

S Y L L A B U S
PROBABILITY THEORY FOR ENGINEERS
EE 464: Fall 2012

Fall 2012
Lecture: Friday 2:00 - 4:50 pm
email: kosko@usc.edu
voicemail: (213) 740 - 6242

Professor Kosko
Office: EEB 438
Hours: Wed 4 - 5
Fri 5 - 6

Course Summary: The course focuses on *reasoning with probabilistic uncertainty*. This involves developing skills in logical reasoning and applying those skills to a wide range of problems and examples. The course depends primarily on lecture material and handouts. *Attendance is mandatory*. There are weekly exams and no make-ups. Unexcused absences result in an automatic exam score of zero.

Required text: Gubner, J. A., *Probability and Random Processes for Electrical and Computer Engineers*, Cambridge University Press, 2006.

Required text: Leon-Garcia, A., *Probability, Statistics, and Random Processes for Electrical Engineering*, Prentice Hall, 2008.

Note: The texts are *secondary* to in-class lecture material and homework sets.

COURSE OUTLINE

AUG 31: Logic and sets. Sigma algebras. Probability axioms.
SEP 7: Independence. Total probability. Bayes theorem.
SEP 14: Combinatorics. Binomial theorem. Limits of sequences.
SEP 21: Poisson Theorem. Negative binomial. Formal reasoning.
SEP 28: Random variables. Densities and cumulative distributions.
OCT 5: Expectations and moments of random variables.
OCT 12: Covariance. Correlation. Uncertainty principles.
OCT 19: Stochastic convergence. Laws of large numbers.
OCT 26: Conditional expectations. Maximum likelihood estimation.
NOV 2: Transformed densities. Random sampling. Entropy.
NOV 9: Central limit theorem and applications. Confidence intervals.
NOV 16: Financial engineering: Rational asset pricing and estimation.
NOV 23: No class: Thanksgiving holiday.
NOV 30: Markov chains. Mean-square and MAP estimation. Linear regression.
DEC 7: Advanced engineering applications. Review.
DEC 14: FINAL EXAM.

GRADING PROCEDURE

Summary: Class grade depends on weekly exams and the final exam. Homework problems are optional. Homework problems from the text do not count. Homework handouts count as extra credit.

- 1. Weekly Exams.** 13 weekly exams. **Closed book.** 10 minutes per exam. No make-up exams. Each weekly exam is worth 6 points. Missed exams earn 0 points. The total weekly-exam score counts as 60 points or 60% of the final grade. The total weekly-exam score sums your 10 best midterm exam scores. We ignore your three worst scores. Algorithm: Label your weekly exam scores from lowest to highest: $w_1 \leq \dots \leq w_{13}$. Then $w_4 + \dots + w_{13}$ is your total weekly-exam score. Class attendance is *mandatory*. **Unexcused absences get an automatic exam score of zero for that session's exam grade.**
- 2. Final Exam.** Worth 40 points. Cumulative. **Closed book.**
- 3. Homework Problems.** Textbook problems are checked but not graded. Homework handout problems are graded but count only as optional points. They count at most as 10 points if *all* homework sets turned in and accurately worked. Grade remains as is if only some homework turned in. How much homework affects which cases is at the discretion of the instructor and the teaching assistant. Students may discuss homework problems among themselves but each student must do his or her own work. Cheating warrants an F in the course. Turning in identical homework sets counts as cheating.
- 4. Course Grade.** 100 points possible in course.
 - A if 90 - 100 points
 - B if 80 - 89 points
 - C if 70 - 79 points
 - D if 60 - 69 points
 - F if 0 - 59 points .
- 5. Cheating.** Not tolerated on homework or exams. Penalty ranges from F on exam to F in course to recommended expulsion.