Syllabus

Course Name Probability and Statistics for Mechanical Engineers

Course Number ENG ME 366

Semester Fall 2019

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*, Seventh Edition, Douglas C. Montgomery and George C. Runger.

Recommended Course Equipment Pentel GraphGear 500 Automatic Drafting Pencil Gray 0.9 mm ($4.98 on Amazon) with 2B lead.

Lectures

- Lectures are held in WED 130 on Tuesdays and Thursdays from 3:35 p.m. – 4:25 p.m. Please be on time.
- 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.

Instructor Professor J. Gregory McDaniel

Email jgm@bu.edu

Office Location Room 406 on the fourth floor of 110 Cummington Mall

Telephone 617-353-4847

Office Hours Thursdays 1 p.m. – 2:30 p.m. or by appointment. To arrange an appointment, email at least two suggested times and a summary of your questions.

Assistant To Be Announced

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

- Homework: 10% (lowest homework grade is dropped)
- Midterm Examination: 45%
- Final Examination: 45%

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 end of class and will be graded for effort.
- 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 in the upper left-hand corner.

Midterm Examination The Midterm Examination is not yet scheduled.

Final Examination The Final Examination is not yet scheduled.

Missed Examinations If a student misses an examination and has an excuse that is acceptable to the professor, a makeup examination will be arranged. If the excuse is unacceptable, the student will receive a zero on the examination.

Class Attendance Attendance at all lecture is required. There will be an attendance signup sheet at each lecture and it is the responsibility of the student to make sure that sheet is signed before leaving. Any student who signs in for another student will be report to the Academic Conduct Committee for academic misconduct. There will be a 10% penalty on the course average for missing 5-9 lectures and a 20% penalty on the course average for missing 10 or more lectures. Note the following:

- Absences due to religious holidays are excused but you must send an email to jgm@bu.edu indicating that you will miss class due to a religious holiday and give the date missed.
- The counting of missed lectures includes those lectures missed before adding the class.
- Any circumstances involving extended absences should be discussed with Professor McDaniel as soon as possible.

Grading Concerns All grading concerns must be reported to the professor within one week of returning the graded work. The student must submit a copy of the graded work with an attached note that documents and explains the concern. Email is not accepted. The paper documents will be placed in an Insurance File and considered at the end of the semester if it appears that they might make a difference in the grade.

Accommodations If a student is entitled to accommodations, it is the responsibility of the student to notify Professor McDaniel by email during the first week of class.

Lecture	Section	Subject
1	2-1	Sample Spaces and Events
2	2-2	Interpretations and Axioms of Probability
3	2-3	Addition Rules
4	2-4	Conditional Probability
	2-5	Multiplication and Total Probability Rules
5	2-6	Independence
6	2-7	Bayes' Theorem
7	3-1	Discrete Random Variables
	3-2	Probability Distributions and Probability Mass Functions
8	3-3	Cumulative Distribution Functions
	3-4	Mean and Variance of a Discrete Random Variable
9	3-5	Discrete Uniform Distribution
	3-6	Binomial Distribution
10	3-7	Geometric and Negative Binomial Distributions
11	3-8	Hypergeometric Distribution
12	3-9	Poisson Distribution
13	4-1	Continuous Random Variables
	4-2	Probability Distributions and Probability Density Functions
14	4-3	Cumulative Distribution Functions
	4-4	Mean and Variance of a Continuous Random Variable
15	4-5	Continuous Uniform Distribution
	4-6	Normal Distribution
16	4-8	Exponential Distribution
17	5-1	Two or More Random Variables
18	5-1	Two or More Random Variables
19	5-2	Covariance and Correlation
20	5-4	Linear Functions of Random Variables
21	8-1	Confidence Interval on the Mean of a Normal Distribution, Variance Known
22	8-1	Confidence Interval on the Mean of a Normal Distribution, Variance Known
23	9-1	Hypothesis Testing
24	9-1	Hypothesis Testing