Synopsis
The goal of this course is to learn how to work with probabilistic models of random experiments. The course covers several ways of describing such experiments (probability models, random variables, random vectors and random processes) and several ways of describing their probability distribution (probability measures; distribution, mass and density functions). Much of the course is concerned with how to compute various probabilistic quantities (e.g. event probabilities, expected values, correlations, best estimates, frequency spectra) from other probabilistic quantities (e.g. density functions). The course topics are similar to those typically covered in a senior level course on this topics, but a deeper level of understanding is expected and more attention is paid to mathematical formulation.

Course Details
Lecture Section 1
Room & Time: MWF 8:30-9:30, 1311 EECS Bldg.
Credit hours: 4
Prerequisite: EECS 401 or graduate standing
Recitations: One session, 1.5 to 2 hrs per week.
Mon 3:30-5:30, 3437 EECS (Section 3); Tues 4:30-6:30, 1301 EECS (Section 2).
Faculty Prof. David L. Neuhoff, 4215 EECS Bldg.
Instructor: neuhoff@umich.edu, 764-6586
Office hours: to be announced
Or by appointment: stop by, call, or send email to schedule an appointment.
Graduate Arvind Krishnamoorthy
Student karvind@engin.umich.edu
Instructor: Office hours: to be announced
Or by appointment: call or send email
Office hours held in the usual EECS room for GSI office hours: 2420 EECS.
This book is not yet published. Advance copies are available at no cost from Ms. Ann Pace in Room 4230 to registered students, and to those who have been given permission to register.
Rough Probability models: Chapter 1 of Gubner
Syllabus: Random Variables: Chapters 2-5, and selections from Chapters 7, 10 and 11.
Estimation/decision theory: Section 7.3
Random processes: Chapters 6 and selections from Chapters 8 and 9.
Additional material will be presented in lecture. Taking notes is important.
First reading assignment: Chapter 1 of Gubner
References: Other textbooks at a similar level:
W. Davenport, Probability and Random Processes
R. Gray and L. Davisson, Random Processes
A. Papoulis, Probability Random Variables and Stochastic Processes,
S. Ross, *A First Course in Probability*
D. Sakrison, *Communication Theory* (Chapters 3 and 4)
H. Stark and J. Woods, *Probability Random Processes and Estimation Theory for Engineers*

Senior level textbooks:
A. Drake, *Fundamentals of Applied Probability*
C. Helstrom, *Probability and Stochastic Processes for Engineers*
A. Leon-Garcia, *Probability and Random Processes for Electrical Engineering*
R. Roberts, *An Introduction to Applied Probability*
J. Thomas, *Introduction to Probability*

**Homework:** With a few exceptions, homework will be assigned every week. Homework is important, and will be counted enough towards the course grade that you take it seriously, but not so much that you cannot afford to make mistakes.

Usually, homework will be posted on the class website on Friday and due the next Friday in class. However, as an extended deadline, homework may also be placed in the collection box in Room 4230 by 3:30 PM on the due date. Late homework will not be accepted, except in extenuating circumstances such as serious illness.

Homework will typically be graded and returned one week later. Solutions will be posted to the class website. If you have questions about the grading, see Prof. Neuhoff or Arvind Krishnamoorthy.

**Notes:** Homework must be turned in in one of the two ways mentioned above. Do not leave it in a mailbox. And do not interrupt a lecture to turn in your homework.

**Collaboration policy:** All homework assignments are to be completed on your own. You are allowed to consult with other students during the conceptualization of a solution, but all written work, whether in scrap or final form, is to be generated by you working alone. You are also not allowed to use, or in anyway derive advantage from, the existence of solutions prepared in prior years. Violation of this policy is an honor code violation. If you have any questions about this policy, please do not hesitate to contact Prof. Neuhoff.

**Exams:** Two 2-hour midterms will be given in the evening at dates to be announced. Final Exam: Thurs. Dec. 16, 10:30-12:30.

**Grade basis:** Homework 15% (lowest homework grade will be dropped) Midterm I 25%, Midterm II 25%, Final Exam 35%.

**E-mail Announcements:** (e.g. homework problem hints and corrections, exam schedules) will be emailed to the class. You must register for the class email list this week by sending email to eecs501-1-request@eecs.umich.edu with the word "subscribe" in the subject line. One or more test emails will be sent to this email list. They will be announced in class. Let Prof. Neuhoff know if you do not receive them. (Sometimes people attempting to enroll from nonuniversity accounts encounter difficulties.)

**Course webpage:** [www.eecs.umich.edu/courses/eecs501/eecs501-1](http://www.eecs.umich.edu/courses/eecs501/eecs501-1). It is currently under construction. When ready it will contain most handouts, such as this one, homework assignments, homework solutions, and various notices such as a listing of office hours.

**Makeup Lectures:** Professor Neuhoff will miss several lectures due to conference travel. Makeup lecture times will be chosen in class.