MATH 5210: Introduction to Analysis II  
SYLLABUS Spring 2023  
The University of Iowa  
The College of Liberal Arts and Sciences  
Department of Mathematics  

Time & Location for Lecture:  2:30P – 3:20P MWF, 214 MLH  
Time & Location for Discussion: 8:30A – 9:20A Th, 205 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.

**Prerequisites:** MATH:5200.

**Instructor:** Raúl Curto  
Office location: 225H MLH  
Office hours:  
Mon: 10:30 – 11:20 via Zoom  
Wed: 10:30 – 11:20 via Zoom  
Thu: 11:00 – 11:50 via Zoom  
or by appointment

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

**TA:** Adriana Fernandez I Quero, adriana-fernandeziquero@uiowa.edu, 325N MLH; (319)XXX-XXXX  
Office hours:

**DEO Contact Information:** Professor Ryan Kinser, ryan-kinser@uiowa.edu, 14 MLH, 335-0714

**Course Description:** Local theory of analytic functions of one complex variable, power series, classical transcendental functions; spaces of functions.  
Grades are based on homework, midterms, and a final exam.

**Objectives and Goals of the Course**

The main objective of the course is to introduce the student to the mathematical theory of functions of one complex variable, a subject of considerable beauty and with applications to functional analysis, operator theory, topology, geometry, analysis of ODE and PDE, dynamical systems, and various areas of applied mathematics. The course covers in detail many fundamental concepts in analysis such as analytic functions, conformal mappings, classification of singularities, Cauchy theory and applications to the calculus of residues, harmonic functions, the maximum modulus principle, the Riemann mapping theorem, and factorization theorems.
The course includes a weekly discussion session, intended to help students develop the tools and techniques needed to tackle and solve challenging mathematical problems. In conjunction with MATH:5200, the course is expected to equip students with the solid preparation needed to attempt the Ph.D. Qualifying Exam in Analysis.

**Required text**


**Material to be covered**

Chapter I. The Complex Number System
Chapter II. Metric Spaces and the Topology of \( \mathbb{C} \)
Chapter III. Elementary Properties and Examples of Analytic Functions
Chapter IV. Complex Integration
Chapter V. Singularities
Chapter VI. The Maximum Modulus Theorem
Chapter VII. Compactness and Convergence in the Space of Analytic Functions
Chapter VIII. Runge’s Theorem
Chapter X. Harmonic Functions
Chapter XI. Entire Functions

**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:** I.1, I.2, I.3, I.4, I.5
**Week 2:** I.6, II.1, II.2, II.3, II.4, II.5, II.6
**Week 3:** III.1, III.2
**Week 4:** III.3, IV.1
**Week 5:** IV.2, IV.3, IV.4, IV.5
**Week 6:** IV.5 revisited; Review for Midterm 1; Midterm 1 Answer Key
**Midterm Exam 1** (Thu of Week 6) (based on material covered during Weeks 1 – 5)
**Week 7:** IV.6, IV.7, IV.8
**Week 8:** V.1, V.2
**Week 9:** V.3, VI.1, VI.2, VII.1
**Week 10:** VII.2, VII.3, VII.4
**Week 11:** VII.4 revisited; Review for Midterm 2; Midterm 2 Answer Key
**Midterm Exam 2** (Thu of Week 11) (based on material covered during Weeks 6 – 10)
Week 12: VII.5, VII.6, VII.7  
Week 13: VII.8, VIII.1, VIII.2  
Week 14: VIII.3, X.1, X.2  
Week 15: XI.1, XI.2, XI.3; Review for Final Exam  
Final Exam (Week 16; date, time and location TBD, see below) (based on material covered during Weeks 1-5 (25%), 6-10 (25%) and 11 – 15 (50%))

Grading

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:

A+, A, A- ≥ 90; B+, B, B- ≥ 80; C+, C, C- ≥ 65; D+, D, D- ≥ 50; F < 50

Grading System: Plus/minus grading will be used.  
50% 2 Evening midterms (see below)  
25% Final exam (date, time and place to be announced)  
25% Twelve Homework sets, assigned weekly, and due at 5 pm CST on Friday of Weeks 2, 3, 4 and 5; Monday of Week 7; Friday of Weeks 8, 9 and 10; Monday of Week 12; Friday of Weeks 13 and 14; and Monday of Week 16. The two lowest scores will be dropped.

Each weekly Homework will consist of 10 problems. Six problems will be specifically designated for grading (with each problem scored on a 0-4 point scale), while the other four problems will help students get a fuller understanding of the various topics. To encourage students to attempt all 10 problems, each cogent attempt to solve any of the above-mentioned four problems will be rewarded with one point. Thus, a homework with all 10 problems completed can receive a maximum score of 24 base points plus 4 extra credit points. Each homework will thus receive, as score, an ordered pair (BP,ECP) of nonnegative integers, where 0 ≤ BP ≤ 24 and 0 ≤ ECP ≤ 4. The first coordinate will be used to determine which two homework to drop, and to tally up the total homework score. The sum of all second coordinates will be considered as Extra Credit, and used to possibly enhance the final letter grade in the course, by allowing a transition from A to A+, A- to A, B+ to A-, and so on; to qualify for this, the grand sum of all homework ECP coordinates must be at least 36.

Attendance and class participation is strongly recommended.

All exams will be cumulatively comprehensive.
Midterm Exams

Start and end times: 6:30PM - 8:30PM 02/23/2023 Thu; 106 GILH
Start and end times: 6:30PM - 8:30PM 04/06/2023 Thu; 106 GILH

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 to be 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.

Make-up policy

We will follow CLAS guidelines strictly. Read all of the information from the link below.
https://clas.uiowa.edu/students/handbook/attendance-absences

As stated on the CLAS webpage:

“University policy requires that students be permitted to make up examinations missed because of illness, mandatory religious obligations, authorized UI activities, or unavoidable circumstances. An unavoidable circumstance is defined as an event beyond the student's control and often involves a serious and unexpected hospitalization, a family tragedy, or a related incident. Such circumstances do not include attendance at a wedding, a family vacation, obligations related to work or other such matters. The instructor of a student participating in an authorized UI activity is sent a statement generally by email from the UI official in charge of the event before the absence occurs; this statement will include the specific date and time that the student will miss class. Activities related to employment, fraternities or sororities, or volunteer activities are not UI authorized activities.”

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.

The homework for this course is designed to help you master your knowledge related to the topics covered during lecture. As such, you may work on the homework problems with others or use online resources. However, please be aware that to master the skills needed for this class, practice is required and that to do well on the midterms and final exam you will need to work all these problems multiple times and without help. Make sure to test your knowledge by doing much of the homework on your own. Even if you collaborate with your colleagues when solving the homework problems, I strongly
encourage you not to copy, verbatim, the solutions from others but instead try to write them in your own understanding. This is an excellent approach proven to help students with their comprehension of the material.

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

**Other Course Policies**

Students are expected to attend all lectures, and do all of the homework regularly. Students are responsible for everything covered in the lectures, textbook, and the prerequisites. Important announcements about changes (if necessary) to the syllabus, homework, exams, etc. will be done in the lectures or they will be sent via ICON.

You are strongly encouraged to go to your lecturer’s office hours. Make an appointment, if you have a conflict with the listed office hours.

**Cell phones** must be turned off during the lectures and exams. If you have to read or text a message during the lecture, please do it outside the classroom. During the exams, the cell phones are required to be put (far) away, preferably at the bottom of your backpack. During the exams, you cannot hold them in your hand, not keep them on your desk, chair, or anywhere easily accessible, and you cannot use it as a calculator. This applies to all electronic devices which can communicate or connect online.

**Notes to the Students**

1. 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, [https://clas.uiowa.edu/students/handbook](https://clas.uiowa.edu/students/handbook). 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 first, then the lecturer of your course, then the course coordinator, then the Chair of the Department of Mathematics Professor Weimin Han, and then an appropriate Dean. The Department of Mathematics has offices in 14 MLH (MacLean Hall). To make an appointment to talk to the chair of the department call 335-0714 or contact the departmental assistant in 14 MLH.

2. We would like to hear from anyone who has a disability that 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, SDS and obtain the need forms. The necessary modifications will be made available to you after the SDS has processed and approved your request.

3. We are planning to use ICON for posting grades and other course material. In addition, 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.

4. 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.
ATTENDANCE AND CLASSROOM EXPECTATIONS
Students are responsible for attending class and for knowing an instructor’s attendance policies, which vary by course and content area. All students are expected to attend class and to contribute to its learning environment in part by complying with University policies and directives regarding appropriate classroom behavior or other matters.

ABSENCES
Students are responsible for communicating with instructors as soon they know that an absence might occur or as soon as possible in the case of an illness. Delays in communication could result in a forfeit of what otherwise might be an excused absence.

ABSENCES: ILLNESS, UNAVOIDABLE CIRCUMSTANCES, AND UNIVERSITY SPONSORED ACTIVITIES
Students who are ill, in an unavoidable circumstance affecting academic work, or who miss class because of a University sponsored activity are allowed by UI policy to make up a missed exam. Documentation is required by the instructor except in the case of a brief illness. Students are responsible for communicating with instructors as soon as the absence is known (https://opsmanual.uiowa.edu/students/absences-class#8.1).

ABSENCES: HOLY DAYS
Reasonable accommodations are allowed for students whose religious holy days coincide with their classroom assignments, tests, and attendance if the student notifies the instructor in writing of any such religious Holy Day conflicts within the first days of the semester and no later than the third week. (See the University Operations Manual: https://opsmanual.uiowa.edu/students/absences-class#8.2).

ABSENCES: MILITARY SERVICE OBLIGATIONS
Students absent from class due to U.S. veteran or U.S. military service obligations (including military service-related medical appointments, military orders, and National Guard Service obligations) must be excused without penalty. Instructors must make reasonable accommodations to allow students to make-up exams or other work. Students must communicate with their instructors about the expected possibility of missing class as soon as possible. (For more information, see https://opsmanual.uiowa.edu/iv-8-absences-class%C2%A0-0).

ACADEMIC MISCONDUCT
Plagiarism and the process for addressing academic misconduct of graduate students are defined in Section IV, Article F “Plagiarism by Graduate Students” of the UI Graduate College Manual of Rules and Regulations. Please contact the CLAS Associate Dean for Graduate Education for any necessary assistance in navigating the process mandated by the Graduate College.
ACADEMIC ACCOMMODATIONS
UI is committed to providing an educational experience that is accessible to all students. A student may request academic accommodations for a disability (such as a mental health, attention, learning, vision, and a physical or health-related condition) through the Student Disability Services (SDS) office. The student is responsible for discussing specific accommodations with the instructor. Note that accommodations are not granted retroactively but from the time of the student’s request to the instructor onward; additionally, accommodations must be requested at least two weeks in advance of the related assignment or exam (https://sds.studentlife.uiowa.edu/). Graduate students serving as Teaching Assistants, Research Assistants, or Fellows must contact Faculty and Staff Disability Services (https://hr.uiowa.edu/support/faculty-and-staff-disability-services) for assistance with accommodations.

CLASS RECORDINGS: PRIVACY AND SHARING
Course lectures and discussions are sometimes recorded or live-streamed. These are only available to students registered for the course and the intellectual property of the faculty member. These materials may not be shared or reproduced without the explicit written consent of the instructors. Students may not share these recordings with those who are not enrolled in the course; likewise, students may not upload recordings to any other online environment. Doing so is a breach of the Code of Student Conduct and could be a violation of the Federal Education Rights and Privacy Act (FERPA); also see https://dos.uiowa.edu/policies/code-of-student-life/.

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 (Operations Manual, III.15.2). Emails should be respectful and brief, with complex matters addressed during the instructor’s drop-in hours, for example. Faculty are not expected to answer email after business hours or during the weekends.

FREE SPEECH AND EXPRESSION
The University of Iowa supports and upholds the First Amendment protection of freedom of speech and the principles of academic and artistic freedom. We are committed to open inquiry, vigorous debate, and creative expression inside and outside of the classroom. Visit Free Speech at Iowa for more information on the university’s policies on free speech and academic freedom: https://freespeech.uiowa.edu/.

COMPLAINTS ABOUT ACADEMIC MATTERS
Students with a complaint about a grade or a related academic matter should first visit with the instructor and then with the course supervisor (if applicable), and finally with the Director of the school, department, or program offering the course. If a graduate student has not been able to resolve the issue through the Director of the school, department, or program, they should contact the associate dean for graduate education in the college of liberal arts and sciences.
FINAL EXAMINATION POLICIES
The final exam schedule is published during the fifth week of the fall and spring
semesters or on the first day of summer classes; students are responsible for knowing
the date, time, and place of their final exams. Students should not make travel plans
until knowing this information. A student with exams scheduled on the same day and
time or who have more than two final exams on the same day should visit this page for
how to resolve these problems by the given deadline
(https://registrar.uiowa.edu/makeup-final-examination-policies). No exams are allowed
the week before finals, but with some exceptions made for labs, language courses, and
off-cycle courses (https://registrar.uiowa.edu/final-examination-scheduling-policies).

HOME OF THE COURSE
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. See
https://grad.uiowa.edu/academics/deadlines.

MENTAL HEALTH
Students are encouraged to seek help as a preventive measure or if feeling stressed or
overwhelmed. Students should talk to their instructors for guidance with specific class-
related concerns and are encouraged to contact University Counseling Service (UCS) at
319-335-7294 during regular business hours to schedule an appointment. USC offers
group and individual therapy as well as counseling for couples about relationships while
making referrals to other resources (https://counseling.uiowa.edu/). Student Health can
also address related concerns (https://studenthealth.uiowa.edu/). These visits are free
to students. After hours, students are encouraged to call the Johnson County
Community Crisis Line at (319) 351-0140 or dial 911 in an emergency.

NONDISCRIMINATION IN THE CLASSROOM
The University of Iowa is committed to making the classroom a respectful and inclusive
space for people of all gender, sexual, racial, religious, and other identities. Toward this
goal, students are invited in MyUI to optionally share the names and pronouns they
would like their instructors and advisors to use to address them. The University of Iowa
prohibits discrimination and harassment against individuals based on race, class,
gender, sexual orientation, national origin, and other identity categories indicated by the
University’s Human Rights policy. For more information, contact the Office of Equal
Opportunity and Diversity at https://diversity.uiowa.edu/division/office-equality-opportunity-
and-diversity-eod.

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 are expected to conduct
themselves in a manner that maintains an environment free from sexual harassment
and sexual misconduct. Those experiencing Incidents of sexual harassment are
strongly encouraged to report incidents and to seek help (https://osmrc.uiowa.edu/).