

# MATH-1420: ELEMENTARY PROBABILITY AND STATISTICS II

---

## Cuyahoga Community College

**Viewing: MATH-1420 : Elementary Probability and Statistics II**

**Board of Trustees:**

March 2020

**Academic Term:**

Fall 2021

**Subject Code**

MATH - Mathematics

**Course Number:**

1420

**Title:**

Elementary Probability and Statistics II

**Catalog Description:**

Second of two-semester introductory sequence in probability and statistics. Intended for students majoring in liberal arts, business, sciences, engineering, and education. Includes study of Chi-square distribution and F distribution and their applications, inferences on variances and proportions, comparing two means, categorical data, correlation, simple and multiple regression, analysis of variance, nonparametric tests and use of statistical software packages.

**Credit Hour(s):**

3

**Lecture Hour(s):**

3

**Lab Hour(s):**

0

**Other Hour(s):**

0

## Requisites

**Prerequisite and Corequisite**

MATH-1410 Elementary Probability and Statistics I, or departmental approval: equivalent coursework.

## Outcomes

**Course Outcome(s):**

Perform hypothesis tests to evaluate claims about population means and proportions for one or two samples.

**Essential Learning Outcome Mapping:**

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**

1. Identify and verify test assumptions
  2. Perform hypothesis tests using small and large samples
  3. Perform hypothesis tests known and unknown population standard deviations
  4. Identify independent or dependent samples for hypothesis tests
  5. Determine the appropriate hypothesis test based upon a data set.
  6. Use of P-values to carry out hypothesis tests
  7. Find two sample interval estimates to make inferences about population parameters
-

**Course Outcome(s):**

Apply Chi-square tests to solve problems

**Objective(s):**

1. Use the F test for testing two population variances
  2. Use the Chi-square and F tables to carry out specific types of hypothesis tests
  3. Use the Chi-square tests for population variance, Goodness-of-Fit & Test for Independence
- 

**Course Outcome(s):**

Apply a single factor Analysis of Variance (ANOVA) to make inferences about means of several populations

**Objective(s):**

1. Use the F table to carry out an ANOVA analysis
  2. Identify an ANOVA model
  3. Verify the ANOVA model assumptions
  4. Identify the completely randomized design and a treatment effect
  5. Use multiple comparison tests to determine the significant differences between means
- 

**Course Outcome(s):**

Build and Analyze Simple and Multiple Linear Regression models.

**Essential Learning Outcome Mapping:**

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**

1. Build a Simple and Multiple Linear Regression models to determine the line of best fit and prediction
  2. Identify and verify model assumptions
  3. Make inferences about Beta parameters
  4. Check the validity of models
  5. Assess the strength of a model
- 

**Course Outcome(s):**

Compute nonparametric statistics and apply hypothesis tests to solve problems violating parametric assumptions

**Essential Learning Outcome Mapping:**

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**

1. Find various non-parametric statistics
  2. Identify when to use non-parametric methods.
  3. Perform hypothesis tests using non-parametric methods as appropriate.
- 

**Course Outcome(s):**

Use a variety of technology, software packages and supplemental websites to solve probability & statistics problems.

**Objective(s):**

1. Use Graphing Calculators, Excel and Minitab to perform statistical analysis, construct charts & graphs to solve probability and statistics problems
  2. Use Supplemental Websites to solve a variety of probability and statistical problems
- 

**Methods of Evaluation:**

1. Periodic exams.
2. Quizzes.

3. Homework.
4. In class collaborative work.
5. Comprehensive final exam.

#### Course Content Outline:

1. Comparing two means
  - a. Equal variances
  - b. Unequal variances
  - c. Paired t-test
2. Chi-square distribution and inferences on variances
  - a. Chi-square distribution
  - b. Interval estimation on population variance
  - c. Hypothesis testing on population variance
3. Inferences on proportions
  - a. Estimating a proportion
  - b. Testing hypothesis on a proportion
  - c. Comparing two proportions
4. The F distribution
  - a. Table of the F tribution
  - b. Comparing two variances
5. Categorical data
  - a. Multi-nomial distribution
  - b. Goodness-of-fit-test
  - c. Testing for independence
  - d. Comparing proportions
6. Inferences on Regression Models
  - a. Correlation coefficients
  - b. The linear regression models
  - c. Inferences on correlation and regression coefficients
7. Analysis of variance
  - a. The model and notation
  - b. Treatment effects
  - c. Statistical inferences
8. Non-parametric methods
  - a. One sample procedures
  - b. Two sample procedures
  - c. K-sample procedures
9. Use of technology, software packages and websites
  - a. Use graphing calculators and software packages for analysis
  - b. How to interpret results
  - c. Use of supplemental websites

#### Resources

Allen Bluman. *Elementary Statistics*. 10th edition. McGraw Hill, 2018.

---

Michael Sullivan III. *Statistics, Informed Decisions Using Data*. 5th edition. Prentice Hall, 2017.

---

Robert Gould and Colleen Ryan. *Introductory Statistics: Exploring the World Through Data*. 2nd edition. Pearson Education Inc., 2016.

---

Carolyn Warren, Kimberly Denley, Emily Atchley. *Beginning Statistics*. 2nd edition. Hawkes Learning, 2014.

---

#### Resources Other

1. Various statistical software Packages.
2. Publisher websites.

## **Instructional Services**

**OAN Number:**

Ohio Transfer 36 TMMSL

Top of page

Key: 2843