ChE 253K -- Applied Statistics -- Course Syllabus

Instructor

Keith Friedman, Ph.D. in ChE
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Lecture: Monday and Wednesday 9:00-9:50am in UTC 3.134
Office Hrs: Monday and Wednesday 10-11am in CPE 4.454

Teaching Assistant

Austin Lane, a Ph.D. student in ChE with Prof. Willson
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Office Hrs: To Be Arranged

Description

ChE 253K Applied Statistics Spring 2014 Unique Number 15100

Course Prerequisites (All with a grade ≥ C):
ChE 210 (Computing), ChE 317 (ChE Analysis), Math 427K (Differential Equations).

Course organization follows the description in the catalog, and includes:
- Descriptive statistics: data plots and summary stats; linear regression and correlation.
- Inferential statistics: probability and distributions; hypothesis testing and ANOVA.
- Engineering statistics: design of experiments; statistical process control.

The short-term purpose of this class is to prepare you to analyze experimental data in ChE 253M and ChE 264. The long-term purpose is to teach you the tools that engineers use daily to turn data into information. Work through this class, and you will gain:
- Familiarity with statistical methods used in engineering
- Ability to apply statistical solutions to chemical engineering problems
- Familiarity with statistical software used in industry
- Ability to the choose proper approach to analysis of data
- Ability to apply statistical process control methodology to chemical engineering
- Ability to apply statistical tables to analysis of chemical engineering data
- Ability to logically approach problem definition and solution

This class will help you meet Criterion B of the Accreditation Board for Engineering and Technology (ABET): "An ability to design and conduct experiments as well as analyze and interpret data."

Materials

Please use all of the class materials. Lecture, text, homework and software reinforce each other and each includes materials that are not available from the others.

- Textbook: Richard A. Johnson, Miller & Freund's Probability and Statistics for Engineers, Seventh or Eighth Edition. Prentice-Hall, New Jersey, 2004 or 2010.
- Computer and Software: You will need a computer to do some of the homework.
  - Microsoft Excel. Microsoft Office is available at the Campus Computer Store.
  - JMP Statistical Discovery Software. The department provides JMP.
- Website: "APPLIED STATISTICS" at https://courses.utexas.edu (Blackboard)

Attendance

Information, assignments and quizzes may be given in lecture and not be available elsewhere.

Cockrell School of Engineering policy states: "Engineering students are expected to attend all meetings of the classes for which they are registered. Students who fail to attend class regularly are inviting scholastic difficulty."

Deadlines

Developing the on-time habit will make you more successful engineer.
- Homework is due on its assigned due date and time.
- Midterm and Final Exam dates are listed in the ChE 253K Lecture Schedule.
- Grade disputes are welcome, but they must be raised within two weeks of the grade date.

Late homework and missed exams and quizzes will not be accepted without a University Recognized excuse. University Recognized excuses include medical problems requiring doctor visits, religious holy days, military service and qualifying medical or military family leave. Extra curricular activities are helpful to you, and work pile-ups in multiple classes are real difficulties, but they are not recognized excuses -- sorry.

Grading

A	A-	B+	B	B-	C+	C	C-	D
≥92%	<92 – ≥90%	<90 – ≥87%	<87 – ≥82%	<82 – ≥80%	<80 – ≥77%	<77 – ≥72%	<72 – ≥70%	<70%

Homework	Midterm 1	Midterm 2	Final Exam
~35%	~20%	~20%	~25%

Homework

Please give homework priority; it is the best way to learn and so it's worth as many points as the Final. Homework will be assigned and due most week. An audit amount of the assigned problems will be graded; the remainder will simply be checked to see that they have been completed. The homework must be neat, easy to follow and easy to read. Please staple your papers together and write your name on the first page.

Start the homework yourself and do as much as you can. What you cannot do on your own, you can discuss with your classmates or with me. Complete the homework yourself; to be sure you have mastered the material.

Integrity

Honesty is fundamental to engineering. Dishonest engineers are at best a shameful waste, and at worst, they kill people. If you cannot work honestly, as a student and as a professional, you can not be an engineer.

- Homework. You may work together with classmates to understand the material and problem-solving methods. But if you do not complete the homework yourself, you will not be able to complete the exams. Write up your work yourself. If your work and another student's work are obviously copies, then you and the person whose homework you copied will receive a zero for that assignment.
- Memos. Do not plagiarize. If you do, you and your team will receive a zero.
- Exams. If you share or steal answers, or use unauthorized materials on an exam, you are cheating and will receive a zero for that exam.

To plagiarize is to use someone else's ideas or words and claim them as your own (by not explicitly stating that they are not your own). Plagiarizing directly from someone else's work or from an old file is strictly forbidden. Short phases or statements from references may be used if put in quotation marks with due credit given by reference. If no reference is cited, it is presumed that the work is original -- and if you did not actually write it, it's plagiarism. If you have a question about interpretation of this policy, assume the most conservative possible interpretation or ask your instructor or TA for an interpretation before turning in your work. (Paraphrased from Prof. Willson's syllabus.)

Cheating or plagiarism will be handled via the Student Discipline process of Student Judicial Services, i.e., a Finding of Scholastic Dishonesty, as described on their website: deanofstudents.utexas.edu/sjs/.

Administrative

University of Texas policy states:

"Academic accommodations. The University of Texas at Austin provides, upon request, appropriate academic accommodations for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-4641 TTY or the College of Engineering Director of Students with Disabilities at 471-4321."

"Religious holy days. A student who misses classes or other required activities, including examinations, for the observance of a religious holy day should inform the instructor as far in advance of the absence as possible, so that arrangements can be made to complete an assignment within a reasonable time after the absence."

"Absence for military service. In accordance with Section 51.9111 of the Texas Education Code, a student is excused from attending classes or engaging in other required activities, including exams, if he or she is called to active military service of a reasonably brief duration. The student will be allowed a reasonable time after the absence to complete assignments and take exams."

Students will be informed of the date that the Course/Instructor evaluations will be done. Students are required to attend class on that date unless prior arrangements have been made to complete the survey.

ChE 253K -- Applied Statistics -- Class Schedule

Lect. Date	Lecture Title	Homework	HW Due
January 13 Monday	Class Overview		
January 15 Wednesday	Exploring 1-D Data with Plots	1-D Data Plots	January 17 1pm Friday
January 20 Monday	Martin Luther King Day: No Class. Read: Centers and Spreads		
January 22 Wednesday	Divisions. Combining Mean + Std Dev	1-D Stats #1	January 24 1pm Friday
January 27 Monday	Ugly Data and Outliers		
January 29 Wednesday	2-D Data Plots Reveal Relationships	1-D Stats #2 2-D Plots	January 31 1pm Friday
February 3 Monday	Linear Regression Calculations	1-D Data Memo	February 3 5pm Monday
February 5 Wednesday	Evaluating Regression Results	2-D Lin Reg'n	February 7 1pm Friday
February 7 Friday	JMP Installation Help 1:00 - 2:00 in CPE 1.418		
February 10 Monday	Intro to JMP Statistical Software		
February 12 Wednesday	JMP for Curve Fitting Beyond LR	1-D + 2-D JMP	February 14 1pm Friday
February 14 Friday	JMP 1-D + 2-D Extra Class 1:00 - 2:00 in CPE 1.418		
February 17 Monday	2-D Application: Amine Scrubbing		
February 19 Wednesday *	Review For Midterm #1 + Crib Sheets Class or To Be Arranged	2-D Data Memo	February 21 1pm Friday
February 24 Monday *	Midterm #1 Time and Location to be arranged	MT #1 Practice	February 24 before exam
February 26 Wednesday	Simple Probabilities Prob'y Expt (M&M).	Prob'y Calc's	February 28 1pm Friday
March 3 Monday	Complex Probabilities + Discrete Distributions		
March 5 Wednesday	Continuous Distributions: Standard Normal Dist'n	Prob'y Dist'ns	March 7 1pm Friday
March 10 Monday	Spring		

March 12 Wednesday	Break		
March 17 Monday	Central Limit Theorem + Confidence Intervals		
March 19 Wednesday	Hypotheses Tests Sample vs. Population Mean	Hypo Test #1	March 21 1pm Friday
March 24 Monday	HT: Sample vs. Sample Mean HT Application		
March 26 Wednesday	HT: Matched Pair or Variance	Hypo Test #2	March 28 1pm Friday
March 31 Monday *	Review For Midterm #2. Crib Sheets Class or To Be Arranged	Hypo Test Memo	March 31 5pm Monday
April 2 Wednesday *	Midterm #2 Time and Location to be arranged	MT #2 Practice	April 2 before exam
April 7 Monday	Analysis Of Variance: One-Way		
April 9 Wednesday	One and Two Way ANOVA	ANOVA	April 11 1pm Friday
April 14 Monday	Sampling + Design of Expts		
April 16 Wednesday	JMP for DOE	Design of Expts	April 18 1pm Friday
April 18 Friday	JMP DOE Extra Class 1:00 - 2:00 in CPE 1.418		
April 21 Monday	Quality Control Charts -- Basics		
April 23 Wednesday	Quality Control Charts in JMP & Fun Lab	SPC Charts	April 25 1pm Friday
April 25 Friday	JMP SPC Extra Class 1:00 - 2:00 in CPE 1.418		
April 28 Monday	Quality Improvement + Quality App		
April 30 Wednesday	Extra Class	Quality Memo	May 2 1pm Friday
to be arranged	Review For Final Exam. Crib Sheets		
May 10, Sat. 2-5pm	Final Exam	Final Practice	May 10 before exam

* Reviews and Midterms may be held in the early evening