

Stat 408/508 –Experimental Design (Spring 2009)

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| Instructor: | Dr. R. N. “Herb” McGrath |
| Office | 347 Business Administration |
| Email: | Rnmcgra@bgsu.edu |
| Phone: | (419) 372-8451 (but best to use email) |
| Office Hours: | TBD |
| Class Meetings | Tuesday, 1:00 - 2:15 BAA2003, Thursday, 1:00 – 2:15 BA 105 |

Text Montgomery, D.C. (2009), *Design and Analysis of Experiments*, Seventh Edition, Wiley.

Prerequisite: Math 441 or Math 541 (or Math 641) or consent of instructor.

Catalog Course Description: Constructing statistical designs and analyzing resulting data; basic experimental design and analysis of variance.

Homework: Homework will be assigned about once per week (approximately 10 assignments) and will be collected at the beginning of the class on the date due. Collaboration on homework is allowed. However, each student must hand in their own assignment that they created. Assignments that have been clearly copied electronically from another student and modified will result in a score of 0 for all parties involved. Some assignments may include individual problems only required for Stat 508 students.

Project: A group project will be assigned (with the groups being formed by the instructor) in which you are to design, run, and analyze an experiment. There will be three deliverables: 1) A proposal detailing how the experiment will be performed 2) a presentation of the analyses and conclusions, and 3) a report of the analyses and conclusions. More details will be provided. The project will be optional for students registered for Stat 408. However, the group presentations will be covered on the final exam so all students are expected to attend the presentation classes.

Exams: There will be a midterm exam (tentatively scheduled for March 17 1:00 - 2:15) and a final exam scheduled for Tuesday, May 5, 1:15 – 3:15. Both exams will be open book and open notes. The exams will be given in the computer lab so you will have access to statistical software. Note the day and time of the final. No make-up exams will be given unless there is an official university conflict. You are aware of the date and time now so arrange any post-semester travel accordingly.

Software: Blackboard will mainly be used in this course to post announcements, assignments, handouts, and grades. You are expected to check the site frequently (once per day during the week). Any handouts that you are expected to bring to lecture will be posted by 5:00pm the previous day.

I will probably use multiple statistical software packages during the class including SAS, Minitab, and the open source software package R for demonstration purposes. (No previous experience with these packages is required.) You may use any software when completing assignments and on exams (subject to availability). However, you are responsible for understanding what the software is doing (unless otherwise specified). While the use of software may be extensive for assignments, you will not be *specifically* tested on software usage on exams.

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| Grading Weights: | Homework | 20% |
| | Midterm Exam | 25% |
| | Project (proposal and report) | 25% |
| | Comprehensive Final Exam | 30% |

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| Tentative Grading Scale: | The final scale may be adjusted downward but do not count on it. It will not be tougher than this. | |
| | Final Average | Grade |
| | 90% ≤ 100% | A |
| | 80% < 90% | B |
| | 70% < 80% | C |
| | 60% < 70% | D |
| | 0 < 60% | F |

Very Tentative Course Outline

| Approximate Date | Reading in text (Should be completed before the given date) | Topic |
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| precourse | 1.1-1.6, 2.1-2.3 | Introduction to experimental design, basic statistical concepts, distributions, and analyses |
| 1/13 | 2.4 | Comparing a single mean to a standard |
| 1/15 | 2.4 | Comparing two means, independent case |
| 1/20 | 2.4 | Sample Size and Power (one and two samples) |
| 1/22 | 2.5 | Paired Comparisons |
| 1/27 | 3.1-3.3 | Single Factor Fixed Effects Model |
| 1/29 | 3.1-3.3 | Single Factor Fixed Effects Model |
| 2/3 | 3.4 | Assumption Checking |
| 2/5 | 3.4, 3.11, 15.1.1 | Approaches when assumptions violated |
| 2/10 | 3.5 | Contrasts |
| 2/12 | 3.5 | Contrasts |
| 2/17 | 3.7 | Sample Size and Power |
| 2/19 | 4.1 | Randomized Complete Block Designs |
| 2/24 | 4.1 | Randomized Complete Block Designs |
| 2/26 | 4.2-4.3 | Latin Squares |
| 3/3 | 4.4 | Balanced Incomplete Block Designs |
| 3/5 | 5.1-5.3 | Two Factor Factorials |
| 3/10 | | Spring Break |
| 3/12 | | Spring Break |
| 3/17 | | Midterm Exam |
| 3/19 | 5.4-5.5 | General Factorials |
| 3/24 | 5.6 | More on Blocking |
| 3/26 | 13.1-13.4 | Random and Mixed Effects Models |
| 3/31 | 13.1-13.4 | Random and Mixed Effects Models |
| 4/2 | 13.5-13.6 | Expected Mean Squares |
| 4/7 | 13.7 | Variance Components |
| 4/9 | 13.7 | Variance Components |
| 4/14 | 14.1-14.2 | Nested Designs |
| 4/16 | 14.1-14.2 | Nested Designs |
| 4/21 | | Project Presentations |
| 4/23 | | Project Presentations |
| 4/28 | | Project Presentations |
| 4/30 | | Project Presentations |
| 5/5 | | Final Exam (1:15 – 3:15) |