ECE286H1 S (Winter2024)
Probability & Statistics

Learning objectives

A course in probability and statistics for Engineering Science students. Coverage includes: sample space, events, definitions of probability, conditional probability, Bayes' theorem, important classes of discrete and continuous random variables and their distributions, joint, conditional, and marginal distributions, expectation, moment generating and characteristic functions, transformations of random variables, central limit theorem and approximations, graphical methods, quantile plots, point and interval estimation of population parameters, method of maximum likelihood, hypotheses testing, simple and multiple regression, correlation analysis, and introduction to Bayesian statistics.

Instructor of LEC 0101

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Textbook

R.E. Walpole, R.H. Myers, S.L. Myers and K. Ye,
Probability & Statistics for Engineers & Scientists, 9th ed., Pearson, Inc., 2011.
ISBN-13: 978-0-13-411585-6.

You can purchase the book at at the campus bookstore or any other vendor. You can also use this link to purchase the print or digital textbook: https://www.uoftbookstore.com/adoption-search-results?ccid=2825841&itemid=56264

Lectures

Section LEC 0101
- Tuesday 12-1 in MC 254
- Thursday 12-1 in MC 254
- Friday 1-2 in MC 254

Section LEC 0102
- Monday 1-2 in MC 254
- Thursday 2-3 in MC 254
- Friday 11-12 in MC 254

Lectures start on Monday, January 8.

Tutorials

Tutorials are optional but recommended. They will focus on the homework and core concepts. Tutorials begin Monday, January 15. The tutorial sections are:

1. TUT 0101 Thursday 2-3 (BA 1200)
2. TUT 0102 Tuesday 2-3 (BA B025)
3. TUT 0103 Thursday 2-3 (WB 219)
4. TUT 0104 Monday 4-5 (BA B026)
5. TUT 0105 Monday 3-4 (BA 2179)
6. TUT 0106 Monday 2-3 (BA B026)
7. TUT 0107 Tuesday 12-1 (BA 2135)
8. TUT 0108 Friday 4-5 (BA 2145)
9. TUT 0109 Wednesday 1-2 (SU 255)
10. TUT 0110 Tuesday 4-5 (BA 2179)
11. TUT 0111 Tuesday 4-5 (BA B026)
12. TUT 0112 Tuesday 5-6 (BA 2179)

Exams

There will be two midterm exams and a final exam. The midterms will be on February 8 and March 19. Both will be from 9:15 AM - 10:45 AM in EX 100.

Regrade policy

Regrade requests will only be accepted within a finite window following an exam or quiz, and will not be accepted during lecture or tutorial. Regrades will only be considered for exams written in pen. We reserve the right to fully regrade any submitted quiz or exam. Therefore, regrading may result in a lower overall grade.

If you believe an error has been made in grading your exam, you should attach a clear, neat, and concise note to your test indicating (i) which questions were graded incorrectly and (ii) why you deserve more points.

Grading

The breakdown of the final grade is:

- 25%: Midterm exam 1
- 25%: Midterm exam 2
- 50%: Final exam

Planned coverage (tentative)

- *Introduction.* The role of probability and statistics, sets, counting, sample space, events, definitions of probability, conditional probability, Bayes' rule. (Text, §1.1, 2.1, 2.2, 2.4-2.7)
- *Random variables, distributions, and expectation.* Concept of a random variable, discrete probability distributions, continuous probability distributions, joint probability distributions, mean, variance, covariance, linear combinations of random variables. (Text, §3.1-3.4, 4.1-4.3)
- *Common distributions.* Discrete uniform, binomial and multinomial, hypergeometric, negative binomial, geometric, Poisson, continuous uniform, normal distribution and its applications, gamma, exponential, chi-squared. (Text, §5.1-5.5, 6.1-6.7, 6.10)
- *Functions of random variables.* Transformations of random variables, moments and moment generating functions. (Text, §7.1-7.3)
- *Sampling.* Sampling procedures, measures of location, measures of variability, discrete and continuous data, statistical modelling and graphical methods (§1.2-1.6)
- *Sampling distributions.* Random sampling, central limit theorem, sampling distributions, t-distribution, F-distribution, quantiles, quartiles and percentiles. (Text, portions of §8.1-8.8)
- *Estimation.* Statistical inference, unbiased estimator, variance of a point estimator, interval estimation, mean estimation, standard error of a point estimate, prediction intervals, tolerance limits, absolute error and relative error, sample-size calculation, single- and two-sample estimators, maximum likelihood estimation. (Text, portions of §9.1-9.14)
- *Hypothesis testing.* General concepts, Type I and Type II errors, significance level and p-value, tests on means and variances for single- and two samples, choice of sample size, fitting a distribution to data, goodness-of-fit tests. (Text, portions of §10.1-10.14)
- *Linear regresssion.* Simple linear regression model, least squares and the fitted model, properties of least squares estimators, inferences for regression coefficients, residual analysis and model checking, prediction, correlation analysis. (Text, portions of §11.1-11.12)