

Syllabus for Penn State STAT 440, Spring 2013

Computational Statistics

Instructor: Murali Haran

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Office Hours: Monday 4:00pm-5:00pm and Tuesday: 11:00am-12:00pm

Teaching Assistant: Xiang Zhan

Office: 418 Thomas email: xyz5074²

Office Hours: Tuesday: 1:30-2:30, Thursday: 2:30-3:30pm.

Class Times: MWF 11:15A - 12:05 in 011 Life Sciences Building.

Textbook: *Statistical Computing with R* by M. Rizzo, Chapman and Hall.

Course notes/handouts. Optional: *Introducing Monte Carlo Methods with R*, Robert, Christian P. and Casella, George (2010), Springer.

Targeted Coverage: The course has three main goals: (1) to teach students about computationally intensive approaches to probability and statistical inference. The topics broadly fall under Monte Carlo methods and optimization and include the bootstrap, the expectation-maximization (EM) algorithm, some matrix analysis and a few advanced topics (time permitting); (2) to use computational tools to reinforce important concepts from probability and statistics; (3) to develop fluency with implementing algorithms in computer code. In particular, students will learn about computing using the language R. The main topics covered in the course:

- Random number generation, Monte Carlo basics, importance sampling
- Parametric and nonparametric bootstrap, permutation tests
- Optimization basics. Newton-Raphson, Expectation-maximization (EM) algorithm
- Markov chain Monte Carlo (time permitting)

Course Website: <http://www.stat.psu.edu/~mharan/440/440.html>

Please bookmark this website. I will post information relevant to the class, including the course schedule (which I will keep updating), links for help with R, etc. I will use the course website in tandem with Angel for course related communications.

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Course Requirements:

- Homework (30%). You may discuss them but they must be written up independently. The homework assignments may vary in length and difficulty, and hence may differ in the number of points they are worth.
- Midterm exam (25%) tentatively **Friday, March 1, 2013**
- Take home final (10%) tentatively **out Wednesday April 17, due Friday April 22**
- Final exam: in class (35%) TBA

Course Rules:

1. Homework will be due **in class** typically on Wednesdays. Unless you inform me ahead of time (*at least 1 day in advance*), the following late policies hold: submit your homework in my mailbox by 4:30pm on the same day with a 20% reduction or 4:30pm the next day with a 50% reduction in your score. No late homework will be accepted after that time under any circumstance. *You have 1 week to appeal any grade. No grade changes will be made 1 week after a graded homework or exam is returned.*
2. Homework submissions: All students are required to hand in *typed* computing assignments. Students who are thinking of attending graduate school are encouraged to use the typesetting language **LaTeX** to write up assignments. Obviously theoretical work need not be typed up. The instructor will provide sample **LaTeX** files to interested students.
3. Make-up exams might be allowed, with prior arrangement, no later than 1 week in advance (preferably much earlier), for students with direct conflicts due to other required university activities (chess team, field trip, Blue Band trip, etc.) The director of that program must provide a letter requesting that you be excused.
4. Students are responsible for all announcements and supplements given within any lecture and email.
5. Academic Integrity and Mutual Respect: All Penn State University, College of Science, and Department of Statistics policies regarding ethics, honorable behavior, and mutual respect apply in this course.
 - Penn State's Policies <http://www.psu.edu/ufs/policies/>
 - College of Science's Academic Integrity Policy <http://science.psu.edu/current-students/Integrity/Policy.html>
 - College of Science's Code of Mutual Respect and Cooperation <http://science.psu.edu/climate/code-of-mutual-respect-and-cooperation>
6. If you have a disability-related need for reasonable academic adjustments in this course, contact the Office for Disability Services (ODS) at 814-863-1807 or visit their website <http://equity.psu.edu/ods/>