MATH 5160 - Probability Theory & Stochastic Processes I
Syllabus

- **Instructor:** Joe P. Chen

- **Contact:** MSB M232, joe.p.chen@uconn.edu.

- **Lecture time & location:** TuTh 2:00p∼3:15p, MSB 219.

- **Office Hours:** TuTh 11a-12p & 1p-2p. Also available immediately after class and by appointment.

- **Grading (for those taking the course for credit):** Assignments assigned roughly once every two weeks (60%), plus a take-home final exam (40%).

- **Course philosphy:** This is a first-semester course on probability theory at the graduate level, focusing on limit theorems and discrete-time stochastic processes. Prior experience with probability at the undergraduate level is not necessary (though some people may find that it helps intuit the theory we will cover).

  This course is useful for any mathematician or scientist who wants to learn probability theory and see how it can be applied to solving models arising from the physical sciences.

- **Course outline:** After introducing the foundations of probability, we will cover the following topics roughly in this order: independence; 0-1 laws; convergence of random variables and of probability measures; limit theorems; conditional expectations; discrete-time martingales; and Brownian motion.

  In the later part of the course, we will apply the theory to study more modern topics of probability. The tentative plan is to cover basics of random matrices (such as the semicircle law for Wigner matrices), random fields, and interacting particle systems (such as the Ising model).

- **Prerequisite:** Solid background in analysis and linear algebra at the undergraduate level. Knowledge of measure theory is a plus, though the necessary background will be reviewed in the first week.

- **Texts:** We will use S.R.S. Varadhan, "Probability Theory" to cover the standard material. The book can be purchased in print, or downloaded in individual chapters from Prof. Varadhan's web site. Other good references for this material are:

  - R. Durrett, "Probability Theory and Examples" (Edition 4.1, online version).
  - R. Bass, "Probability Theory," MATH 5160 lecture notes from Fall 2014.

  For the material on random matrices, random fields, and interacting particle systems, I will provide handouts and references.

- **Course web site:** http://piazza.com/uconn/fall2015/math5160/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/fall2015/math5160

  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!**[1]

  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

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[1]Piazza is also available as a mobile app through the Apple App Store (iOS) and Google Play (Android).

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.

- **Special accommodations**

  If you are a student-athlete or a student with disabilities, please provide me with a letter from the appropriate office concerning your special needs, 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.

- **Academic policy**

  Everyone is expected to read and abide by the UConn Policy on Scholarly Integrity in Graduate and Post-Doctoral Education and Research. All sources, printed or on-line, must be cited and acknowledged. Any instance of plagiarism or cheating on the assignment or exam will result in a grade of zero on that assignment or exam, and potentially a grade of failure in the course.

- **Any question?** Please don't hesitate to contact me!