MATH 3150 - Analysis I - Spring 2016

Syllabus

- **Instructor:** Joe P. Chen. MSB 232, joe.p.chen@uconn.edu. Office hours: MWF 10:00–11:00, MW 13:30–14:30. Also by appointment. Do not hesitate to e-mail me to set up an appointment!
- **Grader:** Nha Truong. MSB 118, nha.truong@uconn.edu. Office hours TuTh 13:00–14:00. Also by appointment.
- **Lecture times & location:** (Section 001) MWF 11:15a–12:05p, MSB 203.
- **Course grades:** Assignments, 30%; 2 midterm exams, 20% each; final exam, 30%.
- **Topics to be covered (and approx. timing):** Construction of $\mathbb{R}$, arithmetic in $\mathbb{R}$, sup, inf (2 weeks); Cardinality, Cantor's diagonal argument (1 weeks); metric space concepts, continuity, open and closed sets, Cauchy sequences (2 weeks); compactness (via sequences or via coverings) (1 week); completion of normed vector space (0.5 week); differentiation (1 week); series, tests for convergence (1 week); Riemann integration, Riemann-Lebesgue Theorem (2 weeks); uniform convergence, the space C^0, uniform approximation, Stone-Weierstrass (2 weeks).

  The topics are subject to change pending the pace of the course and your interests.
- **Prerequisites:** A good foundation in writing mathematical proofs (via *e.g.* passing MATH 2710 with a B grade or above) plus a solid foundation in the entire calculus sequence (MATH 2110, MATH 2130, or equivalent). In a nutshell, have good mathematical maturity.
- **WARNING!** This is a serious, rigorous course intended for students who already passed calculus AND an introductory proofs course, but who wish to gain a deeper understanding of the inner workings of calculus. We will start from scratch and establish all of calculus from the grounds up. In this process we will fill in almost all the gaps which you were (or weren't) told in freshman calculus in a convincing, proof-based manner. So it is essential that you know how to distinguish a rigorous fact/proof from a non-rigorous, wishy washy statement. The exams will always include questions that ask you to prove or disprove a statement.
- **Textbook:** *Real Mathematical Analysis* by Charles Pugh. I intend to cover all the non-starred sections from the first 3 chapters (but some starred sections may be included pending your interests). If time permits, select portions of Chapter 4 may be covered.
- **Supplementary resources:** There is no perfect textbook of undergraduate analysis for every person. Pugh is concise and to-the-point, but it might mean that you will spend time filling in the blanks while reading the text.[1] If you would like to see a more conversational, explanatory text, read *The Way of Analysis* by Robert Strichartz.[2] A previous instructor of this course used *A First Course in Real Analysis* by Murray Protter and Charles Morrey, Jr.

  While I will more or less follow the outline in Pugh, by no means will I strictly stick to his exposition. From time to time I will add my own touch to the material, which hopefully will enhance your learning experience. Therefore it is important that you attend class, take good notes, and ask questions often. Class notes and handouts are the final word in this course.

[1] though this is an important survival skill for any research mathematician!

[2] Some people claimed that it made for good bedtime reading! Also, Strichartz is my Ph.D. advisor, so I am giving him a free plug.

- **Course web site:** http://piazza.com/uconn/spring2016/math3150001/home

  To access Piazza for the first time, log in to the HuskyCT course site, click on "Piazza" on the left menu, and then click "Continue" to confirm your enrollment in the Piazza site.

  Alternatively, use this sign-up link: http://piazza.com/uconn/spring2016/math3150001

  Piazza is an interactive platform where professors and students can ask (anonymously or publicly to the class) and answer questions in real time. This is where all announcements, assignments, and discussions can be found. **Please check it regularly, so you don't miss anything important!**[3]

  Want to ask a HW/lecture question? **Post your question on Piazza.** By doing so you save me the trouble of having to answer the same question multiple times. Plus, once your question appears on Piazza, everyone can see and respond to it, and the whole class benefits. **I will not respond to HW problems via e-mail.**

  Want to ask an individual question regarding course attendance, exam rescheduling, or other private matters? Then send me an e-mail.

  A HuskyCT course site will be operational for grade recording/look-up purposes ONLY. All announcements will be made through Piazza.

- **Exams:** Two in-class midterms (tentative dates: W 2/24, W 4/6) and a final exam. Please let me know if you anticipate any conflict with either midterm date by the end of the 2nd week of classes. Otherwise, the dates will become official.

- **Our final exam time** will be announced by the registrar a few weeks into the semester.

  You MUST contact the Dean of Students Office (DOS) regarding any conflict with the scheduled final exam time by the end of the third-from-last week of the semester. No exceptions! Once the DOS grants permission to reschedule your final exam, they will notify me, and I will confirm an alternate arrangement with you.

- **Exam guidelines: Your writing utensils are the only items allowed on the exam.** No calculator is allowed.[4] I will provide a formula sheet in case the exam calls for it.

  No make-up exams will be offered unless under the most extreme circumstances, such as a serious illness or family emergency. If you anticipate such circumstances, please notify the instructor as soon as possible, and well in advance of the scheduled exam date.

- **Important dates:** M 2/1, add/drop via Student Admin closes (without a "W"); M 3/21, Last day to drop a course (with a "W").

- **Course preparations & mechanics:**

  The course moves at a brisk pace, so stay on top of the material! Falling behind (by a week) is dangerous and will cause your exam grade to drop (with high probability)!

  Before each class meeting, read the corresponding sections in the text, as indicated on the "course schedule." Post any question you have on Piazza!

  After each class meeting, spend an hour reviewing what was covered ASAP, and begin to work on the corresponding homework problems (takes another hour). As is the case with 3000-level math classes, the current material builds upon the previous material!

  Homework assignments form an integral component of the course. You should make every effort to solve the assigned problems, using the concepts learned from the lectures and readings. If you don't do the homework, you cannot do well on the exams.

  If you have any question, come see me during office hours, ask on Piazza, and/or talk to your classmates. Help each other out!

[3] Piazza is also available as a mobile app through the Apple App Store (iOS) and Google Play (Android).
[4] This is not a problem-solving course. Calculators will NOT help on the exams AT ALL.

- **Homework format & guidelines**

  Assignments are due at the beginning of class on Wednesdays. Each assignment consists of problems drawn from materials covered in the preceding week. All assigned problems are fair game for the exams.

  As a rule of thumb, I will NOT accept any homework for grade once the solutions are posted on Piazza. So if you have trouble turning in your HW in class on the due date, make sure to use your smartphone to take clear pictures of your assignment, and e-mail them to the instructor ASAP.

  If you have a valid excuse for a HW extension (such as illness, family emergency, or athletic commitment), please secure the appropriate permission and e-mail me **in advance**.

  In all there will be 11 assignments for this course. **Your lowest HW score will be dropped.**[5]

- **Homework guidelines**

  Please clearly write down **your name** and **section number** on top of the first page. And if your assignment contains multiple pages, please **staple** them!

  Please write down your solutions **legibly and neatly**. Don't skimp on margins! Remember to properly **define** your variables, **label** your diagrams, etc., so that I know what you're trying to communicate.

  As this is a proof-based course, everyone is expected to write cogent proofs which are as concise and to-the-point as possible. This does not always come naturally for first-timers, but you will learn to write better with each successive assignment. **Answers without appropriate justification, or contain garbled thoughts, will receive reduced to no credit.**

  If you need to refer to a specific result mentioned in class or in the textbook, please indicate so as well.

  Collaboration on HW is allowed and encouraged. Please indicate on the top of the first page the name(s) of those with whom you collaborate. However, **you should write up your work on your own and in your own words.**

  Blatant duplication or paraphrasing of others' work (*e.g.* publisher's solution manual or solutions from previous semesters) without attribution is considered **plagiarism**, and will be dealt with under UConn's academic integrity policy. Consequences may include, but are not limited to, zeroes on the assignments and a grade of failure in the course.

- **Special accommodations**

  If you are a student-athlete or a student with disabilities, please provide me with a letter from the appropriate office (the Counseling Program for Intercollegiate Athletes (CPIA), or the Center for Students with Disabilities (CSD)) concerning your special needs (*e.g.* when taking exams), so that I can make appropriate accommodations.

  If you suffer a prolonged illness during the semester, please send me a doctor's note ASAP stating the period for which you will be out of the classroom, unable to submit assignments or take exams. This is all the information I need to adjust the weights that go into your grades.

- **The Student Code**

  Everyone is expected to read and abide by the UConn Student Code, especially Appendix A: Academic Integrity in Undergraduate Education and Research and the associated FAQ. Any academic misconduct will be dealt with under the policy stated there.

- **Any question?** Please don't hesitate to contact me! Don't put off till the last minute for help!

[5] In addition, there will be additional opportunities for extra credit (awarded by dropping the next lowest HW scores) throughout the semester, such as participating in the annual calculus competition and submitting solutions to Prof. Stuart Sidney's math challenge problems. I will announce these opportunities as they become available.