Syllabus

Course Name Probability and Statistics for Mechanical Engineers

Course Number ENG ME 366

Semester Fall 2016

Course Description Principles of probability and statistics including events, Bayes' theorem, random variables, joint and marginal distributions, random sequences and series, reliability theory, estimation, and quality control. Examples drawn from engineering applications. Cannot be taken for credit in addition to CAS MA 381, ENG BE 200, or ENG EC 381.

Learning Outcomes

1. Acquire knowledge of introductory probability and statistics.
2. Develop an appreciation of the fact that lack of complete, deterministic knowledge about the state of a system does not mean lack of knowledge altogether.
3. Learn how to build probabilistic models that describe imperfect state information. And learn how to update these models as additional information is obtained.
4. Develop problem-solving approaches to learning and acquiring information through sampling.
5. Understand how redundancy of functional components of a system and the general system architecture affect system reliability.
6. Learn how to use collected data to construct a systematic description of process variability.
7. Acquire the ability to design diagnostic procedures to assist in the real-time description of the state of a system.

Prerequisite ENG EK 127 and CAS MA 225

Required Course Materials *Applied Statistics and Probability for Engineers*, Sixth Edition, Douglas C. Montgomery and George C. Runger.

Lectures

- Lectures are held in STH B19 on Mondays, 2:00 p.m. – 4:00 p.m.
- Attendance will be taken and used as one indicator of your level of effort.
- You are strongly encouraged to ask questions during lecture and to offer answers to questions asked by the professor, even if you are not sure they are correct.
- Ringers on cell phones should be turned off during lecture.
- Texting during lecture is prohibited. Violations of this prohibition will result in a decreased participation grade.

Instructor Professor J. Gregory McDaniel

Instructor Email `jgm@bu.edu`

Instructor Office Location Room 406, fourth floor of 110 Cummington Mall

Instructor Phone 617-353-4847

Office Hours Wednesdays 2 p.m. – 4 p.m. or by appointment. To arrange an appointment, email at least two suggested times and a summary of your questions.

Course Average The numerical course average will be computed using the following distribution:

- Participation: 10%
- Homework: 30% (lowest homework grade is dropped)
- Midterm Examination: 30%
- Final Examination: 30%

Course Grade The letter grade for the course will be determined from the following chart:

Percent Range	**Letter Grade**
92.5–100	A
90.0–92.5	A-
87.5–90.0	B+
82.5–87.5	B
80.0–82.5	B-
77.5–80.0	C+
72.5–77.5	C
70.0–72.5	C-
60.0–70.0	D
50.0–60.0	F

Homework

- Homework is due at the beginning of class.
- Homework is not accepted late without a documented excuse that is subject to approval by the instructor.
- Students are allowed to work together and learn collaboratively on homework. The work you turn in must be your own. Copying another student's work and turning it in as your own is not allowed and will be referred to the Conduct Committee.
- Homework must be stapled un the upper left-hand corner.

Midterm Examination The midterm examination is scheduled for Monday, October 31.

Final Examination The final examination is not yet scheduled.

Missed Examinations

- If you know ahead of time that you will miss the examination, you must notify the instructor by email and describe your reason for missing the examination.
  - If the instructor determines that the reason is appropriate, you will be given a makeup examination.
  - If the instructor determines that the reason is not appropriate, you will receive a zero for that examination. The following reasons are not appropriate: oversleeping, working on an assignment for another course, travel for pleasure.
- If you do not know ahead of time that you will miss the examination, you must notify the instructor in writing as soon as possible after the examination and describe your reason for missing the examination.

Lecture	Section	Subject
0	1-1	The Engineering Method and Statistical Thinking
	1-2	Collecting Engineering Data
	1-3	Mechanistic and Empirical Models
	1-4	Probability and Probability Models
1	2-1	Sample Spaces and Events
	2-2	Interpretations and Axioms of Probability
2	2-3	Addition Rules
	2-4	Conditional Probability
	2-5	Multiplication and Total Probability Rules
3	2-6	Independence
	2-7	Bayes' Theorem
4	3-1	Discrete Random Variables
	3-2	Probability Distributions and Probability Mass Functions
	3-3	Cumulative Distribution Functions
	3-4	Mean and Variance of a Discrete Random Variable
5	3-5	Discrete Uniform Distribution
	3-6	Binomial Distribution
	3-7	Geometric and Negative Binomial Distributions
6	3-8	Hypergeometric Distribution
	3-9	Poisson Distribution
7	4-1	Continuous Random Variables
	4-2	Probability Distributions and Probability Density Functions
	4-3	Cumulative Distribution Functions
	4-4	Mean and Variance of a Continuous Random Variable
8	4-5	Continuous Uniform Distribution
	4-6	Normal Distribution
9	4-7	Normal Approximation to the Binomial and Poisson Distributions
	4-8	Exponential Distribution
10	5-1	Two or More Random Variables
11	5-2	Covariance and Correlation
12	6-1	Numerical Summaries of Data