# Math 4611 – 6611: Introduction to Applied Statistics (Spring 2015)

# Class: MWF Room: DH 124 Time: 10.20 AM – 11.15 AM

**Textbook**: Introduction to Probability and Statistics by William Mendenhall, Robert J. Beaver, Barbara M. Beaver, **14<sup>th</sup> edition (2013)**, **Publishers**: CENGAGE LEARNING

# Instructor: Manohar Aggarwal; Office Room #: 386 Dunn Hall; Email: <u>maggarwl@memphis.edu</u>; Office Hours: MW: 1.30 PM to 2.30 PM (or by appointment)

# **Course Objectives**

The course is designed to provide the student with foundation in fundamental concepts of probability and statistics. The focus of the course is on descriptive statistics and inferential statistics. After completing the course the students should be able to represent data graphically, summarize and describe data numerically, find probabilities using sample spaces and probability rules, understand the normal distribution, find confidence intervals, use test of significance, draw scatter plots, find and interpret correlation coefficient, find the regression lines. They should also be able to apply statistical concepts to real life problems.

No previous familiarity with probability or statistics is assumed. However, it is expected that the students are conversant with basic linear algebra.

It is suggested that the students should carefully read the (i) text, preferably ahead or just after the lecture, (ii) class lecture notes, (iii) timely submit the homework assignments, and (iv) try to read solutions to HW assignments.

# Topics to be covered

# **Chapter 1: Describing Data with Graphs**

- Types of Variables
- Bar Charts and Pie Charts
- Histogram
- Stem and Leaf Diagram

# Chapter 2: Describing Data with Numerical Measures

- Describing a set of numerical measures
- Measures of Center
- Measures of Variability
- Box Plot

# **Chapter 3: Describing Bivariate Data**

- Bivariate Data
- Scatter Plots
- Numerical Measures: Correlation and Regression

# Chapter 4: Probability

- Basic Concepts
- Sample Space and Events
- Properties of Probability
- Methods of Enumeration
- Conditional Probabilities
- Independent Events
- Bayes' Theorem

# **Chapter 5: Discrete Probability Distributions**

- Random Variables of the Discrete Type
- Mathematical Expectation
- The Mean, Variance, and Standard Deviation
- Bernoulli Trials and the Binomial Distribution
- The Poisson Distribution
- Hypergeometric Distribution
- Multinomial Distribution

# **Chapter 6: The Normal Probability Distribution**

- Probability Distributions for Continuous Random Variables
- The Normal Probability Distribution
- Tabulated Areas of the Normal Distribution

# **Chapter 7: Sampling Distributions**

- Statistic
- Sampling Distribution
- The Central Limit Theorem
- Sampling Distribution of the Sample Mean
- Sampling Distribution of the Sample Proportion

# Chapter 8: Large-Sample Estimation

- Point Estimation
- Confidence Intervals for Means
- Confidence Intervals for the Difference of Two Means
- Confidence Intervals for variances
- Confidence Intervals for Proportions

# Chapter 9: Large- Sample Tests of Statistical Hypotheses

- Tests about Single Mean
- Tests of Equality of Two Means
- Tests for Variances
- Tests about Proportions
- Chi-Square Tests

# Chapter 10: Inference from Small Samples

- Student's t-distribution
- Small-sample inferences concerning (i) a population mean, (ii) difference two means
- Inference concerning a population variance
- Comparing two population variances

# Chapter 11: Analysis of Variance

- Introduction
- One-way classification

# Chapter 12: Linear Regression and Correlation

- Introduction
- Simple Linear Probabilistic Model
- The Method of Least Squares

# Chapter 14: Chi Square Tests

- Contingency Tables
- The Chi-Square Test of Independence
- **Grades:** The grades will be based on homework (15%), four in-class tests (15% each), and the comprehensive final (40%), with the lowest in-test score dropped.

Grades will be determined as follows:

#### A: 90-100; B: 80-89; C: 70-79; D: 60-69; Below 60%- F

Make ups: No make-ups will be given. Instead, the lowest in-class test grade will be dropped.

Homeworks: Homework will be announced in the class and is to be submitted on or before the **due date**.

#### Note: Late homeworks will not be accepted.

An additional homework assignment will be given to students at the 6000 level.

**Tutoring:** If you need help in the course, please do not hesitate to contact me during my office hours or at other time by appointment. Free tutoring help is also available through the Educational Support Program (ESP) in Dunn Hall room 143.

#### Attendance: Compulsory

There will be opportunities to earn bonus points based on your attendance. You will get 3 **bonus** points if you have not been absent on any day or have been absent **only for one day during the whole semester**. You will get 2 **bonus points** if you have been **absent only for two days or three days** during the whole semester. YOU MUST STAY FOR THE ENTIRE CLASS PERIOD TO BE ELIGIBLE FOR ANY BONUS POINTS.

Exam Schedule: Test 1: Wednesday, February 11, 2015 Test-2: Wednesday, March 4, 2015 Test-3: Wednesday, April 1, 2015 Test-4: Wednesday, April 22, 2015

Final Exam: Monday, May 4, 2015, 8 AM to 10 AM