

### Course Outline

**COURSE:** MATH 5                      **DIVISION:** 10                      **ALSO LISTED AS:**

**TERM EFFECTIVE:** Summer 2020                      **CURRICULUM APPROVAL DATE:** 06/09/2020

**SHORT TITLE:** INTRO STATISTICS

**LONG TITLE:** Introduction to Statistics

<u>Units</u>	<u>Number of Weeks</u>	<u>Type</u>	<u>Contact Hours/Week</u>	<u>Total Contact Hours</u>
3	18	Lecture:	3	54
		Lab:	1	18
		Other:	0	0
		Total:	4	72

**COURSE DESCRIPTION:**

Descriptive analysis and presentation of either single-variable data or bivariate data, probability, probability distributions, normal probability distributions, sample variability, statistical inferences involving one and two populations, analysis of variance, linear correlation and regression analysis. Statistical computer software will be extensively integrated as a tool in the description and analysis of data. The instructor will be using and supporting a TI-83 Plus graphing calculator in all classroom demonstrations. (C-ID: MATH 110)  
**PREREQUISITE:** MATH 233, or MATH 240, or MATH 233A and MATH 233B, or MATH 242 with a grade of 'C' or better.

**PREREQUISITES:**

- Completion of MATH 233, as UG, with a grade of C or better.
- OR
- Completion of MATH 233B, as UG, with a grade of C or better.
- OR
- Completion of MATH 235, as UG, with a grade of C or better.
- OR
- Completion of MATH 240, as UG, with a grade of C or better.
- OR
- Completion of MATH 242, as UG, with a grade of C or better.
- OR
- Completion of MATH 3, as UG, with a grade of C or better.
- OR
- Completion of MATH 6, as UG, with a grade of C or better.
- OR
- Completion of MATH 7, as UG, with a grade of C or better.
- OR

Completion of MATH 8A, as UG, with a grade of C or better.  
OR  
Completion of MATH 8B, as UG, with a grade of C or better.  
OR  
Completion of MATH 12, as UG, with a grade of C or better.  
OR  
Completion of MATH 14, as UG, with a grade of C or better.  
OR  
Completion of MATH 1A, as UG, with a grade of C or better.  
OR  
Completion of MATH 1B, as UG, with a grade of C or better.  
OR  
Completion of MATH 1C, as UG, with a grade of C or better.  
OR  
Score of 33 on Intermediate Algebra  
OR  
Score of 13 on Pre-Calculus  
OR  
Score of 2600 on Accuplacer Math  
OR  
Score of 2600 on MM CCCApply Math  
OR  
Score of 2600 on MM Placement Tool Math

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion  
03 - Lecture/Laboratory  
04 - Laboratory/Studio/Activity  
047 - Laboratory - LEH 0.7  
05 - Hybrid  
71 - Dist. Ed Internet Simultaneous  
72 - Dist. Ed Internet Delayed  
73 - Dist. Ed Internet Delayed LAB  
737 - Dist. Ed Internet LAB-LEH 0.7

## **STUDENT LEARNING OUTCOMES:**

1. Describe and analyze data using descriptive statistics including histograms, frequency tables, stem-and-leaf diagrams, boxplots, mean, median, mode, and standard deviation. Be able to distinguish among different scales of measurement and their implications.

Measure of assessment: Homework, Lab, Quiz, Exam

Year assessed, or planned year of assessment: 2009

2. Demonstrate proficiency with calculations of basic probabilities for simple events.

Measure of assessment: Homework, Lab, Quiz, Exam

Year assessed, or planned year of assessment: 2014

3. Identify the difference between discrete and continuous random variables. Be able to calculate the mean and variance of a discrete distribution.

Measure of assessment: Homework, Lab, Quiz, Exam

4. Calculate probabilities using a normal distribution or graphing calculator.

Measure of assessment: Homework, Lab, Quiz, Exam

Year assessed, or planned year of assessment: 2014

5. Interpret the Central Limit Theorem and apply the concept to examples.

Measure of assessment: Homework, Lab, Quiz, Exam

Year assessed, or planned year of assessment: 2013

6. Create and interpret confidence intervals estimates of population means and proportions.

Measure of assessment: Homework, Lab, Quiz, Exam

Year assessed, or planned year of assessment: 2009

7. Identify the basic concepts of hypothesis testing including Type I and Type II errors. Employ hypothesis test procedures to test claims about single population means and proportions, and two population means and proportions. Select the appropriate technique ( $p$ -value,  $t$ -test,  $z$ -test) for analyzing the hypothesis test. Be able to interpret the result of the hypothesis test in words.

Measure of assessment: Homework, Lab, Quiz, Exam

Year assessed, or planned year of assessment: 2009

8. Employ linear correlation and regression to model simple linear relationships.

Measure of assessment: Homework, Lab, Quiz, Exam

Year assessed, or planned year of assessment: 2013

9. Utilize statistical software to analyze and interpret data.

Measure of assessment: Lab, Group Project

Year assessed, or planned year of assessment: 2013

10. Demonstrate a synthesis of concepts learned throughout the semester by a group project, which will require students to formulate a survey, collect data, analyze data, and derive inferences from the data.

Measure of assessment: Group Project

Year assessed, or planned year of assessment: 2013

11. Discuss sampling methods and identify the standard methods of obtaining data and identify advantages and disadvantages of each.

Measure of assessment: Homework

12. Do application problems using data from disciplines including business, social sciences, psychology, life science, health science, and education.

## **CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS**

Curriculum Approval Date: 06/09/2020

2 Hours

Content: Introduction to Basic Terms; Measurability and Variability

Out of Class Assignment: Assigned reading and problems.

Student Performance Objectives: Students identify examples as samples, populations, quantitative vs. qualitative data. They will also be able to explain and identify sampling methods.

Out of Class Assignment: Homework assignment

1 Hour

Content: Lab #1 - Introduction to MINITAB

Student Performance Objectives: Students will become familiar with the various dropdown menus. They will learn how to input, sort, and display data. They will also learn how to import data and write data to an external storage device.

Out of Class Assignment: Lab Report

2 Hours

Content: Frequency Distributions and Histograms

Student Performance Objectives: Students will learn to create and interpret tables and graphs which condense and summarize data.

Out of Class Assignment: Homework problems

1 Hour

Content: Lab #2 - Group Project 1 - Descriptive Analysis of Student Heights.

Student Performance Objectives: Students will input and sort height data. They will use MINITAB to create histograms, Stem-and-Leaf diagrams and dot plots of student height data.

Out of Class Assignment: Lab Report

3 Hours

Content: Pictures of Data and Measures of Central Tendency

Student Performance Objectives: Students will learn to create and analyze dot plots, stem-and-leaf diagrams and pie charts. They will also study measures of central tendency: mean, median, midrange, and mode.

Out of Class Assignment: Homework problems

1 Hour

Content: LAB #2 (continued) - Descriptive measures.

Student Performance Objectives: Students will continue to analyze "Student Heights" data using measures of Central Tendency and Measures of Variation. They will also use MINITAB to investigate properties of the mean.

Out of Class Assignment: Lab Report

3 Hours

Content: Measures of Dispersion

Student Performance Objectives: Students will calculate and analyze standard deviation, range, and variation. They will calculate-scores, percentiles, quartiles, and deciles. Five Number Summary and boxplots will also be studied.

Out of Class Assignment: Homework problems

1 Hour

Content: LAB #3 - Boxplots

Student Performance Objectives: Students will learn how to create boxplots using MINITAB. They will complete analysis of "Student Heights" data by creating and comparing boxplots.

Out of Class Assignment: Lab Report

4 Hours

Content: Probability

Student Performance Objectives: Students will study relative frequency and methods for calculating probabilities for simple events. Both the Addition Rule and Multiplication Rule will be studied. Conditional probabilities will be defined and illustrated with an emphasis on contingency tables.

Out of Class Assignment: Homework problems

1 Hour

Content: LAB #4 - Discrete Probabilities.

Student Performance Objectives: Students will use MINITAB to simulate the tossing of 2 dice. Relative frequencies will be calculated and compared with theoretical probabilities to illustrate the Law of Large Numbers.

Out of Class Assignment: Lab Report

5 Hours

Content: Discrete Probability Distributions

Student Performance Objectives: Students will study discrete and continuous random variables and probability distributions. Students will learn methods for finding mean, variance, and standard deviation for probability distributions as well as expected value. Binomial experiments and the calculation of probabilities in binomial experiments will also be covered.

Out of Class Assignment: Homework problems

1 Hour

Content: LAB #5 - Binomial Distributions

Student Performance Objectives: Students will explore the relationship between tree diagrams, binomial distributions and calculating binomial probabilities.

Out of Class Assignment: Lab Report

5 Hours

Content: Normal Probability Distribution

Student Performance Objectives: Students will master the continuous normal probability distribution. Topics covered will include standard and nonstandard normal distribution and finding probabilities and z-scores.

Out of Class Assignment: Homework problems

1 Hour

Content: LAB #6 - Normal Probability Distribution

Student Performance Objectives: Students will study the nature of normal probability distributions by generating normally distributed data and comparing resulting experimental probabilities with theoretical probabilities for normally distributed data.

Out of Class Assignment: Lab Report

2 Hours:

Content: Central Limit Theorem - Central Limit Theorem

Student Performance Objectives: Students will study the Central Limit Theorem and its application to the sampling distribution of the mean and resulting probabilities.

Out of Class Assignment: Homework problems

1 Hour

Content: LAB #7 - Central Limit Theorem -

Student Performance Objectives: The students will participate in a computer lab simulating the sampling distribution of means of large samples to reinforce and illustrate the Central Limit Theorem.

Out of Class Assignment: Lab Report

5 Hours

Content: Estimates and Sample Sizes

Student Performance Objectives: Students will create and interpret confidence intervals to estimate population proportions and means.

Out of Class Assignment: Homework problems

1 Hour

Content: LAB #8 - Confidence Intervals Lab

Student Performance Objectives: Students will use MINITAB to generate data and build confidence intervals.

Out of Class Assignment: Lab Report

8 Hours

Content: Hypothesis Testing

Student Performance Objectives: Students will learn to implement basic concepts and procedures used for testing claims made about population means and proportions

Out of Class Assignment: Homework problems

1 Hour

Content: LAB #9 - Hypothesis Testing

Student Performance Objectives: Students will utilize MINITAB to perform a hypothesis test.

Out of Class Assignment: Lab Report

4 Hours

Content: Inferences Involving Two Populations

Student Performance Objectives: Students will create confidence intervals and perform hypothesis tests about the means of two populations for large independent samples and two proportions.

Out of Class Assignment: Homework problems

3 Hours

1 Hour

Content: GROUP PROJECT PROPOSAL

Student Performance Objectives: Students will decide on project topic, formulate hypotheses and develop appropriate survey questionnaire.

Out of Class Assignment: Formal Project Proposal

Content: Linear Correlation and Regression

Student Performance Objectives: Students will investigate methods for analyzing and dealing with relationships between two variables.

Out of Class Assignment: Homework problems

1 Hour

Content: LAB #11

Student Performance Objectives: Students will utilize MINITAB to, perform a linear regression on a set of data.

3 Hours:

Content: Analysis of Variance

Student Performance Objectives: Students will learn the basic method of one way analysis of variance (ANOVA).

Out of Class Assignment: Homework problems

1 Hour

Content: LAB #12 - Group Project

Student Performance Objectives: Students will begin to analyze collected data using MINITAB.

Out of Class Assignment: Final Project

3 Hours

Content: Chi-Square/Review

Student Performance Objectives: Students will study the Chi-square distribution and use it to test goodness of fit.

Out of Class Assignment: Homework problems

1 Hour

Content: LAB #12 - Group Project

Student Performance Objectives: Continue to work on group project using MINITAB to develop confidence intervals and test hypotheses.

Out of Class Assignment: Final Project

2 Hours

FINAL EXAM

**METHODS OF INSTRUCTION:**

Instruction will be by lecture/discussion with periodic cooperative problem solving sessions with student presentations.

**METHODS OF EVALUATION:**

Writing assignments

If this is a degree applicable course, but substantial writing assignments are not appropriate, because course primarily involves skill demonstration or problem solving

Problem-solving assignments

Percent of total grade: 100.00 %

Percent range of total grade: 100 % to 100 % Homework Problems; Lab Reports; Quizzes; Exams; Other: Final Project

**OUT OF CLASS ASSIGNMENTS:**

Required Outside Hours:

Assignment Description: Final Class Project: Demonstrate a synthesis of concepts learned throughout the semester by a group project, which will require students to formulate a survey, collect data, analyze data, and derive inferences from the data.

**REPRESENTATIVE TEXTBOOKS:**

Required Representative Textbooks

Mario F. Triola. Required: Triola. Essentials of Statistics, 5th Edition Pearson, 2015. Or other appropriate college level text.. ISBN-10: 0-321-92459-2,2015.

**ARTICULATION and CERTIFICATE INFORMATION**

Associate Degree:  
GAV B4, effective 000000  
CSU GE:  
CSU B4, effective 000000  
IGETC:  
IGETC 2A, effective 000000  
CSU TRANSFER:  
Transferable CSU, effective 000000  
UC TRANSFER:  
Transferable UC, effective 000000

**SUPPLEMENTAL DATA:**

Basic Skills: N  
Classification: Y  
Noncredit Category: Y  
Cooperative Education:  
Program Status: 1 Program Applicable  
Special Class Status: N  
CAN: STAT2  
CAN Sequence: XXXXXXXX  
CSU Crosswalk Course Department: MATH  
CSU Crosswalk Course Number: 5  
Prior to College Level: Y  
Non Credit Enhanced Funding: N  
Funding Agency Code: Y  
In-Service: N  
Occupational Course: E  
Maximum Hours:  
Minimum Hours:  
Course Control Number: CCC000275138  
Sports/Physical Education Course: N  
Taxonomy of Program: 170100