## **STAT 501 Methods of Applied Statistics**

Lectures: Tu, Th 9:30 – 10:45, LGRT 219 **Professor:** Joanna Jeneralczuk **Office:** LGRT 1328 **Phone:** 545- 3138 **Email:** jeneral@math.umass.edu Web: www.math.umass.edu/~jeneral (syllabus) **Office Hours:** Tu/Th 11:00 – 12:30 and 2:30- 3:30 and by appointment

**Textbook:** Introduction to Probability and Statistics, by Mendenhall, Beaver and Beaver, 13 th edition, Publishers: Brooks/Cole.

**Course Description:** An applied statistics course for graduate students and upper level undergraduates with no previous background in statistics who will need statistics in their further studies and their work. The focus is on understanding and using statistical methods in research and applications. Topics include: descriptive statistics, probability theory, random variables, random sampling, estimation and hypothesis testing, basic concepts in the design of experiments and analysis of variance, linear regression, contingency tables. The course has a large data-analytic component using MINITAB.

Prerequisites: high school algebra; junior standing or higher.

[Note: Because this course presupposes knowledge of basic math skills, it will satisfy the R1 requirement upon successful completion.]

**Computer software**: In this course we will use a statistical software package named MINITAB extensively. MINITAB can be purchased from

the textbook annex at a discounted price. Alternatively, a temporary demonstration version can be downloaded from www.minitab.com. It is also available at libraries and computing facilities around campus. A calculator will be helpful, too.

## **Requirements:**

Homework - 20% Exam I ( March, in class ) - 20% Exam II (April, in class ) - 20%, Final Exam - 30% Project - 10 % <u>Grades</u> will be assigned according to the following scale: A: 93-100; A-: 88-92; B+: 83-87; B: 80-82; B-: 75-79 C+: 70-74; C: 65-69; C-: 60-64; D+: 55-59; D: 51-54; F below 51.

## Exams:

All exams are in-class and closed book. You may bring in a page of notes (8.5x11 inch standard paper, both sides) and use a calculator. The final exam is held according to University schedule. No make-up exams will be given except for legitimate, documented reasons. If you cannot make it to an exam, contact me in person or by telephone or send me an e-mail as early as possible.

**Homework**: Homework must be written neatly on 8.5x11 inch sheets of paper and turned in on time. Unreadable words or figures are considered to be incorrect answers. Cut and paste answers of computer output into proper places of solution sheets when the computer is used to analyze data. In writing up homework, it is not sufficient to give only the answer to a problem; you must show how it was calculated (it is not necessary to show detailed calculations, just enough to show that you know what you are doing.). Discussion of homework with fellow students is encouraged, but the final write-up must be your own. Late homework will not be accepted.

## List of Topics:

1)Exploratory Data Analysis (Chapters 1, 2): Frequency distribution of a variable defined on a population, empirical distributions, dot plots, stem and leaf plots, histograms, quantiles (including sample median, upper and lower quartiles), interquartile range, box plots, sample mean and variance, Tchebysheff's Theorem and the Empirical Rule.

2) Bivariate Data (Chapter 3): Graphical methods: side by side boxplots, bar charts and pie charts, scatter plots, fitting a straight line to a bivariate data set (least squares), correlation coefficient.

3) Probability theory (Chapters 4, 5, 6): sample space, events and their probabilities, independence, conditional probability and the multiplication rule, Bayes rule.

Random sampling, random variables and their distributions, expected value and variance of a random variable (discrete or continuous), the binomial distribution, hypergeometric, Poisson and normal distribution.

4) Sampling Distribution theory (Chapter 7): Simple random sample, Central Limit Theorem, sampling distribution of the mean and proportion

5) Estimation and hypothesis testing of means and proportions (Chapters 8, 9, 10): Point estimation, interval estimation, applications to hypothesis testing. Difference between two population means and proportions

6) Statistical Modeling (Chapters 11+): Design of experiments, analysis of variance, two way contingency tables, linear regression.