CHEM789
Experimental Design and Statistics in Chemistry
Spring Term 2005

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Class Time: Monday 7:30-8:50 pm
Wednesday 6:00-7:20 pm
Class Room: Disque 307
Office Hours: Wednesday 4:00-6:00 pm

Required Textbook:

Douglas C. Montgomery, Design and Analysis of Experiments, 6th ed., New York: John Wiley & Sons, Inc., 2005.

Course Grading:

Take-home mid-term exam (distributed 4/25/05)	35%
Take-home final exam (distributed 6/1/05)	40%
Problem sets	25%

Additional Texts of Interest:

John R. Taylor, An Introduction to Error Analysis: The Studies of Uncertainties in Physical Measurements, Mill Valley, CA: University Science Books, 1982.

Norman Draper, Harry Smith, Applied Regression Analysis, 3rd ed., New York: John Wiley & sons, Inc., 1998. (ISBN: 0-471-17082-8)

David G. Kleinbaum, Lawrence L. Kupper, Applied Regression Analysis and Other Multivariable Methods, North Scituate, MA: Duxbury Press, 1978.

George E.P. Box, J. Stuart Hunter, William G. Hunter, Statistics for Experimenters: Design, Innovation and Discovery, 2nd ed., New York: John Wiley & Sons, 2005. (ISBN: 0-471-71813-0)

Charles K. Bayne, Ira B. Rubin, Practical Experimental Designs and Optimization Methods for Chemists, Deerfield Beach, FL: VCH Publishers, Inc., 1986.

William J. Diamond, Practical Experimental Designs for Engineers and Scientists, Belmont, CA: Lifetime Learning Publications, 1981.

Course Outline:

Basic Statistics — Chapter 2
- measures of central tendency
- measures of dispersion
- confidence intervals
- pooling of standard deviations
- treatment of outliers
- means testing

variance testing	
Error Analysis	
propagation of error	
Regression Analysis	Chapter 10
derivation of normal equations	
regression analysis tables (analysis of variance of regression)	
treatment of outliers	
use of regression lines	
prediction	
discrimination	
confidence intervals	
sensitivity	
detection limits	
Analysis of Variance	Chapter 3
one-way designs	
two-way designs	
Experimental Design Methods	Chapter 5
factorial designs	Chapter 6-7
fractional factorial designs	Chapter 8
central composite designs	
Three-level and mixed-level designs	Chapter 9
Optimization Methods	Chapter 11
steepest ascent methods	
simplex optimization	

WebCT:

We will be using WebCT (Drexel's on-line course tool package) to enhance communication in CHEM789. The instructions below tell you how to log on and begin using WebCT.

1) Enter the Drexel WebCT web site at http://webct.drexel.edu or through DrexelOne.
2) After logging in to WebCT, select **CHEM789** from the list of courses on the left side of the screen.
3) You will now be in the **CHEM789** course area. Select the **Bulletins** icon to read posted messages, the **Calendar** icon for the course schedule, etc.

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