The University of Western Ontario
Faculty of Engineering Science

DEPARTMENT OF CHEMICAL AND BIOCHEMICAL ENGINEERING

CBE 4494B -STATISTICAL PROCESS ANALYSIS

Course Outline 2009-2010

This course is for engineers involved with experimental investigation and interpretation of data. Basic, applied statistical concepts are reviewed. Regression analysis techniques for fitting and discrimination of theoretical models are discussed. Methods for design and analysis of experiments are examined, with emphasis on factorial designs, and response surfaces.

The general objectives will require the student to be able to:

- understand and apply basic applied statistical concepts to engineering problems
- use matrix methods to develop linear least squares analysis and analysis of variance for both single and multi-response systems
- understand and apply methods for nonlinear parameter estimation in both algebraic and differential systems
- apply Factorial and Response Surface Methods to experimental design

Prerequisites:
Statistical Sciences 2141A/B or 2143A/B

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

Corequisites:
None

Antirequisites:
None

Contact Hours:
3 lecture hours, 1 tutorial hours, 0.5 course.

Instructor:
Dr. A. Hrymak (SEB 2008) Tel: 519-661-2111 ext: 82128 email:ahrymak@eng.uwo.ca

Required Text:
Applied Statistics and Probability for Engineers 5th Edition, D. C. Montgomery and G.C. Runger, Wiley

Course Notes:
Will be available on the Course WebCT

Lab Notes:
None

Reference Texts:
W. Mendenhall and T. Sincich, 'Statistics for Engineering and the Sciences', 3rd edition, Collier MacMillan, 1992

Laboratory:
None

Units:
SI and British units will be used

General Learning Objectives

Knowledge Base	√	Individual Work	x	Ethics and Equity	x
Problem Analysis	√	Team Work	x	Economics and Project Management	x
Investigation	√	Communication	x	Life-Long Learning	x
Design	x	Professionalism	x		
Engineering Tools	x	Impact on Society	x		

Specified Learning Objectives:
Introduction to Applied Statistics
At the end of this topic, students should be able to:
- be familiar with normal, chi-squared and F and t distributions
- confidence limits
- hypothesis tests

Regression Analysis
At the end of this topic, students will be conversant with and be able to apply concepts in:
- linear least squares
- ANOVA
- matrix methods
- joint confidence regions
- multi-response estimation
- parameter estimation in differential systems

Design of Experiments
At the end of this topic, students should be able to:
- understand the concept of design of experiments and confounding of factors
- set up full and fractional factorial experiments
- set up multi-level experiments and response surface methods

Evaluation:
Five assignments using computer packages based on Matlab Statistical Toolbox will be assigned. Students will be required to prepare a presentation based on a list of topics and answer questions.

The final mark will be determined as follows:

Assignments	50%
Class Presentation	50%

Assignments are to be handed in to the CBE 4494b locker #C454 located in the Thompson Engineering Building, on the specified due date provided by the Instructor.

Use of English

In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for the improper use of English. Additionally, poorly written work with the exception of the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

Attendance

Any student who, in the opinion of the instructor, is absent too frequently from class or laboratory periods in any course, will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular examination in the course.

Cheating

University policy states that cheating is a scholastic offence. The commission of a scholastic offence is attended by academic penalties, which might include expulsion from the program. If you are caught cheating, there will be no second warning (see Scholastic Offence Policy in the Western Academic Calendar).

Plagiarism

Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar).

The University of Western Ontario has software for plagiarism checking. Students may be required to submit their work in electronic form for plagiarism checking.

Conduct:

Students are expected to arrive at lectures on time, and to conduct themselves during class in a professional and respectful manner that is not disruptive to others.

Sickness and Other Problems:

Students should immediately consult with the instructor or Department Chair if they have any problems that could affect their performance in the course. Where appropriate, the problems should be documented (see attached). The student should seek advice from the Instructor or Department Chair regarding how best to deal with the problem. Failure to notify the Instructor or Department Chair immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

Notice:

Students are responsible for regularly checking their email and notices posted on Instructors' doors.

Consultation:

Students are encouraged to discuss problems with their teaching assistant and/or instructor in tutorial sessions. Office hours will be arranged for the students to see the instructor and teaching assistants. Other individual consultation can be arranged by appointment with the appropriate instructor.

Accreditation (AU) Breakdown

Engineering Science = 50%
Engineering Design = 50%

November 23, 2009/mt