MATH 367/667: Linear Models, Spring 2015

Professor: Dr. Rob Erhardt
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Office Hours: Mondays 3-3:30 PM, Tuesdays 4-5:45 PM, and by appointment
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1. **Location and Time:** 2:00-2:50 MWF, Manchester 125

2. **Book:** Linear Models with R (Second Edition), by Julian Faraway.

3. **Prerequisites:** MTH 121 or 205 (Linear Algebra), and either MTH 256/656 (Statistical Models) or MTH 357/657 (Probability). Previous experience with linear algebra (vector and matrix algebra, matrix inverses, column space, orthogonality, etc.) is essential; prior exposure to probability or statistics is extremely helpful, but gaps can be overcome. No previous computer programming experience is needed.

4. **Outline:** This is a class covering the theory and application of a powerful class of statistical models known as *linear models*. Linear models relate a set of *explanatory variables* to a *response variable* for scientific explanation and prediction. Specifically, we will study estimation and inference (chapters 2-3), prediction vs. explanation (portions of chapters 4 and 5), diagnostics (chapter 6), and how to overcome some common problems encountered with linear models (bits of chapters 7-10).

While this list of topics closely mirrors those covered in MTH 256/656 Statistical Models, in this course we emphasize the derivation and mathematical proof of central results. We also greatly extend computer programming skills from what is required in MTH 256/656.

5. **What is Assigned:**

   • **Assignments:** (20%) We will have weekly homework assignments, generally due on Wednesdays. Assignments will blend some mathematical work with applied data analysis requiring some computer programming.

   • **Exams:** (18% each) There will be three in-class exams, on **Monday February 16**, **Monday March 30**, and **Monday April 27**. Specific topics and details on the exams will be announced the Wednesday prior to each exam.

   • **Final Exam:** (26%) Our comprehensive final exam will be held at 2PM on **Thursday May 7**.

6. **Software:** We will use R, a free statistical software program which can be found here: (http://cran.us.r-project.org/). Students must write their own computer programs from scratch, but no previous computer programming experience is needed.

7. **Grading:** Grades follow the standard scale, with cutoffs: 93 A, 90 A-, 87 B+, 83 B, 80 B-, 77 C+, 73 C, 70 C-, 67 D+, 63 D, 60 D-, and below 60 is F. Modest curving of grades may be used, but only at the end of the semester. Graduate students enrolled in MTH 667 will have some additional questions on homework assignments and exams.
8. **Honesty and Courtesy:** Academic dishonesty of any sort will not be tolerated, and could result in an immediate grade of F. Refer to [http://services.studentlife.wfu.edu/judicial-affairs/honor/](http://services.studentlife.wfu.edu/judicial-affairs/honor/). Phones, laptops, and other electronic devices are distractions when used for non-academic work in class. There is a mountain of research that shows we do lower quality work when distracted by electronic devices. Additionally, I find it extremely disheartening when I see students distracted by electronic devices during class. Surely you can last 50 minutes disconnected.

9. **Getting Help:** Come to my office hours, or e-mail me and set up an appointment. Please contact the Learning Assistance Center (758-5929) within the first two weeks of class if you require accommodations for taking this course due to a disability.