Philadelphia University
Department of Basic Sciences and Mathematics

Second Semester **Course Syllabus** **2011/2012**

Course Title	Design of Experiments
Course Code	250331
Lecturer	
Office Room	
Office Hours	
E−mail	
Webpage	

Course Description

This is a basic course in designing experiments and analyzing the resulting data. The course deals with the types of experiments that are frequently conducted in industrial settings. The prerequisite background is a basic working knowledge of statistical methods. You will need to know how to compute and interpret the sample mean and standard deviation, have previous exposure to the normal distribution, be familiar with the concepts of testing hypotheses (the t-test, for example), constructing and interpreting a confidence interval, and model-fitting using the method of least squares. Most of these ideas will be reviewed as they are needed. Students completing the course are expected to be knowledgeable in the basic experimental designs. Materials covered in the course include Introduction to Statistics and Data Analysis, Inferential Data Analysis for Simple Experiments, One Factor Designs, One Factor Blocking Designs, Latin Square Designs.

Assessment Distribution

Students will be assessed based on a 100 total marks, which are distributed as follows.

Exam Type	**Expected Time**	**Points Allocated**
First		20%
Second		20%
Quizzes		20%
Final		40%

Textbook and Supporting Materials

− D. C. Montgomery and G. C. Runger, **Applied Statistics and Probability for Engineers, 5th Edition**, John Wiley & Sons, Inc. 2011. Call number in PU library: 519.5 MON.

− D. C. Montgomery, **Design and Analysis of Experiments, 7th Edition**, John Wiley & Sons, Inc. 2009. Call number in PU library: 519.57 MON.

Course Objectives The course objective is to learn how to plan, design and conduct experiments efficiently and effectively, and analyze the resulting data to obtain objective conclusions. Both design and statistical analysis issues are discussed. Opportunities to use the principles taught in the course arise in all phases of engineering and scientific work,

including technology development, new product design and development, process development, and manufacturing process improvement. Computer software package, Minitab 15 (http://www.minitab.com), to implement the methods presented will be illustrated extensively, and you will use this package for homework assignments.

Topics by the Week

Week	Topics
1	**Tests of Hypotheses for a Single Sample:** Hypothesis Testing.
2	Tests on the Mean of a Normal Distribution, Variance Known. Tests on the Mean of a Normal Distribution, Variance Unknown.
3	Tests on the Variance and Standard Deviation of a Normal Distribution. Tests on a Population Proportion. Summary Table of Inference Procedures for a Single Sample.
4	**Statistical Inference for Two Samples:** Inference on the Difference in Means of Two Normal Distributions, Variances Known. Inference on the Difference in Means of Two Normal Distributions, Variances Unknown.
5	A Nonparametric Test for the Difference in Two Means. Paired $t-$Test.
6	Inference on the Variances of Two Normal Distributions. Inference on Two Population Proportions. Summary Table and Roadmap for Inference Procedures for Two Samples.
7	**Design and Analysis of Single−Factor Experiments: The Analysis of Variance:** Designing Engineering Experiments.
8	Completely Randomized Single−Factor Experiment.
9	The Random-Effects Model.
10	Randomized Complete Block Design.
11	**Design of Experiments with Several Factors:** Introduction. Factorial Experiments.
12	Two−Factor Factorial Experiments. General Factorial Experiments.
13	2^k Factorial Designs.
14	Blocking and Confounding in the 2^k Design.
15	Fractional Replication of the 2^k Design. Response Surface Methods and Designs.
16	Final Exams.

Class Attendance

Attendance is expected of every student. Being absent is not an excuse for not knowing about any important information that may have been given in class. Under the University's regulations, a student whose absence record exceeds 15% of total class hours will automatically fail the course. Students who in any way disrupt the class will be expelled from the classroom and will not be allowed to return until the problem has been resolved.

Project Assignments

Students are allowed to work together on a project assignment; however, the work that is turned in by each student must be his own. For instance, a mere copy of another student's work will not be graded. A written project must be properly presented to receive full credit. A late project is penalized one point per day after its due date. A project sent by email will not be accepted.

Late Exams

Late (make-up) exams will be given only to students who have a valid excuse and are able to provide a written document for its verification. The level of difficulty of a late exam is about 50% higher than that of the corresponding regular exam. All late exams will be conducted during the last week of the semester. Each student is allowed only one make-up in a semester, either for the first exam or the second, but not both. There is no make-up for a late exam.

Dishonesty

Any form of dishonest conduct will be strictly punished. A student who is caught cheating, or attempting to do so in an exam will be given a zero for the exam and a report will be written to the Dean for further action. A student who helps another student or is seen communicating with another student in an exam will be given the same penalty stated in the previous point. Students with different exam forms are not exempt from the above rules. Repeat offenders will be expelled permanently and banned from future courses.