Experimental Design
Stat 514 - Maymester 2017

MTWR 8:40-11:30 REC 316

Instructor Bruce A. Craig
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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 (Version 9.4). Template SAS programs, data sets, and other information will be posted on the course Web page. Other statistical software can be used for homework but SAS output will be used in lectures, homework, and exams.

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 day and conclude with a written summary and a class presentation the last day of class. Each exam focuses on the new course material covered since the previous exam but will contain earlier material due to the repetition of concepts.

Attendance: Attendance is not required but strongly encouraged. This is a very condensed course so missing one day is comparable to missing a week during a regular semester. Alternative exam times will only be granted if there is an emergency. Official verification of the emergency is required. The exams will be given during class hours (plus a little extra time) but in a larger room.

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 be due most days at the beginning of class (either in person or via Blackboard). Shortly thereafter an answer key will be made available on the Web page. It
is better to turn in what you have completed instead of nothing at all. Exceptions might be possible if discussed in advance. Expect around 12 homeworks during the course. They will be posted at least a day in advance. If there are 12 HWs, the lowest homework score will be dropped when computing the final HW grade.

**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 (you can request an exception). 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. You are permitted to work together to solve the homework exercises but each student must write up their own solution. Failure to follow this policy will result in an initial warning, followed by a 20% reduction in points, then a 40% reduction in points, etc.

**Course Schedule**:

<table>
<thead>
<tr>
<th>Chapter(s)</th>
<th>Description</th>
<th>Approx. Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Overview and Hypothesis Testing</td>
<td>1 day</td>
</tr>
<tr>
<td>3,12,14</td>
<td>Completely Randomized Design</td>
<td>2.5 days</td>
</tr>
<tr>
<td>4</td>
<td>Randomized Block Designs</td>
<td>3 days</td>
</tr>
<tr>
<td>5,14</td>
<td>Factorial Designs</td>
<td>1 day</td>
</tr>
<tr>
<td>12</td>
<td>Mixed Models/Random Effects</td>
<td>2 days</td>
</tr>
<tr>
<td>13</td>
<td>Nested Designs, Split Plot, Repeated Measures</td>
<td>3.5 days</td>
</tr>
<tr>
<td>6,7,8</td>
<td>Fractional Factorial Designs</td>
<td>1 day</td>
</tr>
</tbody>
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**Important Dates**:

- Wed. May 24th - EXAM I (10:15-12:00)
- Mon. May 29th - NO CLASS (Memorial Day)
- Thur. June 1st - EXAM II (10:15-12:00)
- Thus. June 8th - EXAM III (10:15-12:00)

**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)