CIVE.2860 Probability and Statistics for Engineers  
Fall 2019

Sections 201 & 202  
Course ID 5248 & 5249  
3 Credits  
3 Contact hours

Instructor: John Ting  
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Kitson 2005

Office Hours:  
Tues 1:00 - 4:00 pm  
(email for appointment)

Teaching Assistant:  
Jones Owusu Tumasi  
Kitson 300

Office hours:  
Thurs 1:00 - 4:00 pm

Course Details: Probability, statistics, reliability and decision with applications in engineering. Probability of events, discrete and continuous random variables, probability density functions and distributions, estimation, regression and correlation techniques, risk and reliability concepts.

Pre-Requisites: MATH 1310 Calculus I (IA + IB); MATH 1320 Calculus II (co-requisite acceptable)

Course Outline

- Introduction
- Data Analysis  
  o mean, standard deviation, correlation, histograms
  o spreadsheet tools for data analysis
- Basic Probability Concepts  
  o Independence, conditional probability, Bayes’ theorem
  o Random Variables
  o PMF, PDF, CDF, Expectation & moments
- Probability Distributions  
  o Discrete: Bernoulli, binomial, geometric
  o Continuous: Poisson, exponential, normal, lognormal
- Model Estimation  
  o Confidence Intervals, $\chi^2$ and Student - t distributions
- Regression Analysis  
  o Least squares, linear & nonlinear regression, confidence intervals

Ch refs in K&R text

Ch. 1 about 1 wk

Ch. 2 about 3 wks

Ch. 3 about 2 wks

Ch. 4 about 2 wks

Ch. 5 about 2 wks

Ch. 6 about 2 wks

Library link: https://libguides.uml.edu/CIVE2860-Ting

Blackboard Learning Management System: go to https://lowell.umassonline.net/ and log in using your UML student credentials

Textbooks (available in UML eLibrary and through BlackBoard LMS).

  “K&R”
  “B&C”

Other useful references (not required):

- Miller & Freund’s Probability & Statistics for Engineers, 7th or 8th Ed, by Richard A. Johnson  
  “M&F”
Conduct of Course:
Homework assignments, weekly 15% total
3 one-hr term tests each worth 15% 45% total

tentatively Mon Oct 7, Wed Oct 30, Wed Nov 20
1 three-hour final exam (TBA; log into SIS for date & time) 40%

The highest grades from NINE homework assignments will be used in the grade calculations. If you are unable to take one term test due to illness or pre-approved absence, the remaining two term tests will account for 45% of the final grade.

Course outcomes (what I hope you will be able to do after taking this course):

- apply spreadsheet programs to manipulate and analyze data
  - apply formulae, use absolute relative & addressing, plot scatter and bar graphs
- apply basic statistical analysis tools to data:
  - calculate mean, median, standard deviation, plot histograms, etc
- apply basic probability theory (independence, conditional & joint probabilities)
- apply Bayes’ theorem for posterior probabilities as applied to engineering and test design
- apply basic probability & reliability theory to different engineering situations
- apply basic decision theory to assess the expected value of a project
- explain and use the basic forms & properties of probability mass & density functions (PMF, PDF) and cumulative distribution functions (CDF)
- explain and apply specific discrete probability functions such as Bernoulli, Binomial, Geometric
- explain and apply specific continuous probability functions such as Normal, lognormal, Student t, Chi-squared
- analyze data to assess the parameters needed for each probability function
- utilize appropriate probability functions to estimate probabilities of occurrence for specific engineering cases
- estimate the confidence intervals of the predictions made using probability functions
- determine best-fit linear functions for (x,y) data using least-squares regression techniques

In accordance with University policy and the ADA, I will happily accommodate students with documented disabilities confirmed by the Office of Student Disability Services SDS (disability@uml.edu; University Crossing Suite 300, 978-934-4574). If you have a documented disability that will necessitate academic accommodations, please notify me during office hours or after class as we respect and want to protect your privacy. If you have a disability and are not currently receiving accommodations, please contact SDS to arrange accommodations moving forward. Communicating your individual needs can allow us to co-develop learning strategies that will hopefully lead to academic success.

Additionally, the Office of Student Disability Services supports software for ALL students. Read&Write Gold is literacy software that allows you to read on-screen text aloud, research and check written work, and create study guides. You can download the software from the IT Software webpage on the UML website: https://www.uml.edu/IT/Services/Software/Read-Write-Gold.aspx