Engineering Statistics I
Course ID: 31602R, KAP 158
Spring 2013
Dr. Smith

Contents

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Importance of this course:
Engineering Statistics builds upon the methods and techniques of probability (ISE 220) in order to:

1. Properly construct experiments and surveys to collect data for statistical analysis
2. Analyze patterns and correlations among engineering relationships
3. Determine appropriate sampling distributions for samples obtained from experiments
4. Construct tests of hypotheses for concluding the truth or falsity of a hypothesis
5. Develop estimators of population parameters from samples and their confidence intervals
6. Practice the above by learning how to use spreadsheet software for statistical analyses

This course provides a framework and approach for the student to formulate, collect, analyze, and draw conclusions from experimental evidence.

Course Description
The course is designed to provide the student with the skills necessary to perform a statistical analysis. The course objectives for each student include achievement of the following skill set.

At the conclusion of the course the student shall be able to:

1. Construct experiments and surveys to collect data for statistical analysis
2. Analyze patterns and correlations among engineering relationships
3. Determine appropriate sampling distributions for samples obtained from experiments
4. Construct tests of hypotheses for concluding the truth or falsity of a hypothesis
5. Develop estimators of population parameters from samples and their confidence intervals
6. Apply the above concepts using software for statistical analyses

Chapter 2, Descriptive Statistics	Summarizing datasets
Chapter 3, Random variables, pdfs, cdfs	Basics
Chapter 4, Single sample decisions; statiscal inference	Point and interval estimatiion, hypothesis testing for samples from a single population.
Chapter 5, Two sample decisions	Comparing samples from two populations.
Chapter 5, Analysis of variance, ANOVA	Comparing more than two samples.
Chapter 6, Simple Linear Regression and Correlation	Building and analyzing model relationships, y=f(x)
Chapter 6, Multiple Regression	Multidimensional relationships, $y=f(x_1,...x_n)$
Chapter 8, Statistical Process Control	Quality control

Suggestions (for success)

You should read over the reading assignments before the corresponding lecture.
You should attempt the homework (at least once) on your own before asking for help.
Make an honest attempt to understand the material before uttering the words, "I don't get this."
Keep up...keep up...keep up—skipping class?--you will fall behind.

Course Prerequisite Knowledge

ISE 220, Calculus.

Course Goals

Students will learn:

1. Properly construct experiments and surveys to collect data for statistical analysis
2. Analyze patterns and correlations among engineering relationships
3. Determine appropriate sampling distributions for samples obtained from experiments
4. Construct tests of hypotheses for concluding the truth or falsity of a hypothesis
5. Develop estimators of population parameters from samples and their confidence intervals
6. Practice the above by learning how to use spreadsheet software for statistical analyses

Text

Engineering Statistics, 5th Ed, Montgomery, Runger, and Hubele, John Wiley and Sons, New York, NY.

Course Requirements and Grades

The course requirements are as follows:

Requirement	Point Total
4 Homework assignments @ 10 points	40
Midterm Exam	20
Project	20
Final Exam	20
Course Total	100

The project will be announced after submission of homework assignment 2 and will be graded according to attributes of creativity, relevance, content, organization, and timeliness (4 pts each). All grading issues are closed after 1 week from the return date. Late homework = 40% off per day.

Schedule Note: homework due in class on date shown.

Date	Topic	Readings	Assignments/Notes
Mon Jan 14	Introduction, course outline	Ch 1	
Wed Jan 16	Graphical displays, frequency distributions, histograms, measures of central tendency	Ch 2	2-1, 2-3, 2-4
Mon Jan 21	MLK Day, no class		
Wed Jan 23	Random variables, pdfs, measures of dispersion	Ch 3	
Mon Jan 28	Single samples, point estimation, Normal, t, Chi-square, F distributions	Ch 4	4-1, 4-2, 4-3
Wed Jan 30	Hypothesis testing on the mean, variance known	Ch 4	4-4; HW1 due
Mon Feb 4	Hypothesis testing on the mean, variance unknown	Ch 4	4-5
Wed Feb 6	Hypothesis test on the variance	Ch 4	4-6,
Mon Feb 11	Hypothesis test on a proportion, Goodness of Fit test	Ch 4	4-7, 4-10
Wed Feb 13	Two sample tests on 2 means, 2 variances, and 2 proportions	Ch 5	5-1, 5-2; HW2 due
Mon Feb 18	President's Day, no class		
Wed Feb 20	Two sample tests on 2 means, 2 variances, and 2 proportions	Ch 5	5-3, 5-5
Mon Feb 25	Midterm 1 (through Ch 4)		
Wed Feb 27	Tests on more than two samples--analysis of variance for completely randomized single factor experiments	Ch 5	5-8
Mon Mar 4	Analysis of variance—two factor experiments	Ch 5	5-8
Wed Mar 6	Model building, linear regression	Ch 6	6-1, 6-2
Mon Mar 11	Linear regression	Ch 6	6-1, 6-2
Wed Mar 13	Linear regression	Ch 6	HW3 due
Mar 18, 20	Spring Recess – no class		
Mon Mar 25	Regression issues: residuals	Notes	
Wed Mar 27	Regression issues: autocorrelation; model building	Notes	
Mon Apr 1	Multiple regression	Ch 6	6-3
Wed Apr 3	Multiple regression	Ch 6	6-3
Mon Apr 8	Project workshop		
Wed Apr 10	Project workshop		
Mon Apr 15	Statistical Process Control	Ch 8	8-1, 8-2, 8-3
Wed Apr 17	Statistical Process Control		
Mon Apr 22	Statistical Process Control	Ch 8	Projects due
Wed Apr 24	Project presentations		Hw4 due
Mon Apr 29	Project presentations		
Wed May 1	Last day of class, review		
Mon May13	Final Exam 2-4 pm		

Statement for Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. Website and contact information for DSP: http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html, (213) 740-0776 (Phone), (213) 740-6948 (TDD only), (213) 740-8216 (FAX) ability@usc.edu.

Statement on Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. SCampus, the Student Guidebook, (www.usc.edu/scampus or http://scampus.usc.edu) contains the University Student Conduct Code (see University Governance, Section 11.00), while the recommended sanctions are located in Appendix A. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/ . Information on intellectual property at USC is available at: http://usc.edu/academe/acsen/issues/ipr/index.html.

Emergency Preparedness/Course Continuity in a Crisis

In case of a declared emergency if travel to campus is not feasible, USC executive leadership will announce an electronic way for instructors to teach students in their residence halls or homes using a combination of Blackboard, teleconferencing, and other technologies. Please activate your course in Blackboard with access to the course syllabus. Whether or not you use Blackboard regularly, these preparations will be crucial in an emergency. USC's Blackboard learning management system and support information is available at blackboard.usc.edu.