# Math 4611: Introduction to Applied Statistics (Spring, 2021)

**Class: Monday and Wednesday**                **Time: 2.20 PM to 3.45 PM**

**Note: Math 4611 will be Remote Synchronous**

**Instructor**: Manohar  Aggarwal                Email: [maggarwl@memphis.edu](mailto:maggarwl@memphis.edu)

**Communication:**
**Email** is the best way of communication as I check my emails frequently during the day. You may please use my regular UofM email address (maggarwl@memphis.edu). To better serve you please include in the subject line of your email **"MATH 4611".** You should also include your name in your message.

 **I can only respond to your emails sent through UofM email address (@memphis.edu).**


**Virtual Office Hours: Mondays and Wednesdays: 10.00 AM to 11:00 AM or by appointment.**

I will also be available via **Virtual Office Hours** through web conference.

**Attendance: Attendance is compulsory.**

**Textbook**: Introduction to Probability and Statistics by William Mendenhall, Robert J. Beaver, Barbara M. Beaver, **15th edition (2019),  ISBN:** 9781337554428 **Publishers**: CENGAGE LEARNING
**This is a NEW EDITION OF BOOK**
**Textbook is required. Each one of you should buy the book.**

**Course Objectives**
Statistics is the science of learning from data. Statisticians apply statistical thinking and methods to a wide variety of scientific, social, and business endeavors in such areas as biology, chemistry, biochemistry, education, economics, engineering, genetics, marketing, medicine, psychology, public health, sports, among many.
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 students should be able to represent data graphically, summarize and describe data numerically, draw scatter plots, find and interpret correlation coefficient, find the regression lines, find probabilities using sample spaces and probability rules, understand the normal distribution, find confidence intervals, and conduct tests of hypotheses. 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 concepts of 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) should 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

**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

**Chapter 6: The Normal Probability Distribution**
- Probability Distributions for Continuous Random Variables
- The Normal Probability Distribution
- The Standard Normal Distributions
- Calculation of the Normal probabilities.

**Chapter 7: Sampling Distributions**
- Statistic
- Sampling Distributions
- The Central Limit Theorem
- Sampling Distribution of the Sample Mean
- Sampling Distribution of the Sample Proportion

**Chapter 8: Large-Sample Estimation**
- Point Estimation
- Large Sample Confidence Intervals for Means
- Large sample Confidence Intervals for the Difference of Two Means
- Large Sample Confidence Intervals for Proportions

**Chapter 9: Large- Sample Tests of Statistical Hypotheses**
- Tests about Single Mean
- Tests of Equality of Two Means
- Tests about Proportions

**Chapter 10: Inference from Small Samples**
- Student's t-distribution
- Small-sample inferences concerning (i) a population mean and (ii) difference between two means

**EVALUATION:**
There will be **two in class quizzes** worth 100 points each. In addition there will be **two in class tests** worth 100 points each plus a final exam worth 200 points. There will be homework assignments that will count a total of 200 points. The total possible number of points is 800. The students grade in the course will be based on the percentage of the possible 800 points obtained according to the following scale:

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

**No makeup quiz or tests** will be given. If you must miss a test for any reason, your half of the final exam score will be used to replace the test missed if approved by the instructor. If you miss more than one test you will receive a zero on each test missed after the first. If you miss the final exam you will receive a grade of zero on the final exam.

**Final Exam and Test Dates:**

**Final Exam:  Wednesday, May 5, 2021 (1 PM to 3 PM)**
**Quiz 1: Wednesday, February 10, 2021**
**Test 1: Wednesday, February 24, 2021**
**Quiz 2: Monday, March 22, 2021**
**Test 2: Wednesday, April  7, 2021**

**Homework**: The main purpose of homework assignments is **to help students learn the course material.** Homework assignments will be announced in the class and are to be submitted on hard copies of the HW sheets distributed in the class. **Homework assignments are evaluated based on correctness and completeness**. You should show all your calculations while doing your homework assignments. Answers to homework assignments should be written neatly and should be well organized. Copying someone else's homework is prohibited. HW assignments are to be submitted before or on the due date. **Late HW will not be accepted** for any reason **after the due date.**

**Tutoring:** If you need help in the course, please do not hesitate to contact me during my virtual office hours or at other time by appointment.

**Syllabus Changes**

The Instructor reserves the right to make changes as necessary to this syllabus. If changes are necessitated during the term of the course, the instructor will immediately notify students of such changes by individual email communication.

**Student Accommodations**
Students with accessibility issues or learning accommodations issues due to a disability should contact Disability Resources for Students (DRS) to submit an official request for course accommodations. Contact DRS at 901.678.2880 or at drs@memphis.edu

**Help with eCourseware and email issues**
All requests and questions for eCourseware should be directed through the ITS Service Desk at 901.678.8888 or via a service request. ITS will also be able to help with email issues.

**Academic Integrity**
Plagiarism, cheating and other forms of academic dishonesty are prohibited. Students guilty of academic misconduct, either directly or indirectly, through participation or assistance, are immediately responsible to the instructor of the class in addition to other possible disciplinary sanctions which may be imposed through the regular institutional disciplinary procedures. (https://www.memphis.edu/osa/students/academic-misconduct.php)

**Student Health**
Students who have a positive COVID-19 test should contact the Dean of Students at deanofstudents@memphis.edu

**Student Resources**
Students who need additional resources can visit the Dean of Students Office website at https://www.memphis.edu/deanofstudents/crisis/index.php

**Class Schedule**

| Week | Material Covered | Assignment due |
|---|---|---|
| Week 1 | Chapter 1 – Presentation of Data | HW 1(1-28-2021) |
| Week 2 | Chapter 2 – Summarizing of Data | HW 2(2-4-2021) |
| Week 3 | Chapter 3 – Bivariate Data | HW 3 (2- 6-2021) |
| Week 4 | Chapter 4 - Probability | HW 4 (2-22-2021) **Quiz 1 (02-10-2021)** |
| Week 5 | Chapter 4 - Probability | |
| Week 6 | **Test 1 (02-24-2021)** | |
| Week 7 | Chapter 5 – Discrete Distributions | HW 5 (3-10-2021) |
| Week 8 | Chapter 6 –Continuous Distributions | HW 6 (3-16-2021) |
| Week 9 | Chapter 7 – Sampling Distributions | HW 7(3-21-2021) **Quiz 2 (03-22-2021**) |
| Week 10 | Chapter 8 - Large Sample Confidence Interval | HW 8 (03-31-2021) |
| Week 11 | Chapter 8 - Large Sample Confidence Interval | |
| Week 12 | Chapter 9 – Large Sample Testing of Hypothesis **Test 2 (04-07-2021)** | HW 9 (4-14-2021) |
| Week 13 | Chapter 10 – Small Sample Confidence Interval and Testing of Hypothesis | HW 10 (4-21-2021) |
| Week 14 | Review Final Exam **FINAL EXAM: Wednesday, 05-05-2021, 1 PM to 3 PM** | |