MARION TECHNICAL COLLEGE

COURSE NUMBER & NAME: MTH 1240 Statistics

DEPARTMENT NAME: Mathematics

TAG/OTM/CTAG[1] COURSE #:   TMM 010 Introductory Statistics

CREDIT HOURS: 3

PREREQUISITE(s):   MTH1100 or MTH0910 or meet current placement guidelines

COURSE DESCRIPTION:
Statistics is an introduction to descriptive and inferential statistical methods including sampling, probability, point and interval estimation, hypothesis testing, and regression. Real data and appropriate technology will be used.

TEXTBOOK: Statistics: Informed Decisions Using Data

AUTHOR(s):   Michael Sullivan III

PUBLISHER: Pearson Education

YEAR/EDITION: 2020/ 6th edition

MAJOR COURSE LEARNING OBJECTIVES

A student completing this course will be able to:

1. Summarize univariate and bivariate data by employing appropriate graphical, tabular, and numerical methods and describe the attributes of or relationships between the data. These may include (but are not limited to): frequency distributions; box plots; scatter plots; correlation coefficients; regression analysis; and measures of center, variation, and relative position.
2. Identify the characteristics of a well-designed statistical study and be able to critically evaluate various aspects of a study. Recognize the limitations of observational studies and common sources of bias in surveys and experiments. Recognize that association is not causation.
3. Compute the probability of compound events, independent events, and disjoint events, as well as conditional probability. Compute probabilities using discrete and continuous distributions, especially applications of the normal distribution.
4. Explain the difference between statistics and parameters, describe sampling distributions, and generate sampling distributions to observe the Central Limit Theorem.
5. Estimate population parameters using point and interval estimates and interpret the interval in the context of the problem. Summarize the relationship between the confidence level, margin of error, and sample size.
6. Given a research question, formulate null and alternative hypotheses. Describe the logic and framework of the inference of hypothesis testing. Make decision using p-value and draw appropriate conclusion. Interpret statistical significance and recognize that statistical significance does not necessarily imply practical significance. Perform hypothesis testing with at least one test related to quantitative variable (e.g. t-test for mean, test for linear correlation) and at least one test related to qualitative variable (e.g., test for one population proportion and chi-square test for independence).
7. Throughout this course, students should be given the opportunity to interpret statistical results in context when statistical information is presented in news stories and journal articles.

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[1] Approved TAG and OTM courses carry the guarantee that the courses and their credits will transfer and apply toward the major at any of Ohio's public institutions of higher education, provided they were taken when the courses were equivalent. Additional Ohio transfer information may be obtained at https://www.ohiohighered.org/

Competencies from Ohio Department of Higher Education's TMM010 Introductory Statistics (December 8, 2015 version)

TEXTBOOK SECTIONS COVERED

1.1 Introduction to the Practice of Statistics
1.2 Observational Studies versus Designed Experiments
1.3 Simple Random Sampling
1.4 Other Effective Sampling Methods
1.5 Bias in Sampling
1.6 The Design of Experiments
2.1 Organizing Qualitative Data
2.2 Organizing Quantitative Data: The Popular Displays
2.3 Additional Displays of Quantitative Data
2.4 Graphical Misrepresentations of Data
3.1 Measures of Central Tendency
3.2 Measures of Dispersion
3.4 Measures of Position and Outliers
3.5 The Five-Number Summary and Boxplots
4.1 Scatter Diagrams and Correlation
4.2 Least-Squares Regression
5.1 Probability Rules
5.2 The Addition Rule and Complements
5.3 Independence and the Multiplication Rule
5.5 Counting Techniques
5.6 Simulating Probability Experiments
6.1 Discrete Random Variables
6.2 The Binomial Probability Distribution
7.1 Properties of the Normal Distribution
7.2 Applications of the Normal Distribution
7.3 Assessing Normality
8.1 Distribution of the Sample Mean
8.2 Distribution of the Sample Proportion
9.1 Estimating a Population Proportion
9.2 Estimating a Population Mean
10.1 The Language of Hypothesis Testing
10.2 Hypothesis Tests for a Population Proportion
10.3 Hypothesis Tests for a Population Mean

ALTERNATE FREE MATERIALS

Free Textbook: *Introductory Statistics* on OpenStax
https://openstax.org/details/books/introductory-statistics

Free Videos: AP/College Statistics on Khan Academy
https://www.khanacademy.org/math/ap-statistics