

ISE 525 Design of Experiments  
Spring Semester 2022  
Tu,Th 2:00 -3:20 pm, RTH 115  
Web site: courses.uscdcn.net

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Recommended Preparation: ISE 225 Engineering Statistics I (or equivalent)

Objective: In this course, you will develop the skills necessary to plan efficient data collection activities, derive empirical models of physical systems, and perform sequential optimization studies based upon the empirical models.

Text: Myers, Montgomery, and Anderson-Cook, Response Surface Methodology, fourth edition

Course Material: Chapters 1-8 and 11 of the text, plus topics discussed in lecture by the instructor

Grading Policies:

Points Breakdown -

Homework	90
Project	150
Exam #1	140
Exam #2	<u>120</u>
Total	500

Course GRADES will be determined by the distribution of point totals for the class. “Natural groupings” will be used to assign letter grades. The highest scoring group will receive A’s, the next group is the B’s, and so on. A single point will not be the difference between any two letter grades. A “gap” must exist to create a grade boundary.

HOMEWORK assignments will be due on the following Thursdays:

**January 27; February 3, 10; March 3, 10, 24**

Homework will be graded on an “all or nothing” basis. If a paper shows an answer to each assigned exercise that uses approximately the correct method, the grade for the assignment is 15 points. If any exercise is unacceptable, the grade for the assignment is 0 points. Late assignments will be accepted until the Monday following the original due date.

A PROJECT will be due on the following date:

**Tuesday, April 26**

The project will involve investigation and optimization of a response surface. You will collect data from a computer simulation, in order to model the surface. For this project, you may work either individually or in pairs. The project assignment will be distributed about two or three weeks in advance of the due date.

An EXAM will be given on each of the following dates:

**Thursday, February 17 and Thursday, March 31**

The exam will cover the material presented up to and including the preceding homework assignment. Points will be assigned to each section of the exam. Partial credit will be awarded according to work shown. No re-takes will be allowed. No make-up exam will be given.

Week	Topic(s)	Text Sections
1	Response Surface Studies, Simple and Multiple Linear Regression	1.1, 2.1 - 2.3
2	Regression Significance	2.4 - 2.5
3	Model Selection and Diagnostics	2.6 - 2.8, Handout
4	Response Transformations, Factorial Experiments	2.9 - 2.10, 3.2
5	Coded Variables, Orthogonality, Lack of Replication, Center Points	3.3 - 3.5, 3.7
6	Exam	
7	Blocking, Fractional Factorial Experiments	3.8, 4.2
8	Multi-factor Experiment Workshop	
9	Deconfounding, Fold-Over, Steepest Ascent	4.3 - 4.7, 5.1, 5.3, 5.5
10	Canonical Analysis, Ridge Analysis, Design Properties	5.2, 6.2 - 6.4, 8.1 - 8.2
11	Central Composite Design, Exam	8.3 (omit 8.3.3 and 8.3.4), 8.4.1
12	Central Composite Design (cont.),	8.4.2 - 8.4.6
13	Multiple Responses	7.1 - 7.2
14	Taguchi's Parameter Design	11.2 - 11.3
15	Project Review, Learning Experience Evaluation	

**COVID-19 Statement:**

In keeping with University policy, all students are required to engage in appropriate behavior to protect the health and safety of our community. If you feel ill or are unable to come to class or complete class assignments due to issues related to COVID-19, including but not limited to: testing positive yourself, feeling ill, caring for a family member with COVID-19, or having unexpected child-care obligations, contact the instructor immediately.

**Academic Conduct:**

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards”

<https://policy.usc.edu/scampus-part-b/>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

**Support Systems:**

*The Office of Student Accessibility Services*

Provides certification for students with disabilities and helps arrange relevant accommodations.

<http://osas.usc.edu>

*Student Counseling Services (SCS) - (213) 740-7711 – 24/7 on call*

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. <https://engemannshc.usc.edu/counseling/>

*National Suicide Prevention Lifeline - 1-800-273-8255*

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. <http://www.suicidepreventionlifeline.org>

*Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 - 24/7 on call*

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

<https://engemannshc.usc.edu/rsvp/>

*Sexual Assault Resource Center*

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: <http://sarc.usc.edu/>

*Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086*

Works with faculty, staff, visitors, applicants, and students around issues of protected class.

<https://equity.usc.edu/>

*Bias Assessment Response and Support*

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. <https://studentaffairs.usc.edu/bias-assessment-response-support/>

*Student Support and Advocacy – (213) 821-4710*

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. <https://studentaffairs.usc.edu/ssa/>

*Diversity at USC*

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. <https://diversity.usc.edu/>

*USC Emergency Information*

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible, <http://emergency.usc.edu>

*USC Department of Public Safety – 213-740-4321 (UPC) and 323-442-1000 (HSC) for 24-hour emergency assistance or to report a crime.*

Provides overall safety to USC community. <http://dps.usc.edu>