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ECE302H1S 2015 - Probability and Applications
(Updated November 25, 2014)

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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, 16.00 pm – 17.00 pm; Wednesday
> 16.00 pm – 17.00 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. Further, there will be one 15-minute quiz in each tutorial. These quizzes will be closed-book. The purpose of these quizzes is to help keep you up to date with the class material, so they will be designed to be quite easy – you should ace these quizzes if you attend lectures and pay attention. Tutorials begin on the 2nd week of the semester. There are no tutorial meetings during the last week of the semester. The lowest four (4) quiz marks will be automatically dropped from your course grade calculation, which will account for illnesses, and scheduling conflicts. **Other than that, *no exemption for missing quizzes will be given*. You are required to attend the tutorial /quiz section registered on ROSI.**

Composition of the final mark:

Final Examination	50%
Midterm Test	30%
Quizzes	20%

Midterm Test: **The 50 minutes long test will take place on Wednesday, February 25, 2015 during the regular class hour.**

All examinations (quizzes, midterm test, and final exam) are closed book. A two-sided aid sheet is permitted (Type C Examination). A type 2 calculator may be used.

Lecture Schedule:

Week	Monday	Wednesday	Friday
Week 1 Jan 5	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 12	Computing Probability by Counting (ch 2.3)	Conditional Probability (ch 2.4)	Total Probability, Bayes' Rule (ch 2.4)
Week 3 Jan 19	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 26	Random Variables, Discrete RVs, PMF (ch 3.1, 3.2)	Expected Value: Discrete, Expected Value of g(X) (ch 3.3)	Variance, Conditional PMF and Expectation (ch 3.3, 3.4)
Week 5 Feb 2	Important Discrete RVs: Uniform, Bernoulli, Binomial (ch 3.5)	Important Discrete RVs: Geometric, Poisson (ch 3.5)	CDF (ch 4.1)
Week 6 Feb 9	Types of RVs, PDF (ch 4.1, 4.2)	Conditional CDF and PDF (ch 4.2)	Expected Values (ch 4.3)
Feb 16, 2015	*Reading Week*		
Week 7 Feb 23	Midterm Review	Important Continuous RVs: Uniform, Exponential, Gaussian (ch 4.4)	Gaussian, Gamma, Cauchy (ch 4.4)
Week 8 Mar 2	Function of RV (ch 4.5)	Function of RV, Markov and Chebyshev Inequalities (ch 4.5, 4.6)	Characteristic Function (ch 4.7)
Week 9 March 9	Two RVs, Joint PMF (ch 5.1, 5.2)	Marginal PMF, Joint CDF, Marginal CDF (ch 5.3)	Joint PDF, Marginal PDF (ch 5.4)
Week 10 Mar 16	Joint CDF/PDF, Two Mixed RVs, Midterm Discussion (ch 5.3, 5.4)	Independence of Two RVs (ch 5.5)	Expected Value of a Function of Two RVs, Correlation, Covariance (ch 5.6)
Week 11 Mar 23	Conditional Probability and Density with Two RVs (ch 5.7)	Total Probability, Conditional Expectation (ch 5.7)	One Function of Two RVs (ch 5.8)
Week 12 Mar 30	Transformation of Two RVs (ch 5.8)	Two Jointly Gaussian RVs (ch 5.9)	Good Friday, University Closed
Week 13 Apr 6	Sum of RVs, Sample Mean, Law of Large Numbers (ch 7.2)	Central Limit Theorem (ch 7.3)	Course Review

ECE302 2015 Spring Timetable:

Course No	Session	Starting Date	No	Date	Start Time	End Time	Room	Instructor
ECE302H1S	LEC0101	2015/01/05	1	Wed	15:00	16:00	GB303	Plataniotis, Konstantinos
ECE302H1S	LEC0101	2015/01/05	1	Fri	15:00	16:00	GB303	Plataniotis, Konstantinos
ECE302H1S	LEC0101	2015/01/05	1	Mon	15:00	16:00	GB303	Plataniotis, Konstantinos
ECE302H1S	TUT0101	2015/01/05	1	Thu	09:00	11:00	BA3012	Tutorial
ECE302H1S	TUT0102	2015/01/05	1	Thu	09.00	11.00	BA2159	Tutorial

ECE302H1S: Spring 2015 - Homework Assignments

Assignment #1:
1.1, 1.2, 1.5, 2.2, 2.4, 2.5, 2.9, 2.23, 2.24
(Discussed in tutorial week of Jan 12)

Assignment #2:
2.36, 2.38, 2.49, 2.54, 2.63, 2.73, 2.74, 2.75, 2.76, 2.77
(Discussed in tutorial week of Jan 19)

Assignment #3:
2.82, 2.85, 2.92, 2.95, 2.97, 2.99, 2.101, 2.104, 2.126, 2.128
(Discussed in tutorial week of Jan 26)

Assignment #4:
3.8, 3.10, 3.12.ab, 3.13, 3.17, 3.25.b, 3.27, 3.31, 3.36.ab, 3.41, 3.43
(Discussed in tutorial week of Feb 2)

Assignment #5:
3.44, 3.49, 3.52, 3.53, 3.56, 3.57, 3.63, 3.65, 3.66, 4.5, 4.6, 4.9
(Discussed in tutorial week of Feb 9)

Assignment #6:
4.12, 4.16, 4.17, 4.19, 4.27.ab, 4.35, 4.38, 4.39, 4.41, 4.48, 4.54, 4.56
(No tutorial or homework in week of Feb 16 – reading week)
(No tutorial in week of Feb 23 – midterm exam)

Assignment #7:
4.62, 4.63, 4.64, 4.67, 4.68, 4.69
(Discussed in tutorial week of Mar 2)

Assignment #8:
4.77, 4.79, 4.82, 4.85, 4.88, 4.91, 4.99, 4.100, 4.102, 4.104, 4.105, 4.106
(Discussed in tutorial week of Mar 9)

Assignment #9:
5.8 (a - e), 5.9, 5.11, 5.14, 5.17, 5.26, 5.31, 5.33
(Discussed in tutorial week of Mar 16)

Assignment #10:
5.40, 5.41, 5.42, 5.45, 5.48, 5.56, 5.57, 5.58, 5.63 5.64, 5.68
(Discussed in tutorial week of Mar 23)

Assignment #11:
5.76, 5.79, 5.80, 5.81(a, b), 5.84, 5.86, 5.88, 5.93, 5.95, 5.96, 5.98, 5.99
(Discussed in tutorial week of Mar 30)

Assignment #12:
5.102, 5.105, 5.111, 5.112, 5.113, 7.1, 7.5, 7.8, 7.9, 7.16, 7.17, 7.23, 7.26, 7.29
(Discussed in tutorial week of Apr 6)