MATH 367/667: Linear Models, Spring 2015

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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/`. 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.