

ENGR 540 - Design of Engineering Experiments – Spring 2017

Instructor: Prof. Manoj K. Mohanty
College of Engineering
Southern Illinois University at Carbondale

COURSE SYLLABUS

Instructor Code: 705
3 Credit Hours
5.00 - 6.15 T, R
Room # A-29

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Office: Engineering E-8
Phone: 618 453 7910
Office Hrs: 2.00 – 3.30 T and R

Objectives:

- The objective of this course is to teach how to design and conduct experiments efficiently and analyze the resulting data to obtain meaningful conclusions. Both statistical design and analysis issues will be discussed.
- Applications from various fields of engineering (including chemical, mechanical, civil, mining engineering, materials science, industrial engineering, etc.) will be illustrated throughout the course.
- A Computer software package (Design Expert) to implement the methods presented will be illustrated and the students will be required to use this software for a class project.

Required Textbook: *Design and Analysis of Experiments*, 8th edition, by D. C. Montgomery, John Wiley & Sons, New York, 2012-1013

Prerequisite: MATH 483 or MNGE 417, or an Introductory Probability and Statistics course.

Reference Books:

1. Statistics for Engineering and the Sciences - Mendenhall W. and Sincich T., Prentice Hall, 1995, Fourth Edition.
2. Statistics for Experimenters - Box, Hunter & Hunter - John Wiley, 1978.
3. Statistical Design & Analysis of Experiments - Mason, Gunst and Hess - John Wiley, 1989.
4. Applied Linear Statistical Models - Neter, Wasserman, Kutner – Richard Irwin, Inc. Homewood, IL, 1985, Second Edition.
5. Probability and Statistics for Engineers - Miller & Freund - Prentice Hall, 1985, Third Edition.
6. Applied Regression Analysis - Draper, Smith, John Wiley, 1976.

Course Contents:

1. Introduction (Chapter 1)
2. Simple Comparative Experiments (Chapter 2)
 - Sampling Distributions
 - Hypothesis Testing
3. Experiments with Single Factor (Chapter 3)
 - Analysis of Variance (ANOVA)
 - Model Adequacy Checking
 - Practical Interpretation of Results
4. Completely Randomized and Randomized Block Designs (Chapter 4)
5. Introduction to Factorial Designs (Chapter 5)
6. The 2^k Factorial Design (Chapters 6-7)
7. Fractional Factorial Design (Chapters 8-9)
8. Fitting Linear Regression Models (Chapter 10)
9. Response Surface Methods and Process Optimization (Chapter 11)

Grading:

Homework:	20%
Project (includes a written report and an oral presentation):	20%
Midterm Exam (TBA):	30%
Final Exam (May 11, 5 to 7 pm):	30%

The standard university grading policy is usually followed. A relative grading procedure may be followed only if the instructor feels it necessary.

Late Policy

Late homework and project reports will be penalized at a rate of 5 points for each day after the assigned due date. **No homework will be accepted one week or more after the due date.**

Office of the Provost: <http://pvcaa.siu.edu/>

IMPORTANT DATES *

<u>Semester Class Begins:</u>	01/17/2017
<u>Last day to add full-term course (without Dean's signature):</u>	01/22/2017
<u>Last day to withdraw from the University with a full refund:</u>	01/27/2017
<u>Last day to drop a full-term course for a credit/refund:</u>	01/29/2017
<u>Deadline to apply to graduate at the end of this term:</u>	04/2/2017
<u>Final examinations:</u>	5/8-5/12/2017
<u>Commencement:</u>	5/13/2017

Note: For more detailed information on the above deadlines, please visit <http://registrar.siu.edu/calendars>. For add/drop dates that apply to shorter-than-full-term courses, please look at the [Schedule of Classes search results at http://registrar.siu.edu/schedclass/index.php](http://registrar.siu.edu/schedclass/index.php)

SPRING SEMESTER HOLIDAYS

Martin Luther King Jr.'s Birthday Holiday 01/16/2017
Spring Break 3/11-3/19/2017

WITHDRAWAL POLICY ~ Undergraduate only

Students who officially register for a session must officially withdraw from that registration in a timely manner to avoid being charged as well as receiving a failing grade for those classes. An official withdrawal must be initiated by the student, or on behalf of the student through the academic unit, and be processed by the Registrar's office. For the proper procedures to follow when dropping courses and when withdrawing from SIU visit: <http://registrar.siu.edu/students/withdrawal.php>

INCOMPLETE POLICY~ Undergraduate only

An INC grade may be assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments for the course. An INC must be changed to a completed grade within one full semester (undergraduates), and one full year (graduate students), from the close of the term in which the course was taken or graduation, whichever occurs first. Should the student fail to complete the remaining course requirements within the time period designated, the incomplete will be converted to a grade of F and such grade will be computed in the student's grade point average. For more information visit: <http://registrar.siu.edu/grades/incomplete.php>

REPEAT POLICY

An undergraduate student may, for the purpose of raising a grade, enroll in a course for credit more than once. For students receiving a letter grade of A, B, C, D, or F, the course repetition must occur at Southern Illinois University Carbondale. Effective for courses taken Summer 2013 or later, only the most recent (last) grade will be calculated in the overall GPA and count toward hours earned.

This policy will be applied to all transferrable credit in that only the last grade will be used to calculate grade point average. Only those courses taken at the same institution are considered repeats under this policy. See full policy at <http://registrar.siu.edu/students/repeatclasses.php>

GRADUATE POLICIES

Graduate policies often vary from Undergraduate policies. To view the applicable policies for graduate students, please refer to the graduate catalog at <http://gradschool.siu.edu/about-us/grad-catalog/>

DISABILITY POLICY

Disability Support Services provides the required academic and programmatic support services to students with permanent and temporary disabilities. DSS provides centralized coordination and referral services. To utilize DSS services, students must contact DSS to open cases. The process involves interviews, reviews of student-supplied documentation, and completion of Disability Accommodation Agreements. <http://disabilityservices.siu.edu/>

PLAGIARISM

Student Conduct Code <http://srr.siu.edu/student-conduct-code/>
Guidelines for Faculty <http://pvcaa.siu.edu/common/documents/Plagiarism/Guide%20to%20Preventing%20Plagiarism.pdf>

SAFETY AWARENESS FACTS AND EDUCATION

Title IX makes it clear that violence and harassment based on sex and gender is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. If you or someone you know has been harassed or assaulted, you can find the appropriate resources here:

<http://safe.siu.edu>

SALUKI CARES

The purpose of Saluki Cares is to develop, facilitate and coordinate a university-wide program of care and support for students in any type of distress—physical, emotional, financial, or personal. By working closely with faculty, staff, students and their families, SIU will continue to display a culture of care and demonstrate to our students and their families that they are an important part of the community. For Information on Saluki Cares: call(618) 453-1492, email siucares@siu.edu, or <http://salukicares.siu.edu/>

SIU'S EARLY WARNING INTERVENTION PROGRAM (EWIP)

Students enrolled in courses participating in SIU's Early Warning Intervention Program might be contacted by University staff during a semester. More information can be found at the Core Curriculum's Overview webpage: <http://corecurriculum.siu.edu/program-overview/>

EMERGENCY PROCEDURES

We ask that you become familiar with **Emergency Preparedness @ SIU**. Emergency response information is available on posters in buildings on campus, on the Emergency Preparedness @ SIU website, and through text and email alerts. To register for alerts visit: <http://emergency.siu.edu/>

STUDENT MULTICULTURAL RESOURCE CENTER

The Student Multicultural Resource Center serves as a catalyst for inclusion, diversity and innovation. As the Center continues its work, we are here to ensure that you think, grow and succeed. We encourage you to stop by the Center, located in Grinnell Commons, to see the resources available and discover ways you can get involved on the campus. Visit us at <http://inclusivexcellence.siu.edu/>

LEARNING AND SUPPORT SERVICES

Help is within reach. Learning support services offers free tutoring on campus and math labs. To find more information please visit the Center for Learning and Support Services website:

Tutoring : <http://tutoring.siu.edu/>

Math Labs <http://math.siu.edu/courses/course-help.php>

WRITING CENTER

The Writing Center offers free tutoring services to all SIU students and faculty. To find a Center or Schedule an appointment please visit:

<http://write.siu.edu/>

AFFIRMATIVE ACTION & EQUAL OPPORTUNITY

Our office's main focus is to ensure that the university complies with federal and state equity policies and handles reporting and investigating of discrimination cases. For more information visit: <http://diversity.siu.edu/#>

MILITARY COMMUNITY

There are complexities of being a member of the military community and also a student. Drill schedules, calls to active duty, complications with GI Bill disbursement, and other unforeseen military and veteran related developments can complicate academic life. If you are a member of the military community and in need of accommodations please visit Veterans Services at <http://veterans.siu.edu/>

Additional Resources:

ADVISEMENT: <http://advisement.siu.edu/>

SIU ONLINE: <https://online.siu.edu/>

SALUKI SOLUTION FINDER: <http://solutionfinder.siu.edu/>

MORRIS LIBRARY HOURS: <http://libguides.lib.siu.edu/hours>