**STATISTICAL METHODS SYLLABUS – STA 2023 – FALL2023**

**PROFESSOR:** Maria del Carmen Alvarez

**COURSE:** REF 6148 – TR 12:40PM to 1:55PM in RM-4204

**OFFICE HOURS:** TR7:25-8AM, 10:40-11:15AM,2:10-3:30PM in RM3245 office #14

MW 8-10:30AM remotely via email or zoom

**E-MAIL:** [malvare1@mdc.edu](mailto:malvare1@mdc.edu)

**Math Department Chair:** Mr. Nicholas Schur

***COURSE DESCRIPTION***

Collecting, grouping, and presenting data; measures of central tendency and dispersion; probability; testing hypotheses; confidence intervals, and correlation. Pre-requisite: MAT1033.

***LEARNING OUTCOMES***

This course addresses the following MDC learning outcomes:

**Learning Outcome #1**: Communicate effectively using listening, speaking, reading, and writing skills.

**Learning Outcome #2**: Use quantitative analytical skills to evaluate and process numerical data.

**Learning Outcome #3**: Solve problems using critical and creative thinking and scientific reasoning.

**Learning Outcome #4**: Formulate strategies to locate, evaluate, and apply information.

**Learning Outcome #5**: Use computer and emerging technologies effectively

***COURSE COMPENTENCIES***

Upon completion of this course, the student will be able to:

**Competency 1**: The student will be able to demonstrate, basic knowledge of statistical terms.

**Competency 2**: The student will be able to describe, explore and compare data by:

   1. Constructing and interpreting frequency tables and graphs such as bar graphs, pie charts and stem and leaf plots.  
   2. Computing and interpreting the measures of centrality: the mean, median, mode and midrange.  
   3. Computing and interpreting the measures of dispersion: The range, variance and standard deviation.

**Competency 3**: The student will be able to apply the measures of position by:

   1.  Computing z-scores.  
   2. Applying the Empirical Rule to the Normal Distribution.  
   3. Applying the Chebyshev’s Rule to the Non-Normal (or unknown) Distributions.

**Competency 4**: The student will be able to apply the counting principles by:

   1.  Defining the Fundamental Counting Principle.  
   2. Computing the possible outcomes of compound events.  
   3. Computing Combinations and Permutations.

**Competency 5**: The student will have a working knowledge of basic probability theory, including being able to:

   1. Describe a sample space and an event.  
   2. Calculate probabilities of simple, compound and conditional events.

**Competency 6**: With respect to random variables, the student will be able to:

   1. Distinguish between discrete and continuous random variables.  
   2. Construct a probability distribution for a discrete random variable and be able to compute its mean and standard deviation.

3. Compute probabilities for random variables having a binomial distribution.  
   4. Compute probabilities for random variables having a normal distribution.  
   5. Apply the Central Limit Theorem.  
   6. Approximate the Binomial Probability using the Normal Distribution

**Competency 7**: The student will be able to construct confidence intervals, relative to:

   1. A single mean with population standard deviation known and unknown.  
   2. A single proportion.  
   3. The difference between two means.

**Competency 8**: The student will be able to apply hypothesis test procedures by:

  1. Identifying Type I and Type II errors.  
   2. Identifying and interpreting p-values.  
   3. Testing a single mean for large or small samples.  
   4. Testing the difference between two means.  
   5. Testing a single proportion.

**Competency 9**: The student will have a basic understanding of how to deal with bivariate data, including:

1. Being able to construct and interpret a scatter-plot.
2. Being able to compute and interpret the linear correlation coefficient

***CLASS MATERIALS***

* **Aleks Access (Mandatory)**

**Textbook: Elementary Statistics: A Step by Step Approach, 10th edition by Bluman**

Through the Shark Pack Program, you already paid $60 during registration for access into Aleks. In Canvas, click on the “Aleks LTI 1.3” link, launch, and follow instructions.

The Course (class) Code is AAJYC-L9XP9 and our class name in Aleks is

“STA2023-2237-6148|Statistical Methods”.

For more information on the Shark Pack Program visit <https://www.mdc.edu/sharkpack/>

* A scientific calculator is needed for this course.
* A computer with a camera or webcam is needed for this course.

***ATTENDANCE POLICY***

Attendance will be recorded but is not part of the course grade.

***GRADING PROCEDURE***

There will be four exams. Homework from Aleks will be for extra credit. Scientific Calculators or graphing calculators will be allowed during the exams. An optional Final Exam will be available, and it will drop the lowest test grade if the Final Exam grade is greater.

**GRADING**: Exams = 100% of the grade

Aleks Homework = extra credit for a possible total of 40 points to be

added to the sum of the four exams.

The Final Grade will be calculated using the following equation,

Grade = (Test 1 + Test 2 + Test 3 + Test 4 + extra credit points)/4

**Grading Scale**:

90 – 100 A

80 - less than 90 B

70 – less than 80 C

60 – less than 70 D

less than 60 F

**INCOMPLETES:** Incompletes will be given in very limited situations. The students must have completed 2/3 of the course requirements with a passing average and have a serious illness, family death, or unexpected crisis.

***ACADEMIC DISHONESTY POLICY***

If a student is caught cheating, that student will automatically fail the course and will be referred to the dean. For additional information on academic dishonesty policies, please refer to the Student’s Rights and Responsibilities at <https://www.mdc.edu/rightsandresponsibilities/>

***ASSISTANCE***

The Math and Science Study Center is available in case you need tutoring or help doing your homework. Tutoring is available online. To make an appointment, click on <https://www.mdc.edu/kendall/math/> .

***IMPORTANT DATES***

**Last day to drop without financial penalty: F August 25th**

**Last day to withdraw with a grade of W: M October 30th**

Class Recordings :

Class lectures may be recorded and made available to students enrolled in the same class. Students who do not wish to be recorded, please contact the class instructor in the first week of class to discuss alternative arrangements.

Student recordings of classroom lectures or other presentations must be for the student’s own use and not for financial gain. Any other uses must be agreed to by the College and the class instructor.

***TENTATIVE SCHEDULE***

| ***WEEK*** | ***SEC.*** | ***TOPICS*** |
| --- | --- | --- |
| Week 1  (8/21 to 8/25) | 4-1 | Introduction  Sample Spaces and Probability |
| Week 2  (8/28 to 9/1) | 4-3  4-2  4-4 | The Multiplication Rules and Conditional Probabilities  The Addition Rule for Probability  Counting Rules |
| Week 3  (9/5 to 9/8) | 4-5 | Probability and Counting Rules  Review for Test 1  ***Test 1*** on Chapter 4 |
| Week 4  (9/11 to 9/15) | 2-1  2-2  2-3 | Organizing Data  Histograms, Frequency Polygons, and Ogives  Other Types of Graphs |
| Week 5  (9/18 to 9/22) | 3-1 | Measures of Central Tendency |
| Week 6  (9/25 to 9/29) | 3-2  3-3  3-4 | Measures of Variation  Measures of Position  Exploratory Data Analysis |
| Week 7  (10/2 to 10/6) |  | Review for Test 2  ***Test 2*** on Chapter 2 & 3 |
| Week 8  (10/9 to 10/13) | 5-1  5-2 | Probability Distributions  Mean, Variance, Standard Deviation, and Expectation |
| Week 9  (10/16 to 10/20) | 5-3  6-1 | The Binomial Distribution  Normal Distributions |
| Week 10  (10/23 to 10/27) | 6-2  6-3 | Applications of the Normal Distribution  The Central Limit Theorem |
| Week 11  (10/30 to 11/3) | 7-3 | Review for Test 3  ***Test 3*** on Chapters 5 & 6  Confidence Intervals and Sample Size for Proportions |
| Week 12  (11/6 to 11/10) | 7-1 | Confidence Intervals for the Mean When σ is Known |
| Week 13  (11/13 to 11/17) | 7-2  8-1 | Confidence Intervals for the Mean When σ is Unknown  Steps in Hypothesis Testing – Traditional Method |
| Week 14  (11/20 to 11/22) | 8-4 | *z* Test for a Proportion  No Class on R 11/23 - Thanksgiving |
| Week 15  (11/27 to 12/1) | 8-2  8-3 | z Test for a Mean  *t* Test for a Mean |
| Week 16  (12/4 to 12/8) |  | Review for Test 4  ***Test 4*** *-* Chapter 7 and 8  All Homework in Aleks due R 12/6 by 11:59PM |
| Week 17  (12/11 to 12/15) |  | Return Test 4, ***Optional Final Exam*** |