Experimental Design
Stat 514 - Fall 2018

TR 3:00 - 4:15 WANG 2555

Instructor Bruce A. Craig
Office MATH 250
Office Hours M 3:00 - 4:30, F 3:00-4:30, or by appt
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Textbook : Design and Analysis of Experiments (8th Edition) - Montgomery

Course Objectives : To be able to plan an experiment in such a way that the statistical analysis results in valid and objective conclusions. To learn a variety of experimental designs and be able to choose an appropriate design for a specific study. To be able to perform the proper statistical analysis and draw valid conclusions from a specific experiment.

Computing : We will primarily use SAS output in lectures, homework, and exams. SAS code will be provided on the course Web page for all output presented in class. Statistical software, such as JMP, SPSS, R, and MATLAB, can be used for homework and the project but we (instructor and TA) not responsible for providing technical support.

Breakdown of Grade : The final grade is based on a total of 500 points broken down into Homework 125 pts, Exams (3) 300 pts, and a Project 75 pts. The general policy is 90% for an A, 80% for a B, etc. Cutpoints may be lowered but will never be raised. Plus/minus grades are given when appropriate. The group project will begin on about the third week and conclude with a written summary and a class presentation the last week of class. Each exam focuses on the course material covered since the previous exam but it will still contain earlier material due to the repetition of concepts.

Attendance : Attendance is optional but you are responsible for any announcements and the material covered during the lecture. If you cannot attend an exam at the assigned time because of an unplanned but legitimate reason (e.g., sickness, family emergency), a make-up exam will be scheduled. If you have another reason, such as a job interview or plan to attend a conference, you must notify me at least two weeks prior to the exam in order to decide on the legitimacy of the reason and the possibility of rescheduling the exam. Arranging cheap airfare home prior to the final is never a legitimate reason.

Emergencies : In the event of a major campus emergency, course requirements, deadlines, and grading percentages are subject to changes that may be necessitated by a revised calendar or other circumstances beyond the instructor’s control. Relevant changes to this course will be posted onto the course website.
Homework: Homework will primarily be due Tuesdays by 11:59 PM. They can be turned in via Gradescope (link on Blackboard course page). Homeworks cannot be turned in after the deadline so it is best to turn a partially completed homework than nothing at all. Homeworks cannot be made up. Due date exceptions may be arranged if discussed at least one week in advance. Expect around 11 hws during the semester. The lowest homework score will be dropped when computing the final HW grade. They will be handed out at least one week in advance so you can work around potential conflicts. All homeworks will be graded by a grader and then checked by me before their return. Should you have questions regarding the scoring, talk to me as I will keep the official homework grades. I reserve the right to look at all exercises should there be a question regarding partial credit. Gradescope is an online grading app that should make it easier for the TA/instructor to electronically handle grading, thereby providing a speedier return. It requires that you submit a single PDF file or scan the pages into a file. I will provide more information on the course Web site and during class.

HOMEWORK POLICY

Your homework must have the exercises presented in order. The solutions must be clearly readable (hand written or word processor) and easy to follow. These solutions should include all relevant graphs and tables appropriately labeled and described. You are limited to a maximum of three pages per exercise (unless discussed with me). Any graph or table that is turned in without comment or spans across more than one page will be ignored. You can use a word processor or editor to edit or cut and paste specific software output. Providing extra output and not highlighting the important information or providing hard to follow answers can result in a loss of points. You are permitted to discuss the homework exercises with fellow students but each must write up their own solution. Failure to follow this policy will result in an initial warning, followed by a 50% reduction in points, then a 100% reduction in points.

Purdue Honors Pledge: As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue.

Important Dates: –These will be updated through the semester–

- EXAM I (Tues Oct 2nd 8:00-10:00 PM - ME 1061)
- Tues Oct 9th - NO CLASS (October Break)
- EXAM II (Tues Nov 6th 8:00-10:00 PM - ME 1061)
- TBD - NO CLASS (replaced by evening exams)
- Tues Nov 20th - NO CLASS (replaced by evening exams)
- Thur Nov 22nd - NO CLASS (Thanksgiving)
- EXAM III (During finals week - TBA)
Other Helpful Texts:

- A First Course in Design and Analysis of Experiments - Oehlert (2000)
- Analysis of Messy Data - Milliken and Johnson (2009)
- Statistics for Experimenters - Box, Hunter, and Hunter (2005)

Course Schedule:

<table>
<thead>
<tr>
<th>Chapter(s)</th>
<th>Description</th>
<th>Approx. Time</th>
</tr>
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<tbody>
<tr>
<td>2</td>
<td>Overview of Design Principles and Hypothesis Testing</td>
<td>1 wk</td>
</tr>
<tr>
<td>3,12,14</td>
<td>Completely Randomized Design</td>
<td>3 weeks</td>
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<tr>
<td>4</td>
<td>Randomized Block Designs</td>
<td>3 weeks</td>
</tr>
<tr>
<td>5,14</td>
<td>Factorial Designs</td>
<td>1 week</td>
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<tr>
<td>12</td>
<td>Mixed Models/Random Effects</td>
<td>1.5 weeks</td>
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<tr>
<td>13</td>
<td>Nested Designs, Split Plot, Repeated Measures</td>
<td>3.5 weeks</td>
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<tr>
<td>6,7,8</td>
<td>Fractional Factorial Designs</td>
<td>1 week</td>
</tr>
<tr>
<td>11</td>
<td>Response Surface Methods</td>
<td>1 week</td>
</tr>
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Well-being Resources: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 and http://www.purdue.edu/caps/ during and after hours, on weekends and holidays, or by going to the CAPS office of the second floor of the Purdue University Student Health Center (PUSH) during business hours.