MATH R105H: HONORS: INTRODUCTORY STATISTICS

Originator
ptrujillo

College
Oxnard College

Discipline (CB01A)
MATH - Mathematics

Course Number (CB01B)
R105H

Course Title (CB02)
Honors: Introductory Statistics

Banner/Short Title
Honors: Intro Statistics

Credit Type
Credit

Start Term
Fall 2023

Catalog Course Description
This course covers descriptive and inferential statistics for students of social sciences, science, education, business, and engineering. Included are discussions of graphing and interpreting graphs, measures of the center and variation, probability, normal curves, binomial tests, hypothesis testing, correlation and regression, chi-square tests, t-tests, and analysis of variance. This course uses technology to analyze data sets. Honors work challenges students to be more analytical and creative through expanded assignments, real-world applications, and enrichment opportunities. Credit will not be awarded for both the honors and regular versions of a course. Credit will be awarded only for the first course completed with a grade of "C" or better or "P".

Taxonomy of Programs (TOP) Code (CB03)
1701.00 - Mathematics, General

Course Credit Status (CB04)
D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)
A (Transferable to both UC and CSU)

Course Basic Skills Status (CB08)
N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)
E - Non-Occupational

Course Cooperative Work Experience Education Status (CB10)
N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)
Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)
N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)
Y - Not Applicable

Course Noncredit Category (CB22)
Y - Credit Course

Funding Agency Category (CB23)
Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)
1 - Program Applicable

General Education Status (CB25)
B - Satisfies Math/Quantitative Reasoning req (CSUGE-B B4, IGETC 2, or 4-yr)

Support Course Status (CB26)
N - Course is not a support course

Field trips
Will not be required

Grading method
(L) Letter Graded

Does this course require an instructional materials fee?
No

Repeatable for Credit
No

Is this course part of a family?
No

Units and Hours

Carnegie Unit Override
No

In-Class

Lecture
Minimum Contact/In-Class Lecture Hours
70
Maximum Contact/In-Class Lecture Hours
70

Activity

Laboratory

Total in-Class

Total in-Class
Total Minimum Contact/In-Class Hours
70
Total Maximum Contact/In-Class Hours
70

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class
Minimum Outside-of-Class Hours
140
Maximum Outside-of-Class Hours
140

Total Student Learning

Total Student Learning
Total Minimum Student Learning Hours
210
Total Maximum Student Learning Hours
210

Minimum Units (CB07)
4
Maximum Units (CB06)
4

Prerequisites
Course taught at the level of intermediate algebra or placement as determined by the college's multiple measures assessment process.

Entrance Skills
Entrance Skills
Algebraic fluency with expressions and equations. Understanding functions and graphs.

Requisite Justification
Requisite Type
Prerequisite

Requisite
Course taught at the level of intermediate algebra or placement as determined by the college's multiple measures assessment process

Requisite Description
Course in a sequence

Level of Scrutiny/Justification
Content review

Student Learning Outcomes (CSLOs)	
	Upon satisfactory completion of the course, students will be able to:
1	Students will calculate binomial probabilities.
2	Students will conduct a hypothesis test.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	Distinguish among different scales of measurement and their implications
2	Interpret data displayed in table(s) and graphically
3	Apply concepts of sample space, probability, and counting techniques
4	Calculate measure of central tendency and variation for a given data set
5	Identify the standard measures of obtaining data and identify advantages and disadvantages of each (i.e. use appropriate language)
6	Calculate the mean and variance of discrete distribution(s)
7	Calculate probability using normal and t-distributions
8	Distinguishing the difference between sample and population distributions and analyze the role played by the Central Limit Theorem
9	Construct and interpret confidence intervals
10	Determine and interpret levels of statistical significance (e.g. p-values)
11	Interpret the out of a technology-based statistical analysis
12	Identify the basic concepts of hypothesis tests involving Type I and II errors
13	Determine the appropriate hypothesis test involving samples from one and two populations, conduct the appropriate test, and interpret the results
14	Using linear regression and ANOVA analysis for estimation and inference and interpret the associated statics
15	Use appropriate statistical techniques to analyze and interpret applications based on data from various disciplines including, but not limited to business, social science, psychology, life science, health science, and education

Course Content

Lecture/Course Content

1. Summarizing data graphically and numerically
   a. Graphs for numerical data
   b. Graphs for categorical data
   c. Choosing an appropriate type of graph
2. Descriptive statistics
   a. Choosing and reporting an appropriate measure of center
   b. Choosing and reporting an appropriate measure of variation
   c. Describing basic shapes of data
   d. Level/scales of measure
3. Sample space and probability
   a. Applying the basics principles of probability
   b. Counting principals
4. Random variables and expected value
5. Sampling and sampling distribution
   a. Differentiating between effective and non-effective sampling methods
   b. Recognizing the difference between observational studies and experiments
   c. Communicating the basic elements of experimental design
6. Discrete distribution
   a. Binomial probability distribution
7. Continuous distribution
   a. Normal probability distribution
   b. Approximate normal to the binomial probability distribution
8. The Central Limit Theorem
9. Estimation and confidence intervals
   a. Finding confidence intervals for sample data (for both proportions and means)
   b. Using confidence intervals for inference
10. Hypothesis testing and inference
    a. Performing hypothesis tests
    b. Recognize and distinguish Type I and II errors
    c. Using t-test

        i. For one sample
       ii. For two samples
     iii. For matched paired sample
    iv. Confidence intervals
   d. Chi-Squared test
        i. Contingency (two-way) tables
       ii. Goodness-of-Fit
11. Correlation and linear regression and analysis of variance (ANOVA)
   a. ANOVA
        i. For comparing means of more than two groups
       ii. Post hoc tests after ANOVA
   b. Correlation and linear regression
        i. Create a scatter plot
       ii. Finding the regression line
     iii. Using regression line to interpolate (where appropriate)
12. Applications using data
   a. Problems addressing various disciplines (e.g. business, social sciences, psychology, life sciences, health sciences, and education)
13. Statistical analysis using technology
   a. Inputting and analyzing data using graphing calculators
   b. Calculating probabilities and completing hypothesis tests using graphing calculators

Laboratory or Activity Content

None

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Written expression
Problem solving exercises
Skills demonstrations

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Computational homework
Group projects
Individual projects
Problem-solving exams
Quizzes
Research papers
Skills demonstrations
Essays
Problem-Solving Assignments

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Audio-visual presentations
Case studies
Class activities
Class discussions
Distance Education
Lecture
Small group activities

Describe specific examples of the methods the instructor will use:

Instructor will lecture on statistical concepts, and will guide student activities on relevant topics.

Representative Course Assignments

Writing Assignments
1. Students do research projects and write up the results in a standard research format.
2. Students turn in two written assignments per week on which they are graded. The assignments include making graphs, choosing numbers to describe data, and using inference with chi-square tests, ANOVA, and t-tests.
3. HONORS: Projects which include advanced data collection and/or analysis techniques.

Critical Thinking Assignments
1. Students will analyze deeper concepts in descriptive statistics, probability, and problem solving.

Reading Assignments
1. Students read textbook selections that present statistical terminology and theorems as well as techniques in graphing, describing data numerically, hypothesis testing, and how to apply an appropriate statistical test, given sample data.
2. HONORS: Readings which convey deeper understanding of the statistical material covered.

Problem-Solving and Other Assignments (if applicable)
1. Students will be required to learn how to input and analyze data on a graphing calculator and statistical software.
2. HONORS: Projects which are focused on a specific student's area of study. Example: Students will be asked to analyze distributions of height among people of a specific culture, instead of the United States.

Outside Assignments

Representative Outside Assignments
1. Students do research projects and write up the results in a standard research format.
2. Students turn in two written assignments per week on which they are graded. The assignments include making graphs, choosing numbers to describe data, and using inference with chi-square tests, ANOVA, and t-tests.
3. HONORS: Projects which include advanced data collection and/or analysis techniques.

Articulation

C-ID Descriptor Number
MATH 110

Status
Approved

Comparable Courses within the VCCCD

MATH R105 - Introductory Statistics
MATH M15H - Honors: Introductory Statistics
MATH M15 - Introductory Statistics
MATH V44 - Elementary Statistics

District General Education

A. Natural Sciences

B. Social and Behavioral Sciences

C. Humanities

D. Language and Rationality

D2. Communication/Analytical Thinking
Approved

E. Health and Physical Education/Kinesiology

F. Ethnic Studies/Gender Studies

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

B4 Mathematical/Quantitative Reasoning
Approved

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

Area F: Ethnic Studies

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 2A: Mathematical Concepts & Quantitative Reasoning
Approved

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals
Resource Type
Textbook

Description
Sullivan, Michael (2021). *Statistics: Informed Decisions Using Data* (6th). New York, Pearson.

Resource Type
Other Instructional Materials

Description
TI graphing calculators (TI-83 or TI-84).

Distance Education Addendum

Definitions

Distance Education Modalities
Hybrid (1%–50% online)
Hybrid (51%–99% online)
100% online

Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.
Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.
Yes

Regular Effective/Substantive Contact

Hybrid (1%–50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Students will post a discussion board topic on data collection and analysis, and they will respond to other classmates with the intent of dialogue.
Other DE (e.g., recorded lectures)	Students will watch recorded, video lectures.
Video Conferencing	Video tools such as ConferZoom may be used to provide live synchronous or asynchronous sessions with students. ADA compliance will be upheld with Closed Captioning during the session or of the recorded session. Student-to-student group meetings will also be encouraged.
E-mail	Responses to specific email questions

Hybrid (51%–99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Students will post a discussion board topic on data collection and analysis, and they will respond to other classmates with the intent of dialogue.
Other DE (e.g., recorded lectures)	Students will watch recorded, video lectures.
Video Conferencing	Video tools such as ConferZoom may be used to provide live synchronous or asynchronous sessions with students. ADA compliance will be upheld with Closed Captioning during the session or of the recorded session. Student-to-student group meetings will also be encouraged.
E-mail	Responses to specific email questions

100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Students will post a discussion board topic on data collection and analysis, and they will respond to other classmates with the intent of dialogue.
Other DE (e.g., recorded lectures)	Students will watch recorded, video lectures.

| Video Conferencing | Video tools such as ConferZoom may be used to provide live synchronous or asynchronous sessions with students. ADA compliance will be upheld with Closed Captioning during the session or of the recorded session. Student-to-student group meetings will also be encouraged. |
| E-mail | Responses to specific email questions |

Examinations

Hybrid (1%–50% online) Modality
On campus
Online

Hybrid (51%–99% online) Modality
On campus
Online

Primary Minimum Qualification
MATHEMATICS

Review and Approval Dates

Department Chair
05/09/2023

Dean
05/09/2023

Technical Review
05/10/2023

Curriculum Committee
05/10/2023

DTRW-I
MM/DD/YYYY

Curriculum Committee
MM/DD/YYYY

Board
MM/DD/YYYY

CCCCO
MM/DD/YYYY

Control Number
CCC000579732

DOE/accreditation approval date
MM/DD/YYYY