IME 2610
ENGINEERING STATISTICS

Course Syllabus - Fall 2009

Lecture Section 1 (CRN - 44495): MW 9:30–10:20 am *Room*: CEAS D-115

Lecture Section 2 (CRN - 42346): MW 2:30–3:20 pm *Room*: CEAS D-109

2009-2010 Catalog Description: *Introduction to statistical methodology emphasizing applications in engineering. Topics include descriptive and inferential statistics, regression, analysis of variance, and design of experiments. This course is cross-listed with STAT 2610.*

Prerequisites:
1) The ability to use basic calculus (MATH 1220 or MATH 1700).
2) The ability to use new software in problem solving, given basic instructions and examples (basic computer skills).

Course Coordinator & Instructor:

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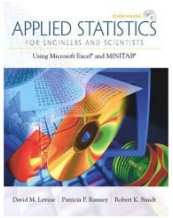
Textbooks:



Required:

1) *Applied Statistics for Engineers and Scientists using Microsoft Excel and MINITAB, 1st edition*
David M. Levine, Patricia P. Ramsey and Robert K. Smidt
Prentice Hall, 2001 (ISBN-10: 0134888014; ISBN-13:9780134888019)

Suggested:

2) *Student Solution Manual: Applied Statistics for Engineers and Scientists using Microsoft Excel and MINITAB, 1st edition*
David M. Levine
Prentice Hall, 2001 (ISBN-10: 0130286818; ISBN-13:9780130286819)

(*Note: Unlicensed photocopies of the textbook will not be allowed into lectures or the tests.*)

Software: *MINITAB, Release 15*, MINITAB, Inc. (*www.minitab.com*)
This software is available to you in the CAE center (Windows version).
It can be purchased ($99.99) or rented ($29.99 for 6 months; $49.99 for 12 months) through *on the hub* (http://www.onthehub.com/minitab/minitab_english.htm).

References:

Probability and Statistics in Engineering, 4th edition
William Hines
Wiley, 2003

Fundamentals of Probability and Statistics for Engineers, 1st edition
T.T. Soong
Wiley, 2004

Engineering Statistics, 3rd edition
Douglas C. Montgomery, George C. Runger, and Norma F. Hubele
Wiley, 2004

MINITAB Handbook, 4th edition
Barbara Ryan and Brian L. Joiner
Duxbury Press, 2001

Objectives[1]: At the end of the semester, the student will be able:

1) To use descriptive and inferential statistical techniques to solve engineering problems. *(a, b, e, g, k)*

2) To apply basic linear regression techniques in an engineering context. *(a, b, e, g, k)*

3) To plan and conduct fundamental experiments of design, analyze the results, and make recommendations based on the analysis. *(a, b, c, e, g, k)*

[1]*Letters in parenthesis refer to the ABET Engineering 2000 criteria met by the corresponding objective.*

Performance Criteria[2]:

The student should be able to:

Objective 1

1.1. Describe and compare data sets using summary statistics and graphical techniques. [1, 2]
1.2. Understand basic concepts pertaining to probability, random variables, and probability distributions. [1, 2]
1.3. Calculate and use percentile information. [1, 2]
1.4. Define the Central Limit Theorem and discuss its importance in statistical analysis. [1, 2]
1.5. Build confidence intervals for a single parameter and the difference between two parameters. [1, 2]
1.6. Perform and interpret hypothesis tests for parameters of one or more populations. [1, 2]
1.7. Compare the means and of more than two samples using analysis of variance. [1, 2]
1.8. Apply the statistical concepts, techniques, and tests presented in this course to new and different engineering situations. [1, 2]
1.9. Check that the assumptions of the statistical tests and techniques presented are met. [1, 2]
1.10. Use the appropriate software routines to answer a given statistical problem. [1, 2]
1.11. Interpret statistical software output and make inferences from this output. [1, 2]

Objective 2

2.1 Estimate the parameters necessary to build a regression model. [1, 2]
2.2 Perform hypothesis tests on individual regression coefficients. [1, 2]
2.3 Build confidence intervals for regression coefficients and the mean response. [1, 2]
2.4 Predict from a regression model. [1, 2]
2.5 Assess the adequacy of a regression model. [1, 2]

Objective 3

3.1 Design and carry out simple Single factor, Two-factor, Randomized Block and Factorial experiments. [1, 2]
3.2 Interpret and draw conclusions from the results of a designed experiment. [1, 2]
3.3 Apply Post Hoc tests to determine treatment differences. [1, 2]

Evaluation: Your final grade will be based on the following:

(1)	*Laboratory Assignments*		25%
(2)	3 *In-Class Tests*		75%
	Best of 3 tests:	30.0%	
	Second Best of 3 tests:	25.0%	
	Worst of 3 tests:	20.0%	
			100%

Grading Scale:

93 - 100	A
88 - 92	BA
83 – 87	B
78 - 82	CB
73 - 77	C
68 - 72	DC
60 - 67	D
Below 60	E

[2]*Numbers in brackets refer to the method of evaluation (see the preceding evaluation section).*

Attendance Policy: Attendance is mandatory for both lecture and laboratory sessions. A student will receive a score of zero for any assessment/evaluation item not submitted because of absence. (This includes lab assignments and tests.) Extreme circumstances will be considered on an individual basis; however, arrangements should be made prior to the date of a lab or test when reasonably possible, and supporting documentation is necessary (with the exception of the contraction of the H1N1 flu).

Academic Honesty Policy: You are responsible for making yourself aware of and understanding the policies and procedures in the Undergraduate and Graduate Catalogs that pertain to Academic Honesty. These policies include cheating, fabrication, falsification and forgery, multiple submission, plagiarism, complicity and computer misuse. [The policies can be found at http://catalog.wmich.edu under Academic Policies, Student Rights and Responsibilities.] If there is reason to believe you have been involved in academic dishonesty, you will be referred to the Office of Student Conduct. You will be given the opportunity to review the charge(s). If you believe you are not responsible, you will have the opportunity for a hearing. You should consult with your instructor if you are uncertain about an issue of academic honesty prior to the submission of an assignment or test.

Electronic Devices: Cell phones must be silenced during lecture, labs, and testing periods. Music devices (e.g., ipods) are not to be used during lecture or testing periods. Computers should also be turned off during the lecture periods unless you have let the instructor know that you are using it for note taking.

Homework: Homework assignments will be assigned and posted on the course webpage. Assignments will not be collected (or graded), but it is very important that you complete them in order to gain a better understanding of the course material. These assignments will also give you a good idea of the types of questions that will appear in the tests. Assignment solutions will also be posted on the webpage.

Laboratory Assignments: All laboratory assignments will be assigned an equal weight in the final course score. Assignments are to be turned in at the end of the lab session, unless otherwise directed by the instructor or graduate assistant. Most assignments will require the use of software. You are welcome to answer any questions using software, unless we have specified otherwise. If you use software to solve a problem, you must submit sufficient documentation to illustrate your approach to the problem, along with the appropriate output to justify your results. *You will receive a score of zero for each assignment that you fail to turn in at the specified time.* Most assignments will be completed in teams. Only one copy of the assignment should be handed in from each team, with all names appearing on at least the first page.

Tests: Each test will be administered during the lecture period on the days indicated in the schedule (*see page 5*). You are responsible for the material up to the day of the test. You will have approximately 50 minutes to complete each test. During each test you are allowed to have a calculator and one 8 ½″ x 11″ sheet of paper with anything that you would like to put on it (both sides can be used). Tables will be provided. Cell phones must be silenced during the testing period. Phone calculators are not to be used during the testing period and all hats must be removed.

SCHEDULE

Week	Date	Topic	Chapters and Sections	Suggested HW Due Dates
1	September 9	Introduction	Chapter 1: 1.1-1.3	
	No Lab	*No Lab*		
2	September 14	Types of Data and Graphical Displays of Data	Chapter 1: 1.4-1.6; (2.1, 2.3-.2.9)	
	September 16	Descriptive Statistics	Chapter 3: 3.1-3.2	Assignment 1
	Lab 1	*Minitab and Graphical Displays of Data (Chapter 2)*		
3	September 21	Descriptive Statistics and Probability Rules	Chapter 3: 3.3; 4: 4.1-4.2	Assignment 2
	September 23	Discrete Probability Distributions	Chapter 4: 4.3	Assignment 3
	Lab 2	*Descriptive Statistics& Counting Rules*		
4	September 28	Discrete Probability Distributions	Chapter 4: 4.4-4.7	Assignment 4
	September 30	Continuous Probability Distributions	Chapter 5: 5.1-5.3	Assignment 5
	Lab 3	*Probability & Discrete Probability Distributions*		
5	October 5	Continuous Probability Distributions	Chapter 5: 5.4-5.6	Assignment 6
	October 7	Sampling Distributions	Chapter 5: 5.9-5.10	
	Lab 4	*Normal Distribution and Normal Probability Plots*		
6	**October 12**	**TEST 1: Chapters 1 – 5 (5.1-5.5 only)**		
	October 14	Estimation and Confidence Intervals (Mean)	Chapter 8: 8.1-8.3	Assignment 7
	Lab 5	*Sampling Distributions and the Normal Distribution*		
7	October 19	Confidence, Prediction, and Tolerance Intervals	Chapter 8: 8.5-8.6	Assignment 8
	October 21	Confidence Intervals – Variance & Proportion	Chapter 8: 8.4, 8.7	Assignment 9
	Lab 6	*Confidence, Prediction, and Tolerance Intervals*		
8	October 26	Hypothesis Testing – Mean	Chapter 9: 9.1-9.3	Assignment 10
	October 28	Hypothesis Testing – Two Groups	Chapter 9: 9.4-9.5	Assignment 11
	Lab 7	*Hypothesis Testing I*		
9	November 2	Hypothesis Testing – Paired Tests and Proportions	Chapter 9: 9.6-9.7	Assignment 12
	November 4	ANOVA	Chapter 10: 10.1-10.4	
	Lab 8	*Hypothesis Testing II*		
10	**November 9**	**TEST 2: Chapters 5 (5.9-5.10), 8-9**		
	November 11	Randomized Block Design	Chapter 10: 10.5	Assignment 13
	Lab 9	*Single-Factor ANOVA*		
11	November 16	Factorial Designs	Chapter 11: 11.1	Assignment 14
	November 18	Factorial Designs – 2^k Designs	Chapter 11: 11.2	Assignment 15
	Lab 10	*Blocked and Factorial Designs*		
12	November 23	Fractional Factorial Designs – Half Fraction Designs	Chapter 11: 11.3	Assignment 16
	November 23	**10th Annual Lip-Sync Contest (7:30 PM - 10:30 PM; Room D-109) - Extra Credit Opportunity!**		
	November 25	**No Lecture - Thanksgiving Recess**		
	No Lab	*Thanksgiving*		
13	November 30	Simple Regression – Calculations and Transformations	Chapter 12: 12.1-12.3, 12.10	
	December 2	Simple Regression – Inference and Correlation	Chapter 12: 12.4-12.7, 12.11	Assignment 17
	Lab 11	*Design of Experiments*		
14	December 7	Simple Regression –Prediction and Confidence Intervals	Chapter 12: 12.8-12.9	Assignment 18
	December 9	**TEST 3: Chapters 10 - 12**		
	Lab 12	*Regression*		

LAB ROOM ASSIGNMENTS

Laboratory sessions will be held in the following rooms. An announcement on the course web page and/or during lecture will be made for special lab projects that may take place in locations other than those listed below.

Section	**Day/Time**	**Room**	**Instructor**
Lab Group A: (44451)	M 7:30 - 10:20 pm	CEAS C-228	Dr. Steven Butt
Lab Group B: (43366)	T 2:30 - 5:20 pm	CEAS C-229	Mr. Michael Hoonhorst
Lab Group C: (42348)	T 6:30 - 9:20 pm	CEAS C-229	Ms. Anna Kamphaus
Lab Group D: (44166)	W 3:30 - 6:20 pm	CEAS C-229	Ms. Ilgin Acar
Lab Group E: (43828)	R 11:30 - 2:20 pm	CEAS C-226	Ms. Fehime Utkan
Lab Group F: (42349)	R 6:30 - 9:20 pm	CEAS C-229	Ms. Amanda Glick