SYLLABUS, ENME 392
Statistical Methods for Product and Processes Development
Fall 2017

Course Description
This course will cover the fundamentals of probability and statistics. The course format will include lectures, homework assignments and exams.

Lecturers
Dr. Peter Chung
office: 2135 Glenn L. Martin Hall
email: pchung15@umd.edu
office hours:
Location: 2135 Glenn L. Martin Hall
Hours: Tuesdays 11:00am-12:00pm

Teaching Assistants
email:
office hours: Location: HelpME! Tutoring Center (Glenn L. Martin Hall 3109)
Hours:

Teaching Fellows
Email:
office hours: Location: HelpME! Tutoring Center (Glenn L. Martin Hall 3109)
Hours:

Required Course Materials
- Textbook
- TurningTechnologies Response Device ("Clicker") or Response Ware ("Clicker cell phone app") (www.turningtechnologies.com)

Course Objectives
1) Learn the fundamentals of probability and applied statistical analysis,
2) Learn important tools of statistics, including distributions, confidence intervals, hypothesis testing, ANOVA, regression, Design of Experiments, and statistical quality control
3) Apply statistical tools to engineering applications

Student (Learning) Outcomes – ABET

(a) an ability to apply knowledge of mathematics, science, and engineering

(e) an ability to identify, formulate, and solve engineering problems

(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

SCHEDULE

The class schedule further below in this document. *It is subject to updates as the semester proceeds*. When the schedule is changed, an announcement will be made in class.

ASSESSMENT

The course grade will be calculated as follows:

Written Problem Sets, Online Homework, Short Ans, Clickers	10%
Mini-Projects	5%
Exam 1	25%
Exam 2	25%
Final Exam	35%
TOTAL	100%

The grading philosophy used in this course is to give very low weight to homeworks and other assessments (clickers, quizzes, etc.) to give students as many opportunities to learn without being hurt irreparably for early mistakes. The concepts seen in the homeworks and clickers are then the basis for the exams. Exams have greater weight.

COURSE POLICIES:

- THE UNIVERSITY-WIDE COURSE RELATED POLICIES WILL BE STRICTLY ENFORCED
  http://www.ugst.umd.edu/courserelatedpolicies.html

HONOR CODE POLICIES:

- **You may:**
  - Use other openly available materials to help YOU understand the materials covered in your personal reading and study
  - Discuss course concepts to help yourself and other classmates better exercise the concepts of the course INDEPENDENTLY
- **You may NOT**
  - Represent the work, knowledge, or efforts of others as your own.
    - For example: copying the answers or solutions of others, signing in for attendance for someone other than yourself, copying a friend's project code, providing your own materials for others to copy, copying the solution to a problem from a solutions manual
- The honor code will be vigorously enforced and violations will be vigorously prosecuted.
- All assignments and exams are covered by the code of academic integrity (**honor code)**.
- The **honor pledge and signature** are required on all materials submitted for a grade.

CLICKER QUIZZES

- Clickers must be properly configured and registered. Instructions for doing this are posted on Canvas.
- Clickers will be used for short in-class quizzes throughout the semester. The quiz contents will either reinforce concepts already seen or motivate concepts to appear later in the course.

- The dates and times of the quizzes will be UNANNOUNCED. They will be administered at various times during lectures.

HOMEWORK

During the semester, homework assignments will be completed either (1) in written form and/or (2) through online content.

ALL assignments will be collected and graded ELECTRONICALLY via Canvas. The following rules apply:

- Short-answer problems are due before the class period for which they are assigned.
- All other homework assignments must be uploaded by 1159PM on the day it is due.
- Written assignments must be neat, legible, and organized. It will be the student's responsibility to ensure the scanned assignment is legible and *right-side-up***.** Pages that are scanned upside-down or sideways cannot be rotated by the graders. Pages that are illegible or incorrectly scanned will be marked entirely incorrect.
- The submission must be a **single file** (Do not submit multiple files)
- Assignments must be submitted as **PDF or DOC(X) files only**
- Do NOT email the homework to the instructors and do NOT submit paper copies.

Graded and marked-up written assignments will be viewable on Canvas after they have been graded.

LATE ASSIGNMENTS:

SHORT-ANSWER ASSIGNMENTS: No late assignments. This type of assignment is of value only if submitted before the class which covers the concept. The purpose is to prepare you for the lecture.

WRITTEN ASSIGNMENTS: No late assignments. Canvas submissions before sunrise the morning after will not be considered late.

ON-LINE PROBLEM SETS: Will be indicated on the McGraw Hill Website for each assignment.

EXAMS

There will be two in-class exams and a final exam. Exams will be comprehensive.
Exams will be mostly (but not completely) based on written homework assignments.

What you can expect on exam days:

1. The Code of Student Conduct will always be enforced. The honor pledge must be handwritten and signed on the front cover of the exam paper.
2. Seating may be assigned.
3. Writing instruments, a formula sheet, and a calculator are the only items allowed on the desk during the exam unless otherwise specified. No other electronics or devices of any kind are allowed. You may not hold any papers or devices on your lap.
4. Not Permitted: tablets, phones, computers, or other devices
5. Calculators: You may use basic scientific calculators. Advanced statistical functions may be present in your calculator, but students are bound by the honor code NOT to use them.
6. Formula Sheets: Specific policies will be announced in class before each exam.

a. Your name and UID must be on formula sheets
b. Must be personally prepared and HANDWRITTEN (No photocopy miniaturization, etc.)
c. Formula sheets must be handed-in with the exam.

7. Books, papers, and clothing must be placed well back under the seats on the floor or on the side stairs.
8. Put your name on each sheet of the exam.
9. When time is called, stop working and hand in your exam.
10. Graded midterm exams will be returned.

ACADEMIC INTEGRITY

The University of Maryland, College Park has a nationally recognized code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduates and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information, please visit http://www.shc.umd.edu/.

Academic integrity is a foundation for learning. The University has approved a Code of Academic Integrity available on the web at http://www.testudo.umd.edu/soc/dishonesty.html. The Code prohibits students from cheating on exams, plagiarizing papers, forging signatures, etc. The Code is administered by a Student Honor Council, which strives to promote a community of trust on the College Park campus. Allegations of academic dishonesty can be reported directly to the Honor Council (314-8206) by any member of the campus community.

The University Senate requires that students sign this statement if it is included on an exam or assignment:

> *"I pledge on my honor that I have not given or received any unauthorized assistance on this examination (or assignment)."*

FREQUENTLY ASKED QUESTIONS

- "I sent the professor an email but received no reply or a terse reply?"
    - *Due to the large volume of email that instructors receive, professors will often give terse responses in order to address as many of the requests as possible. Professors will rarely attempt to explain course concepts over email.*
- "I feel I worked very hard in this course despite my poor performance on the exams. Can I have a project or extra credit?"
    - *Offering special unannounced opportunities to individual students is considered unfair. Students have ample opportunities to demonstrate their understanding of the material through the graded assessments.*
- "Will the exams or grades be curved?"
    - *In the past, adjustments to the mean grade of an individual exam and/or the final grade for the semester were made at the discretion of the professor based on factors that cannot be predicted.*
- "It shows online from previous semesters that the average number of B's is X%. Based on that, shouldn't my grade be a B?"

    - *Previous grade distributions are in no way an indicator of this semester's grade distribution.*
- "I missed last week's quiz (or assignment) because I missed class (or other excuse). Can I be excused from it or make it up in some way?"
    - *See University Policies. Only under university-approved circumstances will excused absences be allowed for assessments.* ***Prior approval and written documentation*** *from a doctor, court, or university administrator are required.*
- "Will material from Chapter X or Lecture Y be covered in the exam?"
    - *Students should expect that* ***any*** *material covered in the lectures, homeworks, or readings will appear on the exams and assignments.*
- "Will material from Exam 1 also appear on the Final?"
    - *Yes. In general, a greater emphasis in an exam will be on material not already covered in previous exams. However, important concepts can be reinforced via repetition OR concepts that appear later in the semester often rely on things that appeared earlier.*
- "Will we be tested only on material we covered in the lectures?"
    - *No. Students should expect that* ***any*** *materials covered in the lectures, homeworks, or readings will appear on the exams and assignments.*

Preliminary Course Calendar*

Lecture	Lecture Topics	Assignment Due
Tuesday 8/30/2016	Course Introduction Probability intro	
Thursday 9/1/2016	Probability I	• **Review Syllabus and Chapters 1&2**
Tuesday 9/6/2016	Probability II	• **Short Answers: Probability** • **Short Answers: Discrete Distributions**
Thursday 9/8/2016	Discrete Random Variables and Discrete Probability Distributions • probability mass functions • cumulative distributions • mean and variance • types of discrete distributions	• **Homework: Probability** • **Read Chap 4 Discrete Distributions**
Tuesday 9/13/2016	Discrete Probability Distributions • uniform • binomial • hypergeometric • Poisson	• **Homework: Discrete Distributions**
Thursday 9/15/2016	Continuous Random Variables and Continuous Probability Distributions • probability density functions • cumulative distributions • mean and variance • types of continuous distributions • Normal • Normal approximation to discrete	• **Read Chap 3 Propagation of Error** • **Read Chap 4 Continuous Distributions** • **Short Answers: Continuous Distributions**
Tuesday 9/20/2016	• Exponential • Chi-squared Point Estimation & Sampling Distributions • Central limit theorem • Point estimates • Sampling distributions	• **Homework: Continuous Distributions**
Thursday 9/22/2016	Joint Probability Distributions • Two or more random variables • Covariance and correlation • Multinomial and bivariate • Functions of random variables	• **Matlab MiniProject #1**
Tuesday 9/27/2016	Confidence Intervals • For population means • For proportions • Small samples •	• **Read Chapter 5 Confidence Intervals**

Thursday 9/29/2016	Confidence Intervals • Differences • Paired Data • Variances & Std Dev	• **Short Answers Sampling/Confidence Intervals**
Tuesday 10/4/2016	• Review for Exam 1	• **Homework: Confidence Intervals**
Thursday 10/6/2016	• Exam 1	
Tuesday 10/11/2016	Hypothesis Testing • Tests on mean of normal distribution • Population proportions • Small vs large samples	
Thursday 10/13/2016	Hypothesis Testing • Tests of differences • Paired data	• **Short Answers Hypothesis Testing I** •
Tuesday 10/18/2016	Hypothesis Testing • Tests on variance and std dev of normal distribution • Type I and II errors	• **Read Chapter 6 Hypothesis Testing (up to 6.7)** • **Homework: Hypothesis Testing I**
Thursday 10/20/2016	Hypothesis Testing • Nonparametric testing • Chi-squared Tests for Homogeneity & Independence & Goodness of Fit	• **Read Chapter 6 Hypothesis Testing (remaining)** • **Short Answer Questions: Hypothesis Testing II**
Tuesday 10/25/2016	Hypothesis Testing • Testing Errors Statistical Quality Control • Variables and Attributes	
Thursday 10/27/2016	Statistical Quality Control • Control charts	**Homework: Hypothesis Testing II**
Tuesday 11/1/2016	Review for Exam 2	• **Matlab MiniProject #2**
Thursday 11/3/2016	**Exam 2**	
Tuesday 11/8/2016	Linear Regression • Basic linear regression & least-squares • Hypothesis testing in linear regression • Confidence intervals	• **Short Answers Regression** • **Read Chapter 7 Correlation and Simple Linear Regression**
Thursday 11/10/2016	Linear Regression • Adequacy of regression models, R^2 • Correlation • Multiple linear regression	• **Read Chapter 8 Multiple Regression** •

Tuesday 11/15/2016	ANOVA • Experiment design • Completely randomized single-factor experiment	• **Homework: Regression** • **Short Answers ANOVA** • **Read Chapter 9 Factorial Experiments ANOVA**
Thursday 11/17/2016	ANOVA • Random effects model • Computing Tutorial	
Tuesday 11/22/2016	ANOVA Randomized complete block design	• **Homework: ANOVA**
Thursday 11/24/2016	Thanksgiving Holiday	• Happy Thanksgiving!
Tuesday 11/29/2016	Design of experiments: Multiple Factors • Factorial experiments	• **Read Chapter 9 DOE** • **Short Answers DOE**
Thursday 12/1/2016	Design of experiments: Multiple Factors • Two factor factorial experiments	• **Homework: DOE**
Tuesday 12/6/2016	Design of experiments: Multiple Factors • 2^k factorial design	• **Matlab MiniProject #3**
Thursday 12/8/2016	Review for Final exam	

*Schedule is subject to change.

FINAL EXAMINATION SCHEDULE

UMD scheduled final exam:

Class time TTh 930am **Final Exam: Thurs Dec 15. Same Room as Class.**

Class time TTh 1100am **Final Exam: Wed Dec 14. Same Room as Class.**