MATH136+ : Statistics with Support

General Information

Author:	• Suzanne Palermo
Course Code (CB01) :	MATH136+
Course Title (CB02) :	Statistics with Support
Department:	MATH
Proposal Start:	Fall 2024
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) :	CCC000619135
Curriculum Committee Approval Date:	06/12/2024
Board of Trustees Approval Date:	06/20/2023
Last Cyclical Review Date:	06/01/2019
Course Description and Course Note:	MATH 136+ is a one-semester introductory statistics course with a built-in support lab component. Topics in this course include: the nature of statistical methods, types of data, introductory probability, sampling theory, experimental design, confidence intervals, hypothesis testing, regression analysis, and decision making. Support topics include: curve plotting, linear equations and inequalities, radicals, functions, descriptive statistics, graphical and numerical statistics for quantitative and categorical data, modeling bivariate data with linear functions, introductory set theory. Emphasis will be placed on the application of statistical concepts to real world data, development of statistical reasoning, and the interpretation of results.
Justification:	Content Change
Academic Career:	• Credit

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 Only

Course Support Course Status (CB26)

Course is not a support course

Transferability & Gen. Ed. Options

General Education Status (CB25)

GE Status (CSU) B4, (UC) 2

Transferability

Transferable to both UC and CSU

Transferability Status

Approved

IGETC Area	Area	Status	Approval Date	Comparable Course
2-Math	Mathematical Concepts and Quantitative Reasoning	Approved	08/31/2020	No Comparable Course defined.

CSU GE-Breadth Area	Area	Status	Approval Date	Comparable Course
B4-Mathematics/Quantitative Reasoning	Mathematics/Quantitative Reasoning	Approved	08/31/2020	No Comparable Course defined.

C-ID	Area	Status	Approval Date	Comparable Course
MATH	Mathematics	Approved	08/31/2020	MATH 110 - Introduction to Statistics

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)	**Noncredit Course Category (CB22)**	**Noncredit Special Characteristics**
Credit - Degree Applicable	Credit Course.	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

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

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	0

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 satisfactory completion of MATH 90.

OR

Prerequisite

MATH90 - Intermediate Algebra for BSTEM

Objectives
- Solve linear equations and compound inequalities.
- Perform operations with polynomials.
- Find the equation of a line parallel or perpendicular to a given line.
- Solve a system of linear equations using elimination substitution.
- Solve applied problems.
- Graph functions (linear, quadratic, exponential, logarithmic).

AND

Advisory

ENGL101 - Introduction to College Reading and Composition

Objectives

- Read, analyze, and evaluate a variety of primarily non-fiction readings for content, context, and rhetorical merit with consideration of tone, audience, and purpose.
- Integrate the ideas of others through paraphrasing, summarizing, and quoting without plagiarism.
- Find, evaluate, analyze, and interpret primary and secondary sources, incorporating them into written essays using appropriate documentation format.

Entry Standards

Entry Standards

Course Limitations

Cross Listed or Equivalent Course

MATH 136 Statistics

MATH 136B Statistics B

MATH 136H Honors Statistics

Specifications

Methods of Instruction

Methods of Instruction	Lecture
Methods of Instruction	Laboratory
Methods of Instruction	Discussion
Methods of Instruction	Multimedia
Methods of Instruction	Collaborative Learning

Methods of Instruction	Presentations

Out of Class Assignments

- Homework (e.g. problems sets related to course content)
- Projects involving analysis of real-world data using statistical software (e.g. collect data and create a written report including graphical displays and numeric summaries.)

Methods of Evaluation	Rationale
Exam/Quiz/Test	Quizzes
Exam/Quiz/Test	Five to eight examinations are required
Exam/Quiz/Test	A comprehensive final examination is required

Textbook Rationale

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Sullivan, Michael	Integrated Review Materials to accompany Statistics : Informed Decisions using Data	Pearson	2018	9780134606675
Sullivan, Michael	1. Statistics: Informed Decisions using Data	Pearson	2020	9780136872740
Illowsky, Barbara Dean, Susan	Introductory Statistics	OpenStax	2022	978-1-947172-05-0

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

Description	Support Course for Elementary Statistics
Author	Larry Green
Citation	https://stats.libretexts.org/Courses/Montgomery_College/Support_Course_for_Elementary_Statistics
Online Resource(s)	No value

Materials Fee

No value

Learning Outcomes and Objectives

Course Objectives

Describe and analyze realistic data sets both large and small from disciplines including business, social science, psychology, life science, health science and education using graphs and statistics.

Analyze real world results, interpret the output of a technology-based statistical analysis and identify flaws in statistical reasoning.

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

Calculate probability using the normal distribution, the t distribution and the basic laws of probability.

Describe sampling distributions, distinguish them from population distributions and analyze the role played by the Central Limit Theorem.

Compute confidence intervals of population means, proportions and standard deviations.

Identify the basic concept of hypothesis testing including Type I and II errors, finding and interpreting levels of significance including p-values, selecting the appropriate techniques for testing a hypothesis from one and two populations and interpreting the result.

Perform chi-square tests using chi-square tables and statistical software or calculator.

Use linear regression and ANOVA analysis for estimation and inference, and interpret the statistics.

Calculate and present results using sound statistical reasoning, accurate statistical terminology and technology such as spreadsheets, graphing calculators or StatCrunch.

SLOs

Analyze and describe studies, data sets, and probability models.

Expected Outcome Performance: 70.0

ILOs Core ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.	
	Communicate clearly, ethically, and creatively; listen actively and engage respectfully with others; consider situational, cultural, and personal contexts within or across multiple modes of communication.	
	Use quantitative and/or analytical mathematical skills to solve problems and to interpret, evaluate, and process information and data to draw logical conclusions and support claims.	
ILOs General Education	apply techniques of analysis and critical thinking to critique real world and theoretical topics and issues	

Apply confidence intervals and hypothesis testing to form conclusions about realistic data.

Expected Outcome Performance: 70.0

ILOs Core ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.	
	Use quantitative and/or analytical mathematical skills to solve problems and to interpret, evaluate, and process information and data to draw logical conclusions and support claims.	

ILOs General Education	apply techniques of analysis and critical thinking to critique real world and theoretical topics and issues

Additional SLO Information

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

No Value

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

No Value

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 (20)
- Graphical descriptions of data
- Measures of center: mean, median, and mode
- Measures of spread; standard deviation/variance, quartiles, and range
- Density curves, including normal distributions
- Linear regression, including residual analysis
- Correlation
- 2-Way Tables
- Data set analysis using statistical software and or statistical calculators
- Identification of confounding and lurking variables and other possible misinterpretations of statistical conclusions

Producing Data (7)
- Design of sampling procedures
- Design of experiments
- Strengths and limitations of experimental designs

Probability and Sampling Distributions (13)
- Probability models
- Computing probabilities using the addition and multiplication rules
- Expected value
- The Central Limit Theorem
- Binomial distributions

Inferences Using Sample Means, Proportions, and Standard Deviations (32)
- Confidence intervals for the population proportion and mean
- One and two-sample hypothesis tests of population proportions and means; Z-test and Student's t-test
- Type I and Type II errors
- Chi-square distribution
- Linear regression and ANOVA analysis for estimation and inference
- Accurate presentation of inferential conclusions

Total Hours: 72

Laboratory/Studio Content

Laboratory Content (54)
- Data Analysis using descriptive statistics
- Graphs of two variables

- Linear equations and inequalities with one and two variables, including absolute values and compound inequalities
  - The rectangular coordinate system
  - The slope of a line
  - Equations of lines
- Exponents and radical equations
  - Exponents in the context of scientific notation
  - Scientific notation
  - Solving equations with one radical
- Basic Set Theory
  - The real number system
  - Subsets
  - Complements
  - Unions and intersections
  - Counting techniques, permutations, and combinations
  - Summation notation
- Math Study Skills Content
  - Time management
  - Motivation for college success in mathematics
  - Critical thinking skills
  - Test taking techniques
  - Goal setting
  - Transferring / career exploration resources
  - College support resources
  - Math community resources

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