Syllabus: Math 4637/6637 Fall 2017

Course time: 4:00-5:25 MW
Room: 207 Dunn Hall
Instructor: Dr. Dale Bowman
Office: Room 357 Dunn Hall
Email: ddbowman@memphis.edu
Office hours: 3-4 MW or by appointment

Course description:

Introduction to statistical modeling and analysis with some applications to big data. Topics include: linear models – regression, analysis of variance, multiple comparisons, shrinkage methods, and model checking; dimension reduction methods; discriminant analysis and clustering; and Bayesian modeling and computation. Some knowledge of programming is useful but not required. Emphasis will be on analyzing data, less on the theoretical underpinnings. During class time you will be expected to **do** so attendance is very important.

Topics Covered

Exploratory data analysis – the must do!
Estimation – point and interval
Hypothesis Testing – t-tests and what to do if your data is not normal or even numerical
Correlation and Regression – with normal data and binary data
Comparing more than 2 independent groups – ANOVA and multiple comparisons
Comparing dependent groups – paired tests and GEE
Contingency tables and Fisher's exact test
Classification
Statistical machine learning
Unsupervised learning

Textbook

No textbook is assigned for this class. Any stat methods text book will be useful. The following textbooks are recommended.

Practical Statistics for Data Scientists, Peter Bruce & Andrew Bruce, 2017, O'Reilly Media. This book is available at Amazon for a reasonable price.

Understanding and Applying Basic Statistical Methods Using R, Rand, Wilcox, 2017, Wiley. This book is available from John Wiley & Sons, Inc.

Required Materials

You will need to have access to a computer that has the R programming language installed. R is free to download from http://cran.r-project.org/. A manual for R use is also available at this website. You will not have to do much programming in R during this course as we will use existing packages for most of our applications.

Evaluation

There will be two tests during the semester, a mid-term and a final. In addition to the tests there will be approximately 10 in class quizzes completed on the computer. You will be given homework assignments to practice and many of these we will work on in class. In addition, each student will complete an individual capstone project at the end of the semester and a group project mid-semester. The weights assigned to each assessment are given in the table below.

Assessment	**Number of assignments**	**Weight per assignment**	**Total Points**
Midterm	1	100	100
Final	1	100	100
Quiz	10	25	250
Group project	1	100	100
Capstone project	1	100	100
Total			650

The student's final grade in the course will be determined by the percentage of the total possible points that are accumulated according to the following schedule.

Percentage points	Student grade
90-100%	A
80-89%	B
70-79%	C
60-69%	D
Below 60%	F

Students taking the course at the 6000 level will have extra problems on the test and will be expected to tackle more difficult projects for their capstone.

This syllabus is intended as a guideline for expectation and evaluation in this course. The instructor reserves the right to make any changes that may be deemed necessary during the course of the semester.