

SYLLABUS Spring 2018
The University of Iowa
The College of Liberal Arts and Sciences
Department of Mathematics
MATH 4210.0001 Foundations of Analysis

Lectures: 2:30P-3:20P MWF 113 MLH and Discussion: 2:00-2:50P Th 213 MLH

Some of the policies relating to this course (such as the drop deadline) are governed by its administrative home, the College of Liberal Arts and Sciences, 120 Schaeffer Hall.

Instructor: Oguz Durumeric

Office location: B20F MLH

Office hours: Mon, Wed, Thu 9:00-10:20

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TA: Christopher Adams (meetings with the TA are 2:00-2:50P Th 213 MLH)

DEO Contact Information: Professor Maggy Tomova, 14 MLH, maggy-tomova@uiowa.edu

Prerequisites: MATH 3770 or graduate standing

Catalog Description of Course: Introduction to fundamental ideas of analysis; emphasis on understanding and constructing definitions, theorems, and proofs; real and complex numbers, set theory in metric spaces, compactness and connectedness, sequences, Cauchy sequences, series, and continuity; elements of differential and integral calculus; sequences and series of functions; modes of convergence; equicontinuity; serves as a bridge between MATH:3770 and MATH:5200.

Objectives and Goals of the Course:

- Strong emphasis on formal reasoning, understanding and constructing definitions, theorems, and proofs
- Real and Complex Numbers: Development of the real numbers from the rationals. Extended real numbers. Complex Numbers. Euclidean Spaces.
- Set Theory: Countable/Uncountable Sets. Metric Spaces. Open and closed sets in metric spaces. Compactness with finite subcovers. Weierstrass theorem. Cantor Set. Connectedness.
- Sequences: Convergence, subsequences, and Cauchy sequences in \mathbb{R} and in general metric spaces. Limsup and liminf. Completeness. Series, partial sums, convergence and absolute convergence. Power series and radius of convergence.
- Continuity: Continuity, relationship of continuity and compactness, relationship of continuity and connectedness.
- Calculus: Derivatives. Mean value theorem. Taylor's theorem. Riemann-Stieltjes integral. Fundamental Theorem. Functions of bounded variation.
- Sequences and Series of Functions: Modes of convergence: Pointwise, Uniform, Lp. Relationship of modes of convergence and continuity, integration and differentiation. Stone-Weierstrass Theorem. Equicontinuity and Arzela-Ascoli theorem.
- As much as time permits, Functions of several variables, Implicit and Inverse function Theorems

Texts: Principles of Mathematical Analysis, by Walter Rudin ISBN 978-0-0415-42356 McGraw Hill. Available in the University Bookstore and Iowa Book and Supply, Amazon and many other possibilities for online purchases.

Tentative Syllabus and timetable:

Chapters	1, 2, 3, 4, 5, 6, 7, 9 of Principles of Mathematical Analysis, Rudin
Time to spend on each	1, 2, 2, 2, 2, 1, 3, 2 weeks

Grades: **Plus/minus** grading will be used.

40%	2 Midterms, on February 23 and April 13 both Fridays, in class exams
25%	Final Exam during the finals week, in class exam
15%	Homework (about 10, drop the lowest two)
15%	5 quizzes on Thursdays (tentatively on 2/1, 2/15, 3/8, 3/29, 4/26), every 2 weeks
5%	Attendance and class participation

ALL EXAMS ARE COMPREHENSIVE, unless specified otherwise

A Word about the Date and Time of the Final Exam: The date and time of every final examination is announced by the Registrar generally by the fifth week of the classes. **No exams of any kind are allowed during the last week of classes.** All students should plan on being at the UI through the final examination period. Once the Registrar has announced the date, time, and location of each final exam, the complete schedule will be published on the Registrar’s web site and will be shared with instructors and students. It is the student's responsibility to know the date, time, and place of the final exam.

Criterion-Referenced Grading: Described by CLAS as “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. Students’ achievements are measured by this mastery of concepts and skills.” Our starting scale is as follows. If a need arises, this scale can be revised only to improve your letter grades, (that is, the cut scores will never go up).

A, A- > 90	B+, B, B- > 80	C+, C, C- > 65	D+, D, D- > 50
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Course Structure and Expectations: You are expected to attend almost all (>90%) of the lectures and participate in class. More than 10% absences will reduce your grade. You are responsible for everything covered in the lectures, discussion sections, textbook and the prerequisites. Lectures will cover material beyond the textbook when a need arises.

Homework will be assigned by Fridays (almost every week) and it is due the following Friday. No late homework without a good excuse, and no make-ups for homework. If a HW is late for 1-6 days, the score will be reduced by 10%. Any HW that is late for 7 or more days will not be accepted, unless that is due to an illness that can be documented. We will drop the lowest two homework grades. If you have a conflict with exams, quizzes or a medical problem, discuss your situation with your lecturer as soon as possible.

Rules on Collaboration: In this class, students are allowed to talk with others about homework. However, do not share your written work with others or ask others to see their completed assignments since both are considered academic misconduct. In other words, you can discuss a problem with other students, but you write your solution alone. If you worked/discussed a problem with others, you must state their names on your homework before the beginning of that problem, even if you wrote the solution yourself. HWs showing duplication will be considered the result of academic dishonesty. If you need help, please stop by during the lecturer's office hours. Students are responsible for understanding this policy; if you have questions, ask for clarification.

Resources: You are strongly encouraged to go to your lecturer's and TA's office hours, or make an appointment if you have a conflict with the office hours.

Other Expectations of Student Performance: Please put away your cell phones during the lectures, and turn the volume off. If you need to make an urgent call or text, please go outside the classroom to do it. Usage of laptops and phones during the class time are not permitted except if it is related to this course.

Notes to the Students: All students in the College have specific rights and responsibilities. You have the right to adjudication of any complaints you have about classroom activities or instructor actions. Information on these procedures and your responsibilities is available in the Schedule of Courses and on-line in the College's Student Academic Handbook, see the next page. In summary, first see the person you wish to complain about, and then see his/her immediate supervisor. The chain is: graduate or undergraduate assistants, then Prof. Durumeric, then the DEO of the Department of Mathematics, Prof. Tomova, and then an appropriate Dean. The Department of Mathematics has offices in 14 MLH (MacLean Hall). To make an appointment to talk to the DEO of the department call 335-0714 or contact the departmental secretary in 14 MLH.

We would like to hear from anyone who has a disability which may require some modification of seating, testing, or other class requirements so that appropriate arrangements may be made. Please contact your lecturer during his office hours, in the beginning of the semester and far in advance of the exams. You should notify the Office of Student Disability services and obtain the forms. The necessary modifications will be made available to you.

We are planning to use ICON for posting grades and other course material. Also, some announcements may be e-mailed through ICON to your UI e-mail. Check ICON and your UI e-mail regularly, and make sure that UI has your correct e-mail address.

This course plan may be modified during the semester. All changes will be announced in class in advance. It is solely the student's responsibility to be informed of such announced changes.

Teaching Policies & Resources — Syllabus Insert

Administrative Home

The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook.

Electronic Communication

University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondence (Operations Manual, III.15.2. Scroll down to k.11).

Accommodations for Disabilities

A student seeking academic accommodations should first register with Student Disability Services and then meet with the course instructor privately in the instructor's office to make particular arrangements. See <https://sds.studentlife.uiowa.edu/> for more information.

Nondiscrimination in the Classroom

The University of Iowa is committed to making the classroom a respectful and inclusive space for all people irrespective of their gender, sexual, racial, religious or other identities. Toward this goal, students are invited to optionally share their preferred names and pronouns with their instructors and classmates. The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national origin, and other identity categories set forth in the University's Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity, diversity@uiowa.edu, or visit diversity.uiowa.edu.

Academic Honesty

All students taking CLAS courses have, in essence, agreed to the College's Code of Academic Honesty: "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled (CLAS Academic Policies Handbook).

CLAS Final Examination Policies

The date and time of every final examination is announced by the Registrar generally by the fifth week of classes. No exams of any kind are allowed during the last week of classes. All students should plan on being at the UI through the final examination period. It is the student's responsibility to know the date, time, and place of the final exam.

Making a Suggestion or a Complaint

Students with a suggestion or complaint should first visit with the instructor (and the course supervisor), and then with the departmental DEO. Complaints must be made within six months of the incident (CLAS Academic Policies Handbook).

Understanding Sexual Harassment

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the Office of the Sexual Misconduct Response Coordinator for assistance, definitions, and the full University policy.

Reacting Safely to Severe Weather

In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Public Safety website.