SYLLABUS FALL 2013
The University of Iowa
The College of Liberal Arts and Sciences
Department of Mathematics
Introduction to Analysis I: 22M: 115: AAA

Lecture: MWF 2:30-3:20pm
Location: MLH, 105
Discussion Session: Th 2:00-2:50pm (110 MLH)
Website address: http://homepage.math.uiowa.edu/~ichifan/

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: Prof. Ionut Chifan
Office location: MLH, 25L
Office hours: MF 3:30-5:00pm and by appointment
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E-mail: ionut-chifan@uiowa.edu

TA: Samuel Ferguson
Office location: MLH, 225C
Office hours: MW 12:20-1:15pm and Th 2:50-3:30pm
Phone: (319)-335-3759
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DEO Contact Information:
Dan Anderson, 14 MLH, dan-anderson@uiowa.edu

Description of Course:
The course is designed as a gentle, yet comprehensive, introduction in real analysis. It covers in detail many fundamental concepts in analysis such as Lebesgue measure on the real line, measurable functions, differentiation and integration theory, $L^p$ spaces, and abstract metric spaces. Due to the intrinsic connections with complex analysis, functional analysis, topology, geometry, analysis of ODE and PDE, aspects of ergodic theory and measurable or analytic group theory, various chapters of applied mathematics, etc, this is mandatory background for every student pursuing a PhD in Mathematics.

Objectives and Goals of the Course:
The course is intended to familiarize the student with many of the fundamental concepts in analysis aforementioned. In his lectures the instructor will promote a more conceptual understanding of this theory and will expose the students to detailed proofs of many important classical theorems in analysis. This is part of his efforts to teach students how to write rigorous proofs, one of the main goals of this class. Also, a discussion session is offered weekly, being
intended to develop extensively students’ ability to apply the theory in solving very complex problems. This is expected to provide all students with a solid preparation for the upcoming PhD Qualifying exam in Analysis.

Texts:
Required texts or materials (available at Iowa Book Store):

Real Analysis by H.L. Royden and P.M. Fitzpatrick; fourth edition
Optional texts: I will also use other problems (than the ones in the book) for homework or bonus problems

I will be covering the following chapters from the textbook (in the following order):
Ch 1 – The real numbers: Sets, Sequences, and Functions
Sections: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6
Ch 2 - Lebesgue Measure
Sections: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7
Ch 3 – Lebesgue Measurable Functions
Sections: 3.1, 3.2, 3.3
Ch 4 – Lebesgue Integration
Sections: 4.2, 4.3, 4.4, 4.5, 4.6
Ch 5 – Lebesgue Integration: Further Topics
Sections: 5.1, 5.2, 5.3
Ch 6 – Differentiation and Integration
Sections: 6.1, 6.2, 6.3, 6.4, 6.5, 6.6
Ch 9 – Metric Spaces: General Properties
Sections: 9.1, 9.2, 9.3, 9.4, 9.5, 9.6
Ch 10 – Metric Spaces: Three Fundamental Theorems
Sections: 10.1, 10.2, 10.3
Ch 7 – The L^p Spaces: Completeness and Approximation
Sections: 7.1, 7.2, 7.3, 7.4
Ch 8 – The L^p Spaces: Duality and Weak Convergence
Section: 8.1

Grading System and the Use of +/-:
I will use the +/- grading system. You will be graded according to the following scale:

A+ [97, 100]; A [93,97]; A- [90,93]
B+ [87,90]; B [83,87]; B- [80,83];
C+ [77,80]; C [73,77]; C- [70,73];
D+ [67,70); D [63,67); D- [40,63); F [0, 40)

Assignments as Percentage of Final Grade:
Homework --30%

Exams as Percentage of Final Grade:
Midterms: Midterm I (on 9/27 during class time) --20%
Midterm II (on 11/1 during class time) --20%
Final exam: Final (in class) – 30%

Some words about the exams:
Students who miss a midterm or the final will receive zero points for that test. The final exam is comprehensive and it is scheduled for TBA in TBA. Make-up tests will not be given, unless extraordinary circumstances prevent attendance. Tests will contain a combination of problems and theoretical questions as well as proofs. As midterms and final exam are the best ways to measure your understanding of the material, it is important to take these exams very seriously and prepare in advance for them.

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.

Course Policies:
Course attendance: Attendance is expected for each class meeting, as it will help you better understand the concepts covered in lectures. If you miss a class, you are responsible for any assignments/announcements made/material covered.

Participation in class discussions and preparations: I strongly encourage you to actively participate in class discussions; ask questions or ask for more explanations whenever you feel confused; in this class there is NO stupid question!
Also, as a general rule, for each lecture you should spend at least two hours on reading/homework/repeating the material, etc. You should start working over the homework problems right after the relevant sections are covered. If you encounter difficulties I strongly recommend you seek help immediately! Don't postpone it until one day before the exam! Also remember this: small deficiencies at the beginning tend to rapidly grow into big ones.

Timely completion of assignments: There will be approximately ten weakly homework assignments primarily of problems from the book and other problems of my choosing. As the semester progresses, the assignments and their due dates will be announced during the lecture time. They will also be posted on my webpage right after the class. The lowest homework score will be dropped. The homework is always due on Friday at the beginning of the class. Solutions for homework problems will be posted on my webpage. No late homework is accepted without penalties.
**Cell phones policy:** I am expecting you to NOT use your cell phones, i-pads, or computers during the lecture time for other purposes than class related.

**Complaint procedure:** Any student having a problem with the course should contact the instructor. Most issues can be resolved with a straightforward discussion.

**Changing grade policy:** If I change your grade on a homework or exam you should always remind me in the same day by e-mail that I have changed your grade.

**Student Collaboration:**

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 final exam you will need to work many of these problems multiple times without help. Be 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, mot-a-mot, the solutions from others but instead try to write them in your own understanding.

**Resources for Students:**

Students will find the Writing Center and the Speaking Center very useful for this course:

Writing Center: [http://www.uiowa.edu/~writingc/](http://www.uiowa.edu/~writingc/)

Speaking Center: [http://clas.uiowa.edu/rhetoric/for-students/speaking-center](http://clas.uiowa.edu/rhetoric/for-students/speaking-center)

**Math Tutorial**

**Calendar of Course Assignments and Exams:**

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<thead>
<tr>
<th>Week</th>
<th>Beg-End</th>
<th>No Lectures</th>
<th>Sections Covered</th>
<th>Activities</th>
</tr>
</thead>
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<td>8/26-8/30</td>
<td>3</td>
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<tr>
<td>2</td>
<td>9/4-9/6</td>
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<td>9/9-9/13</td>
<td>3</td>
<td>2.4,2.5,2.6,2.7</td>
<td>Hw</td>
</tr>
<tr>
<td>4</td>
<td>9/16-9/20</td>
<td>3</td>
<td>3.1,3.2,3.3</td>
<td>Hw</td>
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<td>9/23-9/27</td>
<td>3</td>
<td>4.2,4.3</td>
<td>Review, Midterm I</td>
</tr>
<tr>
<td>6</td>
<td>9/30-10/4</td>
<td>3</td>
<td>4.4,4.5,4.6</td>
<td>Hw</td>
</tr>
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<td>10/7-10/11</td>
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<td>5.1,5.2</td>
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<td>5.3,6.1, 6.2</td>
<td>Hw</td>
</tr>
<tr>
<td>9</td>
<td>10/21-10/25</td>
<td>3</td>
<td>6.3,6.4,6.5</td>
<td>Hw</td>
</tr>
</tbody>
</table>
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 at [http://clas.uiowa.edu/students/handbook](http://clas.uiowa.edu/students/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 correspondences ([Operations Manual, III.15.2, k.11](http://clas.uiowa.edu/students/handbook)).

Accommodations for Disabilities

A student seeking academic accommodations should first register with Student Disability Services and then meet privately with the course instructor to make particular arrangements. See [www.uiowa.edu/~sds/](http://www.uiowa.edu/~sds/) for more information.

Academic Honesty

All CLAS students or students taking classes offered by CLAS have, in essence, agreed to the College's [Code of Academic Honesty](http://clas.uiowa.edu/students/handbook): "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](http://clas.uiowa.edu/students/handbook)).

CLAS Final Examination Policies

The final examination schedule for each class is announced by the Registrar generally by the tenth day of classes. Final exams are offered only during the official final examination period. **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 a 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](http://clas.uiowa.edu/students/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 UI Comprehensive Guide on Sexual Harassment 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 Department of Public Safety website.