

Math 493
Probability
Lectures: MWF, 2:00-3:00, Brown 118
Washington University in St. Louis, Fall 2016

Instructor: José E. Figueroa-López

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Course description

This is an advanced undergraduate/master level course in calculus-based Probability (no measure theory). This course, together with Math494 (to be offered in the next spring), aims to provide solid mathematical foundations for probabilistic modeling and statistical inferences. Topics include basics of probability theory, conditional probability, Bayes theorem, random variables and distributions, expectations and moments, transformations, the classical distributions, the law of large numbers, and the central limit theorem.

References

- A First Course in Probability by Sheldon Ross, Edition: 9th. Person 2014. (**Required**)
- Introduction to Mathematical Statistics by Hogg, McKean, and Craig. Edition: 7th. Person 2012. (**Recommended**)

Prerequisites:

Prereq: Math 318 (Calculus of Several Variables) or Math 308 (Mathematics for the Physical Sciences)

Course website:

All homework assignments, handouts, and other information will be available on **Blackboard** (<http://bb.wustl.edu/>).

Exams:

- **Two midterm exams** and a **comprehensive final** will test your grasp of the material covered in class. The dates for the midterm exams are (tentatively) set as Fridays **Oct. 7** and **Nov. 11**. The final is scheduled for **Dec. 19**, 3:30 - 5:30.
- All exams are close-notes and close-book. A one-sided letter-sized page with **only formulas/equations** may be brought to each midterm. These notes would be collected (make copies).
- Exam questions are going to be drawn from both the examples seen in lectures and the homework exercises, probably after some minor modifications.
- Exam questions can be done by hand with the help of a basic scientific (non-graphing) calculator.
- You should always bring your Washington University Photo ID to exams. Proctors will check student's IDs.
- Make-up exams are strongly discouraged. If you are aware of a conflict, please inform the instructor before the exam.

Homework

- There will be about 9 HWs; Only a few selected problems will be graded and counted towards your HW score.
- The lowest HW score will be dropped;
- Written homework should be submitted at the BEGINNING of class. NO LATE HOMEWORK WILL BE ACCEPTED.
- You will receive no credits for solutions with no work or justifications. The grader and instructor reserves the right to deduct points for messy papers.
- While it is acceptable to briefly discuss individual assignments among students, the student's work that is turn in for grading must reflect his/her understanding of the material ("almost" identical solutions will not be accepted and tolerated).

Tentative grading procedure (The following is tentative; any changes will be announced in advanced.)

- Broadly, the A range will be 85 to 100, the B range will be 70 to 85, the C range will be 60 to 70, and the D range will be 50 to 60, with plus and minus grades given to roughly the top 20% and bottom 20% students in each of these ranges.
- Weights:

<i>Two Midterm Exams</i>	20% each
<i>One comprehensive final exam</i>	35%
<i>Homeworks</i>	25%

- If you register for "Pass/Fail" (or "Credit/No Credit"), you must achieve at least 60 to pass, which is the lowest score for a C-.

Attendance:

Class attendance is **strongly** recommended. Experience has shown that students who attend class regularly perform better. Lectures will involve discussion of topics and, more importantly, solving examples that will be similar to those appearing in the exams.

Important Regrading Policy:

Students have only one week to request the regrading of an assignment or an exam after the time that this has been returned to the class.

Tentative course outline:

Week	Dates	Topics	Sections
1	08/29 - 09/02	Probability: Axioms, basic examples, and properties	2.1-2.5
2	09/05 - 09/09	Conditional Probability and Bayes's Rule	3.1-3.3
3	09/12 - 09/16	Independence, Random Variables, and Expected Values	3.4, 4.1-4.3
4	09/19 - 09/23	Functions of a r.v., Variance, and Binomial distribution	4.4-4.6
5	09/26 - 09/30	Poisson Distribution and Other Discrete Distributions	4.7-4.8
Midterm Exam 1: Friday Oct. 7th			
6	10/03 - 10/05	Continuous r.v.: Basic Concepts, Expectation, and Variance	5.1-5.2
7	10/10 - 10/14	Special Continuous Distributions	5.3-5.6
Fall Break: 10/15-10/18			
8	10/19 - 10/21	Jointly Distributed r.v.'s, independence and sums of r.v.'s	6.1-6.3
9	10/24 - 10/28	Conditional Distributions and Conditional Expectations	6.4-6.5, 7.5-7.6
10	10/31 - 11/04	Moment Generating Functions & Multivariate Normal Distributions	7.1-7.8
Midterm Exam 2: Friday Nov. 11th			
11	11/07 - 11/09	t and F distributions	Notes
12	11/14 - 11/18	Consistency and Weak Law of Large Numbers	8.1 - 8.2
13	11/21	Strong Law of Large Numbers	8.4
Thanksgiving Break: 11/23 - 11/25			
14	11/28 - 12/02	Central Limit Theorems	8.3
15	12/05 - 12/09	Review (if time allows it)	
Final Exam: Monday Dec. 19th			

I hope you will enjoy this course. Have a nice semester.