28/2022 Thu 106 GILH
Start and end times: 6:30 PM – 8:30 PM 11/03/2022 Thu 106 GILH

Date and Time of the Final Exam
The final examination date and time will be announced by the Registrar generally by the fifth week of classes, and it will be announced on the course ICON site once it is known. Do not plan your end-of-the-semester travel plans until the final exam schedule is made public. It is your responsibility to know the date, time, and place of the final exam. According to Registrar's final exam policy, students have a maximum of two weeks after the announced final exam schedule to request a change if an exam conflict exists or if a student has more than two exams in one day (see the policy here).
College of Liberal Arts and Sciences (CLAS) Course Policies

Attendance and Absences
University regulations require that students be allowed to make up examinations which have been missed due to illness or other unavoidable circumstances. Students with mandatory religious obligations or UI authorized activities must discuss their absences with me as soon as possible. Religious obligations must be communicated within the first three weeks of classes.

Exam Policies

Communication: UI Email
Students are responsible for all official correspondences sent to their UI email address (uiowa.edu) and must use this address for any communication with instructors or staff in the UI community.

Calculator Use: The use of a calculator or any other electronic device in the midterms and final exam is not allowed. When you are doing your HW (to prepare you for your exams), keep in mind that you will not have a calculator in the exams.

Student Collaboration: Student collaboration is NOT permitted on the midterms and final exam. Any attempt to collaborate during these exams will result in a score of 0 on that test.

Late Homework will not be accepted; however, the three lowest scores will be dropped.

Students are encouraged to be mindful of their mental health and seek help as a preventive measure or if feeling overwhelmed and/or struggling to meet course expectations. Students are encouraged to talk to their instructor for assistance with specific class-related concerns. For additional support and counseling, students are encouraged to contact University Counseling Service (UCS). Information about UCS, including resources and how to schedule an appointment, can be found at counseling.uiowa.edu. Find out more about UI mental health services at mentalhealth.uiowa.edu.

Student Care and Assistance provides assistance to University of Iowa students who are experiencing a variety of crisis and emergency situations, including but not limited to medical issues, family emergencies, unexpected challenges, and sourcing basic needs such as food and shelter. More information on the resources related to basic needs can be found at basicneeds.uiowa.edu/resources/. Students are encouraged to contact Student Care & Assistance in the Office of the Dean of Students (Room 135 IMU, dos-assistance@uiowa.edu, or 319-335-1162) for support and assistance with resources.
**Accommodations for Students with Disabilities**
The University is committed to providing an educational experience that is accessible to all. If a student has a diagnosed disability or other disabling condition that may impact the student’s ability to complete the course requirements as stated in the syllabus, the student may seek accommodations through Student Disability Services (SDS). SDS is responsible for making Letters of Accommodation (LOA) available. The student must provide an LOA to the instructor as early in the semester as possible, but requests not made at least two weeks prior to the scheduled activity for which an accommodation is sought may not be accommodated. The LOA will specify what reasonable course accommodations the student is eligible for and those the instructor should provide. Additional information can be found on the SDS website.

**University Policies**
- Classroom Expectations
- Free Speech and Expression
- Non-discrimination
- Absences for Religious Holy Days
- Sexual Harassment/Misconduct and Supportive Measures
- Sharing of Class Recordings