MATH137 : Statistics for Data Science

General Information

Author:	• Suzanne Palermo • Schulten, Charlotte
Course Code (CB01) :	MATH137
Course Title (CB02) :	Statistics for Data Science
Department:	MATH
Proposal Start:	Spring 2025
TOP Code (CB03) :	(1701.00) Mathematics, General
CIP Code:	(27.0101) Mathematics, General.
SAM Code (CB09) :	Non-Occupational
Distance Education Approved:	Yes
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000640605
Curriculum Committee Approval Date:	06/12/2024
Board of Trustees Approval Date:	07/16/2024
Last Cyclical Review Date:	09/27/2023
Course Description and Course Note:	MATH 137 combines descriptive statistics concepts such as probability techniques, gathering and summarizing data and relationships between variables, inferential statistics concepts such as confidence intervals, hypothesis testing such as chi-square, t-tests, and analysis of variance, decision making, and the application of technology to statistical analysis using Python. Students will study correlation and regression analyses such as linear models and the application of technology for statistical analysis including the interpretation of the relevance of the statistical findings to data science. The course teaches critical concepts and skills in quantitative reasoning and statistical analysis, in conjunction with hands-on analysis of real- world datasets, including economic data, document collections, geographical data, and social networks. It also delves into social issues surrounding the ethical use of data.
Justification:	Content Change
Academic Career:	• Credit
Mode of Delivery:	No value
Author:	• Schulten, Charlotte
Course Family:	No value

Academic Senate Discipline

Primary Discipline:	• Mathematics
Alternate Discipline:	No value
Alternate Discipline:	No value

Course Development

Basic Skill Status (CB08)

Course is not a basic skills course.

☐ Allow Students to Gain Credit by Exam/Challenge

Course Special Class Status (CB13)

Course is not a special class.

Pre-Collegiate Level (CB21)

Not applicable.

Grading Basis

- Grade with Pass / No-Pass Option

Course Support Course Status (CB26)

Course is not a support course

General Education and C-ID

General Education Status (CB25)

GE Status (CSU) B4, (UC) 2

Transferability

Transferable to both UC and CSU

Transferability Status

Approved

C-ID	Area	Status	Approval Date	Comparable Course
MATH	Mathematics	Approved	09/03/2024	MATH 110 - Introduction to Statistics

Cal-GETC	Area	Status	Approval Date	Comparable Course
Area 2: Mathematical Concepts and Quantitative Reasoning	Mathematical Concepts and Quantitative Reasoning	Pending	No value	No Comparable Course defined.

Units and Hours

Summary

Minimum Credit Units (CB07)	5
Maximum Credit Units (CB06)	5
Total Course In-Class (Contact) Hours	126
Total Course Out-of-Class Hours	144
Total Student Learning Hours	270

Credit / Non-Credit Options

Course Type (CB04)

Credit - Degree Applicable

Noncredit Course Category (CB22)

Credit Course.

Noncredit Special Characteristics

No Value

Course Classification Code (CB11)

Credit Course.

☐ Variable Credit Course

Funding Agency Category (CB23)

Not Applicable.

☐ Cooperative Work Experience Education Status (CB10)

Weekly Student Hours

Course Student Hours

	In Class	Out of Class
Lecture Hours	4	8
Laboratory Hours	3	0
Studio Hours	0	0

Course Duration (Weeks)	18
Hours per unit divisor	54
Course In-Class (Contact) Hours	
Lecture	72
Laboratory	54
Studio	0
Total	126
Course Out-of-Class Hours	
Lecture	144
Laboratory	0
Studio	0
Total	144

Time Commitment Notes for Students

No value

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Pre-requisites, Co-requisites, Anti-requisites and Advisories

Prerequisite

Placement is based on academic background.

OR

Prerequisite

MATH90 - Intermediate Algebra for BSTEM

Objectives

- Solve linear equations and compound inequalities.
- Perform operations with polynomials.
- Solve a system of linear equations using elimination substitution.
- Solve applied problems.
- Graph functions (linear, quadratic, exponential, logarithmic).

Entry Standards

Entry Standards

Add, subtract, multiply, and divide real numbers.

Convert between percents, decimals and fractions.

Solve introductory linear equations and inequalities.

Simplify introductory exponential expressions.

Add, subtract, multiply and divide polynomials.

Graph introductory linear equations and inequalities.

Find the equation of a line.

Solve linear systems using 3 different methods.

Use algebra to solve applied problems.

Factor polynomials.

Demonstrate knowledge of test-taking strategies and study skills.

Course Limitations

Cross Listed or Equivalent Course	

Specifications

Methods of Instruction

Methods of Instruction	Lecture
Methods of Instruction	Discussion
Methods of Instruction	Collaborative Learning
Methods of Instruction	Guest Speakers
Methods of Instruction	Laboratory
Methods of Instruction	Multimedia
Methods of Instruction	Demonstrations

Out of Class Assignments

- Homework (e.g. problems sets related to statistical course content and programming)
- Project (e.g. Select an appropriate test to analyze applications based on data from disciplines including engineering, business, economics, natural and social sciences, psychology, health science, information technology, and education. Through analyzing the output, communicate the statistical findings to facilitate decision-making.)

Methods of Evaluation	Rationale
Other	Evaluation of programming assignments and reports for correctness, use of design principles, documentation and efficiency
Exam/Quiz/Test	One or more examinations requiring programming ability to develop an algorithm; evaluate code segments, and write code using theories presented in the course
Exam/Quiz/Test	Two or more exams are required
Exam/Quiz/Test	A comprehensive final examination to test problem solving is required

Textbook Rationale

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
No Value	No Value	No Value	No Value	No Value

Other Instructional Materials (i.e. OER, handouts)

Description	Computational and Iferential Thinking: The Foundations of Data Science
Author	Adhikari, Ani
Citation	https://inferentialthinking.com/chapters/intro.html
Online Resource(s)	

Materials Fee

No value

Learning Outcomes and Objectives

Course Objectives

Identify the standard methods of obtaining data and identify advantages and disadvantages of each.

Summarize data graphically and numerically and interpret the results through visualization using Python.

Calculate measures of central tendency and variation of data sets.

Interpret data displayed in tables and graphs.

Apply concepts of sample space and probability. Calculate the mean and variance of discrete and continuous distributions.

Distinguish the difference between sample and population distributions and analyze the role played by the Central Limit Theorem.

Construct and interpret confidence intervals based on real-world data from a variety of disciplines.

Select the appropriate technique for testing a hypothesis based on real-world data from a variety of disciplines and interpret the result.

Formulate hypothesis tests involving samples from one and two populations using Python.

Identify the basic concept of hypothesis testing including Type I and II errors.

Use linear regression and Analysis of Variance (ANOVA) for estimation and inference, and interpret the associated statistics.

Use appropriate statistical techniques and Python to analyze and interpret applications based on data from disciplines including business, social sciences, psychology, life science, health science, and education.

SLOs

Write correct computer code that will produce appropriate visualizations and analysis of data.	Expected Outcome Performance: 70.0
Analyze and describe studies, data sets, and probability models.	Expected Outcome Performance: 70.0
Apply confidence intervals and hypothesis testing to form conclusions about realistic data.	Expected Outcome Performance: 70.0

Additional SLO Information

Does this proposal include revisions that might improve student attainment of course learning outcomes?

No

Is this proposal submitted in response to learning outcomes assessment data?

No

If yes was selected in either of the above questions for learning outcomes, explain and attach evidence of discussions about learning outcomes.

No Value

SLO Evidence

No Value

Course Content

Lecture Content

Descriptive Statistics (24 hours)

- Summarizing data graphically and numerically
- Descriptive statistics such as measures of central tendency, variation, relative position, and levels/scales of measurement

Probability (11 hours)

- Sample spaces and probability
- Random variables and expected value
- Sampling and sampling distributions
- Discrete distributions – Binomial
- Continuous distributions – Normal
- The Central Limit Theorem

Inferential Statistics (32 hours)

- Estimation and confidence intervals
- Hypothesis Testing and inference, including t-tests for one and two populations, and Chi-square test
- Correlation and linear regression and analysis of variance (ANOVA)

Data Analysis (5 hours)

- Applications using data from disciplines including business, social sciences, psychology, life science, health science, and education

- Statistical analysis using programming software such as Python

Total hours: 72

Laboratory/Studio Content

Statistics Support (27 hours)
- Data types, structures, functions, tables
- Review material being covered in lectures that week
- Lab discussion worksheet
- Tutoring section worksheet

Programming Support (27 hours)
- Programming fundamentals in the context of data
- How to answer data science questions with the tables available
- Complex operations with tables (grouping, joining, etc)
- Write code to perform mathematical and statistical work on input data to produce and present the result
- Write code to locate and read data from multiple types of data source
- Write code using Python to utilize the appropriate plots to visualize data
- Work through/familiarize self with the lab assignment

Total hours: 54

Additional Information

Is this course proposed for GCC Major or General Education Graduation requirement? If yes, indicate which requirement in the two areas provided below.

Yes

GCC Major Requirements

Mathematics

GCC General Education Graduation Requirements

Communication and Analytical Thinking

Repeatability

Not Repeatable

Justification (if repeatable was chosen above)

No Value

Resources

Did you contact your departmental library liaison?

No

If yes, who is your departmental library liason?

No Value

Did you contact the DEIA liaison?

No

Were there any DEIA changes made to this outline?

No

If yes, in what areas were these changes made:

No Value

Will any additional resources be needed for this course? (Click all that apply)

- No

If additional resources are needed, add a brief description and cost in the box provided.

No Value