MATH 232 - Statistics Course Outline

Approval Date: 12/9/2021
Effective Date: 8/11/2023

SECTION A

Unique ID Number	CCC000602743
Discipline(s)	Mathematics
Division	Mathematics
Subject Area	Mathematics
Subject Code	MATH
Course Number	232
Course Title	Statistics
TOP Code/SAM Code	1701.00 - Mathematics, General / E - Non-Occupational
Rationale for adding this course to the curriculum	Update language around technology use to go beyond a graphing calculator. Update some course content language to current Cid usage. Update textbook information to bring current.
Units	3
Cross List	*N/A*
Typical Course Weeks	18

Total Instructional Hours

	Contact Hours
Lecture	36.00
Lab	0.00
Activity	36.00
Work Experience	0.00
Outside of Class Hours	90.00

Total Contact Hours	72
Total Student Hours	162

Open Entry/Open Exit	No
Maximum Enrollment	35
Grading Option	Letter Grade or P/NP
Distance Education Mode of Instruction	On-Campus Hybrid Entirely Online Online with Proctored Exams

SECTION B

General Education Information:

SECTION C

Course Description

Repeatability May be repeated 0 times

Catalog Description The use of probability techniques, hypothesis testing, and predictive techniques to facilitate decision-making. Topics include descriptive statistics; probability and sampling distributions; statistical inference; correlation and linear regression; analysis of variance, chi-square and t-tests; and application of technology for statistical analysis including the interpretation of the relevance of the statistical findings. Applications using data from disciplines such as business, social sciences, psychology, life science, health science, and education.

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SECTION D

Condition on Enrollment

1a. Prerequisite(s)

- Intermediate Algebra with a grade of C or better or
- MATH 93 with a minimum grade of C or better or
- Appropriate Placement

1b. Corequisite(s): *None*

1c. Recommended: *None*

1d. Limitation on Enrollment: *None*

SECTION E

Course Outline Information

1. Student Learning Outcomes:

A. Generate and interpret graphs for categorical, numeric and bi-variate data.
B. Interpret data and draw conclusions using confidence intervals and hypothesis testing.
C. Compute appropriate values as needed to interpret data. Computations may include but are not limited to; measures of center, measures of variation, and z-scores.

2. Course Objectives: Upon completion of this course, the student will be able to:

A. Interpret data displayed in tables and graphs.
B. Apply concepts of sample space and probability.
C. Calculate measures of central tendency and variation for data.
D. Identify the standard methods of obtaining data, advantages and disadvantages of each. Define and identify bias.
E. Calculate the mean and standard deviation of a discrete distribution.
F. Calculate probabilities using normal and student?s t-distributions.
G. Distinguish between sample and population distributions and apply the Central Limit Theorem.
H. Construct and interpret confidence intervals.
I. Determine and interpret levels of statistical significance including p-values.
J. Perform and interpret technology-based statistical analysis, beyond the use of a graphing calculator.

K. Identify the basic concept of hypothesis testing including Type I and II errors.
L. Formulate hypothesis involving samples from one and two populations.
M. Select the appropriate technique for testing a hypothesis and interpret the result.
N. Apply linear regression and ANOVA, and interpret the result.
O. Use appropriate statistical techniques to analyze and interpret applications based on data from at least four of the following disciples: business, economics, social sciences, psychology, political science, administration of justice, life science, physical science, health science, information technology and education.
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3. Course Content

1) Summarizing data graphically and numerically.
2) Descriptive statistics: measurement, measures of central tendency, and variation.
3) Sample spaces and probability.
4) Random variables and expected value.
5) Sampling and sampling distributions.
6) Discrete distributions, including Binomial.
7) Continuous distributions, including Normal.
8) The Central Limit Theorem.
9) Estimation and confidence intervals.
10) Hypothesis Testing and inference, including t-tests for one and two populations, and Chi-square test.
11) Correlation and linear regression and analysis of variance (ANOVA).
12) Applications using data from at least four of the following disciplines: business, economics, social sciences, psychology, political science, administration of justice, life science, physical science, health science, information technology, and education.
13) Technology based Statistical analysis, beyond the use of a graphing calculator, using technology such as SPSS, EXCEL, Minitab, R or Statcrunch.

4. Methods of Instruction:

Activity: Activity Examples: Use the Mean vs Median applet in StatCrunch to analyze the effect of outliers on measures of center. Use the Correlation by Eye applet in StatCrunch to visualize the connection between the linear correlation coefficient and scatterplot.
Discussion: Discussion Examples: Meet with your group to discuss the linear correlation coefficient values you have given to each scatterplot following the Correlation by Eye activity.
Lab: Optional labs may include but are not limited to student exploration of analysis involving the following; Measures of Center and Variation, Linear Regression, Probability Distributions, Confidence Intervals, Hypothesis Testing and ANOVA.
Lecture:
Projects:
Other: Required instruction and use of technology for data analysis beyond the use of a graphing calculator. Labs and activities involving technology based data analysis, such as R or StatCrunch, will include operating instructions.
Online Adaptation: Activity, Directed Study, Discussion
Explain how the online adaptation of the methods of instruction aligns with the course outcomes: Online adaptation will include some combination of; video instruction, live and/or recorded online meetings, online meetings including breakout rooms, discussion boards. Use of these methods will provide students with a robust exposure to course outcomes and objectives while also providing detailed instruction, feedback and interaction from the instructor.

3. Methods of Evaluation: Describe the general types of evaluations for this course and provide at least two, specific examples.

Typical classroom assessment techniques

Exams/Tests --
Quizzes --
Oral Presentation --
Projects -- Data Analysis Projects/Labs
Home Work --
Final Exam --

Additional assessment information:

The Mathematics Department maintains a commitment to diverse teaching methods in courses emphasizing vital quantitative skills and qualitative reasoning ability. To that end, it is expected that sufficient formative assessments will be given to students that in frequency, length and rigor adequately assess both quantitative skills and qualitative reasoning.

Sample assessment questions follow.
1. Using the given data, calculate the most appropriate measures of center and variation and interpret them in context.
2.Analyze the following data to describe the relationship between cricket chirps/minute and ambient temperature.
3. Does the given data provide evidence that the proportion of students successfully transferring to a four year university from community college A is higher than that from community college B? Use a full hypothesis test to support your conclusion.

Letter Grade or P/NP

4. Assignments: State the general types of assignments for this course under the following categories and provide at least two specific examples for each section.

A. Reading Assignments
   Example 1: Read section 6.2 before our next class and be ready to discuss example 3 on page 302.
B. Writing Assignments
   Example 1 - Online or Paper Homework: Complete assigned exercises from applicable section in the text.

   Example 2 - Lab: Analyze the data set to describe the relationship between cricket chirps/minute and ambient temperature.
C. Other Assignments
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5. Required Materials

A. EXAMPLES of typical college-level textbooks (for degree-applicable courses) or other print materials.

Book #1:

Author:	Gould, Robert; Wong, Rebecca; Ryan, Colleen
Title:	Introductory Statistics: Exploring the World Through Data
Publisher:	Pearson
Date of Publication:	2020
Edition:	3rd

Book #2:

Author:	Open Learning Initiative (OLI)

Title: Concepts in Statistics
Publisher: Open Learning Initiative through Carnegie Mellon University
Date of Publication: 2021
Edition:

B. Other required materials/supplies.

- Each listed text has the option to include additional algebra review materials.
- Statistical analysis platform, beyond the use of a graphing calculator, is required. Individual instructors will choose the platform, such as R, Statcrunch or Excel. StatCrunch instructions may be integrated into each listed text.