

IE 4250 Probability Models & Data Analysis

Winter 2006

T,Th: 4:30-5:50PM (3 credits): Manufacturing Engg. 2031

INSTRUCTOR:

GARY S. WASSERMAN, Ph.D., CQE, CRE

Office Hr. T,Th: 3:00 - 4:00 PM

(313) 577-3301/ email: gwasserm@wayne.edu

COURSE ORGANIZATION & PREREQUISITE KNOWLEDGE

Prereq: B E 2100. Advanced concepts for the analysis of variability in engineering problems, multivariate distributions, hypothesis testing, non-parametric statistics, point and interval estimation, fitting straight lines, goodness of fit tests, contingency tables and introduction to the analysis of variance.

WEB ACCESS: Every student is expected to enroll at:

<http://blackboard.wayne.edu>. Handouts, syllabus, answers to homework, and online access to grades are available to each student who has enrolled at Blackboard.com. Additionally, announcements will be posted on Blackboard, and emailed out to the email addresses registered on Blackboard.

EDUCATIONAL GOALS & OUTCOMES

- Demonstrate a command of visual statistical tools (graphs, charts, tables, etc)
- To develop mastery of a statistical computing package such as Minitab®
- To understand and apply inferential statistics for hypothesis testing and confidence interval estimation.
- To understand and apply multiple regression analysis.
- To understand the difference between observational studies and design experiments.
- To understand how to model experimental data.

- To understand the synthesis of factorial designs and how to conduct data analysis and report results.

TEXTBOOK

Montgomery, Douglas and Runger, George C., **Applied Statistics and Probability for Engineers**, John Wiley & Sons, Fourth Edition, 2007.

COMPUTING

Minitab® version 14 will be our preferred statistical computing package for this semester. Minitab is available on campus at several locations including our own pc simulation lab and the main college of engineering building. Student versions can be purchased, as well as downloading a license for personal use of the software during the winter semester. Students may also download a full, trial version of Minitab, which can be used for 30 day period.

GRADING POLICY

Midterm	100
Final Exam	150
Class Project	50
Homework	50
Attendance/participation	50
TOTAL	400

Initially, cutoff scores for the final semester grades of "A", "B", etc. will be based upon the use of a traditional scale—*i.e.*, A = 90-100 ; B = 80-89; etc. Adjustments to grade cutoff scores might then be made depending upon the distribution of the students' final grades and the instructor's overall assessment of student achievement based upon student participation in the class, homework, etc. Such adjustments are made at my discretion, and only when warranted. (*e.g.*, Question 2 on the final contained misleading wording or data which resulted in a

disproportionate number of wrong answers, and so no student should have their grade penalized for circumstances beyond their control.)

ABSENCES

Attendance will be taken on a random basis. Student's final grade will be partially based on class attendance, as described in the grading policy above.

It is the student's responsibility to make up for any classes which they may have missed. If you know that you must miss one or more classes, please let you might let me know by email, if possible, so that I may assist you in making sure that handouts, etc., are saved for you. I will not have any provisions available for missed examinations. It will be the student's responsibility to make sure that they are present on the day of examinations. Excused absences on the day of an exam can only be honored if accompanied by a note from a doctor.

HONOR & ETHICS

The code of unspoken ethics in a professional work environment in the US will apply in the classroom. That is, honesty and ethical conduct will not only be expected, but demanded. Please see me if you have any confusion on what I mean. Obviously, cheating on an exam is not permitted. No talking or sharing of even stationary of class handouts is allowed during the exam. Students caught in violation of this policy will end up with failing grades on their exam and/or course. Cooperation in responding to homework questions is not only permitted, but encouraged, as part of the cooperative learning framework of the course. However, copy someone else's homework and handing it in as their own is not permitted.

TOPICS COVERED THIS SEMESTER

Chapter 6: Random Sampling & Data Description

Chapter 7: Point Estimation of Parameters

Chapter 8: Statistical Intervals for a Single Sample

Chapter 9: Tests of Hypotheses for a Single Sample

Chapter 10: Statistical Inference for Two Samples

Chapter 11: Simple Linear Regression and Correlation

Chapter 12: Multiple Linear Regression

Chapter 13: Design and Analysis of Single-Factor Experiments:
The Analysis of Variance

Chapter 14: Design of Experiments with Several Factors (1st half)

Chapter 15: Nonparametric Statistics

SCHEDULE OF TOPICS

DATE	TOPIC	HW - 3 rd Edition	HW - 4 th Edition
Tu 1/9	Course Overview		
Th 1/11	Chapter 6	6-65, 6-77 (Minitab), 6-85	
Tu 1/16	Ch 7: Point Estimation & Review (except 7.3-2 Max Likelihood Est.)	7-2,4,8,12,29,34,36 (caution: advanced hw asst.!!)	7.15, 19, 23, 2 ,3
Th 1/18	Continued		
Tu 1/23	Ch 8: Statistical Intervals	8-1, 7, 26, 36, 44	8.1, 7, 33, 40, 52
Th 1/25	Continued		
	Ch 9: Single Sample Hypothesis Tests	9-5, 20, 27, 39, 46, 50, 60, 72	9.7(a), 36, 41, 46,72, 85, 87, 102.
	Continued		
Tu 1/30	Ch 10: Two sample tests	10-2, 20, 38, 50	10.5, 16, 32, 46.
Th 2/1	Continued		
Tu 2/6	Ch. 11 Simple Linear Regression	11-6, 11-8	11.5, 7
Th 2/8	Properties of Estimators	11-20, 25	11.23 28
Tu 2/13	Confidence Intervals, Adequacy, Lack of Fit	11-33, 11-36, 11-44,	11.39, 42, 53.
Th 2/15	Ch 12: Multiple linear regression	12-2 (NOTE: $C21=C12=-1.237$ $\times 10^{-4}$), 12-4, 12-15, 12-20	12.2, 12.15, 12.31, 12.33
Tu 2/20	Cont'd		
Th 2/22	Confidence intervals; prediction	12-26 (NOTE: $MSE =$ 8.0643), 12-28, 12-36	12.36, 49, 53,
Tu 2/27	Cont'd		
Th 3/1	MIDTERM EXAM		
Tu 3/6	Model adequacy checking Polynomial regression/ Categorical variables		
Th 3/8	Model building; Multicollinearity	12-46, 12-55	12.66, 76
3/13, 3/15	WINTER BREAK		
Tu 3/20	Ch. 13 DOE intro	13-2, 13-6, 13-11	13.2, 4, 15(a)
Th 3/22	Continued		

Tu 3/27	Random effects model	13-23	13.29
Th 3/29	Randomized block design	13-25, 13-26	33, 34
Tu 4/3	CH 14 Factorial Experiments	14-1, 8	14.3, 8.
Th 4/5	Continued		
Tu 4/10	General factorial/Unreplicated factorial designs	14-12,14-13, 14, 14-18	14.10, 12, 13, 18
Th 4/12	Ch 15 Nonparametric statistics	15-2, 15-3, 15-12, 15- 24	
Tu 4/17	Kruskal-Wallis	15-28,15-30	
Th 4/19	REVIEW DAY		
T 4/24			
Th 4/26	FINAL EXAM		
