ECE302H1S 2018 - Probability and Applications
(Updated November 28, 2017)

Description: Engineers and scientists deal with systems, devices, and environments that contain unavoidable elements of randomness. Probability theory is a mathematical tool that allows logical ways to reason about knowledge and uncertainty. This course introduces 3rd- and 4th-year electrical and computer engineering students to basic concepts in probability theory.

Textbook: A. Leon-Garcia, *Probability and Random Processes for Electrical Engineering*, Third Edition, Addison Wesley, ISBN-13: 978-0-13-147122-1.

Instructor:

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Office hours: Monday & Thursday, 14:00 pm – 15:00 pm;
or by appointment

Course Website: The course website is at UofT Portal. Homework, handouts, grades, and announcements will be posted here. Students are required to check it regularly for new information.

Homework: While ECE302 is one of the most interesting and useful courses in electrical and computer engineering, it is also a challenging upper-year course. To do well in this course you must ***keep up to date with the class schedule***. The best way to accomplish this is to *practice*, through homework and other exercise problems. Homework problems will be announced weekly. They will not be collected, but you are required to work out the problems before new materials are covered.

Tutorials: Teaching assistants will cover homework exercise problems, take questions from students, and present extended examples or applications of probability theory. The purpose of the tutorials is to help keep you up to date with the class material. Tutorials begin on the 2nd full week of the semester. There are no tutorial meetings during the last week of the semester. T **You are required to attend the tutorial section registered on ROSI.**

ECE302 2018 Learning Outcomes

- Understand the basic concepts of probability, random variables, probability distribution, and joint probability distribution.
- Acquire basic knowledge of discrete and continuous, univariate and multi-variate probability distribution functions.
- Have an appreciation for probabilistic analysis techniques.

Composition of the final mark

Final Examination	40%
Midterm I Test	30%
Midterm II Test	30%

Note:

1. **All examinations (midterm tests, and final exam) are closed book. A two-sided aid sheet is permitted (Type C Examination). A type 2 calculator may be used.**
2. Midterm I Test: **The 50 minutes long test will take place on Thursday, February 1, 2018 during the regular class hour.**
3. Midterm II Test: **The 50 minutes long test will take place on Thursday, March 1, 2018 during the regular class hour.**
4. **Tutorial sessions start the week of Monday, January 15, 2018.**
5. **There are no tutorial sessions scheduled for the week of Monday, April 9, 2018.**

ECE302 2018 Lecturing Timetable

Course No	Session	Starting Date	No	Date	Start Time	End Time	Room	Instructor
ECE302H1S	LEC0101	2018/01/04	1	TH	16:00	17:00	BA1210	Plataniotis, Konstantinos
ECE302H1S	LEC0101	2018/01/08	1	M	16:00	17:00	BA1210	Plataniotis, Konstantinos
ECE302H1S	LEC0101	2018/01/09	1	T	11:00	12:00	BA1210	Plataniotis, Konstantinos

Tentative Lecture Schedule

Week	Lecture 1	Lecture 2	Lecture 3
Week 1 Jan 8 (starts Jan 4, 2018)	Course Introduction, Random Experiments, Relative Frequency (ch 2.1, 1.3)	Events, Axiomatic Definition of Probability, Properties of Probability (ch 2.2)	Properties of Probability, Specifying Probability: Discrete and Continuous (ch 2.2)
Week 2 Jan 15	Computing Probability by Counting (ch 2.3)	Conditional Probability (ch 2.4)	Total Probability, Bayes' Rule (ch 2.4)
Week 3 Jan 22	Independence of Events (ch 2.5)	Sequential Experiments, Independent Bernoulli Trials, Binomial Prob Law (ch 2.6)	Geometric Prob Law, Dependent Sequential Experiments (ch 2.6)
Week 4 Jan 29	Random Variables, Discrete RVs, PMF (ch 3.1, 3.2)	Expected Value: Discrete, Expected Value of g(X) (ch 3.3)	**Midterm Test I (Coverage: Chapter 2)**
Week 5 Feb 5	Variance, Conditional PMF and Expectation (Ch. 3.3, 3.4)	Important Discrete RVs: Uniform, Bernoulli, Binomial (ch 3.5)	Important Discrete RVs: Geometric, Poisson (ch 3.5)
Week 6 Feb 12	Cumulative distribution Function CDF (ch 4.1)	Cumulative distribution Function CDF (ch 4.1)	Conditional PDF (ch 4.2) Expected Values (ch 4.3)
Feb 29, 2018	**Reading week**	**Reading Week**	**Reading Week**
Week 7 Feb 26	Important Continuous RVs: Uniform, Exponential, Gaussian (ch 4.4)	Gaussian, Gamma, Cauchy (ch 4.4), Function of RV (ch 4.5)	**Midterm Test II (Coverage: Chapters 2& 3)**
Week 8 Mar 5	Function of RV (ch 4.5) Function of RV, Markov and Chebyshev Inequalities (ch 4.5, 4.6)	Characteristic Function (ch 4.7)	Characteristic Function (ch 4.7)
Week 9 Mar 12	Marginal PMF, Joint CDF, Marginal CDF (ch 5.3)	Joint PDF, Marginal PDF (ch 5.4)	Joint CDF/PDF, Two Mixed RVs (ch 5.3, 5.4)
Week 10 Mar 19	Independence of Two RVs (ch 5.5)	Expected Value of a Function of Two RVs, Correlation, Covariance (ch 5.6)	Conditional Probability and Density with Two RVs (ch 5.7)
Week 11 Mar 26	Total Probability, Conditional Expectation (ch 5.7)	One Function of Two RVs (ch 5.8)	One Function of Two RVs (ch 5.8)
Week 12 April 2	Two Jointly Gaussian RVs (ch 5.9)	Sum of RVs, Sample Mean, Law of Large Numbers (ch 7.2)	Recitation class: functions of RVs
Week 13 April 9	Recitation class: Chapters 4&5	Class Review – Last day of classes (Engineering)	

Note: The lecturing schedule is provided for information purposes only. All specific details are subject to change.