



APPLIED STATISTICS

Course Syllabus

Fall 2012

MATH 351

Anke van Zuylen

Basic information

- Class time & location: MWF 12-12:50 p.m., Jones Hall 307
- Instructor:
Anke van Zuylen
125 Jones Hall
Phone: (757) 221-2036 (O)
Email: anke@wm.edu
Office Hours : (tentative) MW 2:00-3:00pm, W 9:00-10:00am

Prerequisites

Math 112 or 132.

Text book

Probability and Statistics for Scientists and Engineers, Ninth Edition, Walpole, Myers, Myers and Ye. (We will cover selections from Chapters 1–6, 8–11 of the text.)

Description

Statistics is a branch of mathematics dealing with the collection, analysis, interpretation, and presentation of masses of numerical data. In this course we will be focusing on the analysis and interpretation of numerical data. The objective will be to make an inference about a population based on information contained in a sample from that population, and to provide an associated measure of “goodness” for the inference.

In the first part of the class we will begin by briefly introducing the basics of statistics and data analysis, such as data collection and the summarizing of the collected data. Next, we will study the topics of probability, random variables, mathematical expectation and probability distributions. We will expand on the topic of probability distributions by studying a range of both discrete and continuous distributions. The second part of the class will focus on statistical inference, which will include the study of fundamental sampling distributions, and one and two sample estimation and hypothesis testing. To finish the course we will focus on data modeling using simple linear regression. The level of the course will be somewhat lower in mathematical rigor than that of Math 401 and 452 (Probability and Mathematical Statistics), but at a higher level than Math 106 (Introduction to Probability and Statistics).

This course will prepare students to take a more in depth data analysis course, such as Math 352 (Data Analysis).

Topics Covered(outline and subject to change)

- 1 *Introduction to statistics:* sampling procedures, data collection, measures of location and dispersion, types of data, and graphical methods.
- 2 *Probability:* sample spaces, events, counting, probability rules, conditional probability, and Bayes rule.
- 3 *Random Variables and Probability Distributions:* random variables, discrete and continuous probability distributions.
- 4 *Mathematical Expectation:* means and variances of random variables and linear combinations of random variables.
- 5 *Discrete Probability Distributions:* discrete uniform, binomial, hypergeometric, negative binomial, and the poisson distribution.
- 6 *Continuous Probability Distributions:* normal, applications of the normal distribution, normal approximation to the binomial, gamma, exponential, and the chi-squared distributions.
- 8 *Fundamental Sampling Distributions:* random sampling, graphical methods, sampling distributions, central limit theorem, sampling distribution of the sample standard deviation, and t and F distributions.
- 9 *One and Two Sample Estimation Problems:* Methods of estimation, standard error, estimating the difference between two means, estimating the difference between two proportions, and estimating the variance.
- 10 *One and Two Sample Tests of Hypotheses:* Testing a statistical hypothesis, one and two tailed tests, p -values, tests of the mean when σ is both known and unknown, tests on the difference of two means and two proportions, and goodness of fit.
- 11 *Simple Linear Regression and Correlation* simple linear regression, least squares estimators, inference on the regression coefficients, choosing a regression model, correlation, residual analysis, and related topics.

Grading & Exam Dates

Your final course grade will be computed as follows:

Graded Homework:	20%
Exam 1 Oct. 3, 7-8:15pm:	25%
Exam 2 Nov. 14, 7-8:15pm:	25%
Final Exam: Dec. 11 9:00-12:00pm	30%

Letter grades will be no stricter than the following:

$A > 93 > A^- > 90 > B^+ > 87 > B > 83 > B^- > 80 > C^+ > 77 > C > 73 > C^- > 70 > D^+ > 67 > D > 63 > D^- > 60 > F$.

Homework and exam policy

Homework will be assigned and collected frequently. Some, or all, of the problems in each homework set will be graded for correctness; any remaining will be checked completeness.

You are allowed to discuss the homework problems with your classmates. Reading someone else's solutions is NOT "discussion" and is not allowed! Finally, you *have to write down the solutions on your own*, even if you worked through a problem together with your classmate.

Makeup exams will only be given for legitimate reasons like a **serious** illness, or University excused absence. However, you **MUST** provide me with official, written documentation.