Cerro Coso College

Course Outline of Record Report

10/14/2021

MATHC121H : Elementary Probability and Statistics - Honors

General Information

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Course Code (CB01) :	MATHC121H
Course Title (CB02) :	Elementary Probability and Statistics - Honors
Department:	Mathematics
Proposal Start:	Fall 2020
TOP Code (CB03) :	(1701.00) Mathematics, General
SAM Code (CB09) :	Non-occupational
Distance Education Approved:	Yes
Course Control Number (CB00) :	CCC000355488
Curriculum Committee Approval Date:	10/20/2017
Board of Trustees Approval Date:	12/14/2017
External Review Approval Date:	Pending
Course Description:	This course covers data analysis using descriptive and inferential statistics. Graphs and computations include measures of central tendency and dispersion, correlation and regression, and presentation of data on a histogram, scatter plot, box plot, and the normal curve. Probability concepts include those for discrete and continuous random variables. Sampling and hypothesis testing are covered for means and variances. Topics from algebra are combined with applications in statistics in the lab portion of the class. This course applies to the degree requirements for students not majoring in Science, Technology, Engineering, and Math (STEM) fields.The honors section provides more content and requires greater intensity and depth of study than the non-honors class; the honors course also requires at least one extra research assignment.
Submission Type:	Mandatory Revision Revision is for AB 705 compliance.
Author:	No value

Faculty Minimum Qualifications

Master Discipline Preferred:	• Mathematics
Alternate Master Discipline Preferred:	• Engineering
Bachelors or Associates Discipline Preferred:	• Mathematics
Additional Bachelors or Associates Discipline Preferred:	No value

Course Development Options

Basic Skills Status (CB08)

Course is not a basic skills course.

Course Special Class Status (CB13)

Course is not a special class.

Grade Options

- Letter Grade Methods
- Pass/No Pass

☐ Allow Students to Gain Credit by Exam/Challenge

Allowed Number of Retakes

0

Course Prior To College Level (CB21)

Not applicable.

Rationale For Credit By Exam/Challenge

No value

Retake Policy Description

Type:|Non-Repeatable Credit

☑ Allow Students To Audit Course

Course Support Course Status (CB26)

No value

Associated Programs

☑ Course is part of a program (CB24)

Associated Program	Award Type	Active
CC Associate in Arts Degree in Anthropology for Transfer	A.A. Degree for Transfer	Spring 2018 to Fall 2019
CC Kinesiology for Transfer	A.A. Degree for Transfer	Spring 2018 to Fall 2018
Cyber Security Technology	A.S. Degree Major	Spring 2018
CC Associate in Science in Business Administration for Transfer	A.A. Degree for Transfer	Summer 2018 to Summer 2020
CC Liberal Arts: Social & Behavioral Sciences	A.A. Degree Major	Summer 2018 to Fall 2020
CC Liberal Arts: Mathematics & Science	A.A. Degree Major	Summer 2018 to Fall 2020
CC Psychology for Transfer	A.A. Degree for Transfer	Spring 2018
Associate in Science Degree In Mathematics for Transfer	A.A. Degree for Transfer	Summer 2018

CC Associate in Science Degree in Administration of Justice for Transfer -	A.S. Degree for Transfer	Summer 2018
Cyber Security Technician	Certificate of Achievement	Spring 2018
CC Computer Information Systems-	Certificate of Achievement	Spring 2018 to Summer 2019
CC Computer Information Systems	A.S. Degree Major	Spring 2018 to Summer 2019
CSU General Education (CSU GE Breadth) (In Development)	Certificate of Achievement	Fall 2021
Intersegmental General Education Transfer Curriculum Certificate of Achievement (In Development)	Certificate of Achievement	Fall 2021
CC Information Technology	Certificate of Achievement	Summer 2019
CC Information Technology	A.S. Degree Major	Summer 2019
Associate in Arts in Sociology for Transfer Degree	A.A. Degree for Transfer	Fall 2019 to Spring 2020
Nutrition and Dietetics Associate in Science Degree for Transfer (AS-T)	A.S. Degree for Transfer	Fall 2019 to Spring 2020
Political Science Associate in Arts Degree for Transfer (AA-T)	A.A. Degree for Transfer	Spring 2020 to Spring 2020
Economics Associate in Arts Degree for Transfer (AA-T)	A.A. Degree for Transfer	Spring 2020 to Spring 2020
Anthropology Associate in Arts Degree for Transfer	A.A. Degree for Transfer	Spring 2020 to Spring 2022
Economics Associate in Arts Degree for Transfer	A.A. Degree for Transfer	Spring 2020

Political Science Associate in Arts Degree for Transfer	A.A. Degree for Transfer	Spring 2020 to Summer 2020
Sociology Associate in Arts for Transfer Degree	A.A. Degree for Transfer	Spring 2020 to Fall 2021
Business Administration Associate in Science Degree for Transfer	A.A. Degree for Transfer	Summer 2020
CSU General Education (CSU GE Breadth)	Certificate of Achievement	Fall 2020
Law, Public Policy, and Society Associate in Arts Degree for Transfer	A.A. Degree for Transfer	Fall 2020
Intersegmental General Education Transfer Curriculum Certificate of Achievement	Certificate of Achievement	Fall 2020
Liberal Arts: Mathematics & Science Associate in Arts Degree	A.A. Degree Major	Fall 2020
Liberal Arts: Social & Behavioral Sciences Associate in Arts Degree	A.A. Degree Major	Fall 2020
Liberal Arts: Social & Behavioral Sciences Associate in Arts Degree (In Development)	A.A. Degree Major	Spring 2022
Business Administration Associate in Science Degree for Transfer 2.0 (In Development)	A.S. Degree for Transfer	Fall 2022

Transferability & Gen. Ed. Options

Course General Education Status (CB25)

No value

Transferability

Transferable to both UC and CSU

Transferability Status

Approved

Cerro Coso General Education Requirements	Categories	Status	Approval Date	Comparable Course

Area 4.2	Language & Rationality Analytical Thinking	Approved	No value	No Comparable Course defined.

CSU General Education Certification	Categories	Status	Approval Date	Comparable Course
Area B.4	Scientific Inquiry & Quantitative Reasoning Mathematics / Quantitative Reasoning	Approved	No value	No Comparable Course defined.

Intersegmental General Education Transfer Curriculum	Categories	Status	Approval Date	Comparable Course
Area 2	Mathematical Concepts & Quantitative Reasoning	Approved	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
Faculty Load	0

Credit / Non-Credit Options

Course Credit Status (CB04)

Credit - Degree Applicable

Course Non Credit Category (CB22)

Credit Course.

Non-Credit Characteristic

No Value

Course Classification Status (CB11)

Credit Course.

Funding Agency Category (CB23)

Not Applicable.

☐ Cooperative Work Experience Education Status (CB10)

☐ Variable Credit Course

Weekly Student Hours

	In Class	Out of Classs
Lecture Hours	4	8

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	54

Laboratory Hours	3	0
Activity Hours	0	0

Course In-Class (Contact) Hours	
Lecture	72
Laboratory	54
Activity	0
Total	126

Course Out-of-Class Hours	
Lecture	144
Laboratory	0
Activity	0
Total	144

Time Commitment Notes for Students

A total of 6 hours between lecture and lab per week and a 1 hour meeting with instructor every other week 9 hours per week of study outside of class

Faculty Load

Extra Duties: 0

Faculty Load: 0

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

Advisory

ENGLC101 - Freshman Composition

ENGL C101 ensures that students are able to compose a formal research paper from multiple sources including finding, evaluating, organizing, and synthesizing college-level reading materials and to construct a detailed outline and annotated bibliography that projects the structure of the research paper and reflects the extent of their literature search and the relevance of the sources chosen. ENGL C101 prepares students to use the corrected proof of their outline to draft a research paper that is properly formatted and written in clear, grammatically correct prose.

Outcomes

- Read, analyze, and evaluate a variety of university-level texts for content, context, and rhetorical merit with consideration of tone, audience, and purpose.
- Apply a variety of rhetorical strategies in writing unified, well-organized academic essays with arguable theses and persuasive support, using complex ideas presented in university-level sources.
- Develop varied and flexible strategies for generating, drafting, and revising essays.
- Integrate the ideas of others through paraphrasing, summarizing, and quoting without plagiarism.
- Find, evaluate, analyze, interpret, and see the relations among primary and secondary sources, incorporating them into written essays using accurate MLA documentation and formatting

AND

Prerequisite

MATHC055 - Intermediate Algebra

In Math C121 students are expected to consistently perform signed number operations correctly; demonstrate proficiency with operations of algebraic fractions; use the rules of exponents and radicals to simplify expressions and solve equations; recognize the difference between functions and non-functions; graph a line and write the equation of a line; recognize and graph at least one quadratic – parabola, circle, ellipse, or hyperbola; solve a linear system of equations by at least two of the following methods: graphing, substitution, addition elimination, Cramer's rule; solve quadratic equations by at least two of the following methods: factoring, completing the square, quadratic formula, graphing calculator; graph exponential and logarithmic functions; use the properties of exponential and logarithmic functions to solve equations; set up and solve word problems related to the skills above. Students successfully demonstrating these MATH C055 skills will be prepared for MATH C121.

OR

Prerequisite

MATHC053 - Preparation for Statistics

This is an accelerated statistics preparation course for non-STEM majors. Topics include linear, quadratic, rational, exponential, and logarithmic functions and equations; systems of linear equations and inequalities; and data collection, data summaries, and descriptive statistics. The emphasis is on statistical applications of the algebraic material. Students successfully demonstrating these MATH C053 skills will be prepared for MATH C121.

Entrance Skills

Entrance Skills	Description
No value	No value

Limitations on Enrollment

Limitations on Enrollment	Description
No value	No value

Specifications

Methods of Instruction

Methods of Instruction	Lecture
Rationale	Lectures are based on the course objectives. Textbook readings and homework either written or using an online course management system will be assigned.
Methods of Instruction	Problem Solving
Rationale	In the lab students use technology to apply the theory they learn in the lecture to real-life applications.

Methods of Instruction	Presentations (by students)
Rationale	Students do a presentation of their honor's project or paper to the rest of the class.

Assignments

A. Daily homework assignments, Students work mathematics problems. For example, given summary statistics and a significance level, students perform a hypothesis test to test the claim that more than 75% of adults know what Twitter is. B. Online Course Management System, Example: Students determine a Probability Value for a right-tailed hypothesis test about a claim of a population mean using StatCrunch or StatDisk software. C. Project, Students conduct a survey, experiment or observational study outside of class and give a presentation of the results to the group. D. Term paper dealing with an approved statistical topic.

Methods of Evaluation	**Rationale**
Participation	A. Daily in-class assignments Example: Students work statistics problems assigned from the text and from hand- outs to reinforce concepts and skills discussed in lecture.
Tests	B. Weekly Quizzes Weekly quizzes covering the lecture material, homework, and in-class assignments assess the student's understanding. C. Chapter Exams Exams cover lecture material, homework, and in-class assignments and assess the student's understanding.
Project	D. Projects Student projects graded using a rubric scale Example: Read additional material in Statistics course textbook, Triola (2018) Elementary Statistics 13 ed. covering topics of Statistical Process Control and Nonparametric Tests. The student will use this additional knowledge as well as the knowledge gained from the regular Statistics course to conduct research at a local wildlife monitoring and management project. This research will include the collection of data in the field with careful consideration of sampling methods and analysis methods used. The student prepares a report which includes the presentation of the collected data in the form of tables, charts, and graphs along with an analysis and interpretation of results. The student discusses the application of Statistical methods used in sampling and analyzing the data in their project write-up. There will also be a short presentation of the project in class.
Research Paper	E. Honors Paper The student will write a research paper of 2,500 words on a subject mutually agreed upon by the student and instructor. The paper will reflect intensified study beyond the scope of the non-honors class. The paper will use the APA format. Example: The student uses additional knowledge acquired from the honors section as well as the knowledge gained from the regular statistics course to research a local manufacturing company with regards to statistical process control. This research will include interviews and a tour and observation of Statistical Process Control "in the field." The student will write a paper analyzing and commenting on the manufacturing process with emphasis on the application of statistical methods on quality control in manufacturing. The paper will follow the guidelines for writing a scientific paper. There will also be a short presentation of the paper in class.
Distance Education Description: how outcomes are evaluated	Student may be located far from a campus.

Equipment

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Triola	Elementary Statistics	Pearson Education	2018	

Other Instructional Materials

Description	Software: Pearson Education, Inc. MyStatLab Website, 4th ed. -StatCrunch and StatDisk calculators
Author	
Citation	Elementary Probability and Statistics - Honors

Materials Fee

No

Learning Outcomes and Objectives

Course Objectives

Interpret data displayed in tables and in graphs.

Apply concepts of sample space and probability.

Calculate measures of central tendency and variation for a given data set.

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

Calculate the mean and variance of a discrete distribution.

Calculate probabilities using normal and student t-distribution.

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

Construct and interpret confidence intervals.

Determine and interpret levels of statistical significance including p-values.

Interpret the output of a technology-based statistical analysis.
Identify the basic concept of hypothesis testing including Type I and II errors.
Formulate hypothesis tests involving samples from one and two populations.
Select the appropriate technique for testing a hypothesis and interpret the result.
Use linear regression and ANOVA analysis for estimation and inference, and interpret the associated statistics.
Use appropriate statistical techniques to analyze and interpret applications based on data from disciplines including business, social sciences, psychology, life science, health science, and education.

CSLOs

1. Apply appropriate inferential analyses to real situations in order to draw conclusions about a population or several populations.

Expected SLO Performance: 70.0

ISLOs Core ISLOs	Students who are completing a program will be able to think critically and creatively and apply reasoning.
	Students who are completing a program will be prepared to engage in responsible citizenship at various levels.
Social Science Psychology AA Degree for Transfer	3. The student will be able to evaluate psychological data and apply the scientific method to psychological theory. Assessment:The student will complete a research project scored by a rubric.
Social Science Liberal Arts: Social & Behavioral Sciences AA Degree	Identify and apply the Scientific Method used by social scientists to study human behavior.
Social Science IGETC PLOs	Use a complex symbol system to solve problems.
Social Science PLOs for CSU GE COA	Use a complex symbol system to solve problems.
Business Information Technolog Law, Public Policy, and Society for Transfer	Apply laws, public policy, and/or societal or ethical theories to develop a solution to a legal issue, a public policy issue, and/or a societal concern.

2. Compute probabilities using the basic probability laws based on the binomial or normal distribution.

Expected SLO Performance: 70.0

3. Construct and interpret hypothesis tests and confidence intervals.

Expected SLO Performance: 70.0

Social Science Psychology AA Degree for Transfer	3. The student will be able to evaluate psychological data and apply the scientific method to psychological theory. Assessment:The student will complete a research project scored by a rubric.
Social Science Anthropology AA Degree for Transfer	Use the scientific method to analyze aspects of the human condition.
	Use the scientific method to analyze aspects of the human condition.

4. Analyze quantitative data verbally, graphically, symbolically, and numerically. Expected SLO Performance: 70.0

Social Science Sociology AA-T	Use the scientific method to analyze social and cultural patterns among human groups.
Social Science Anthropology AA Degree for Transfer	Use the scientific method to analyze aspects of the human condition.
	Use the scientific method to analyze aspects of the human condition.
Social Science Psychology AA Degree for Transfer	3. The student will be able to evaluate psychological data and apply the scientific method to psychological theory. Assessment:The student will complete a research project scored by a rubric.
Science Liberal Arts: Mathematics & Science AA Degree	Apply algebraic, graphical, numerical, and other methods to solve applied problems in the areas of mathematics, natural sciences, computer graphics, and computer animation.

5. Analyze the importance of inferential statistics to the evolution of twentieth and twenty-first centuries' thought by writing a term paper or investigate a real-life application using a statistical software package and present the results in the form of a written project and oral presentation. This outcome is unique to the honors section. Expected SLO Performance: 70.0

Social Science Anthropology AA Degree for Transfer	Use the scientific method to analyze aspects of the human condition.
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	Use the scientific method to analyze aspects of the human condition.

Outline

Course Outline

The Mathematics Department has adopted the following best practices for teaching this course: offering or awarding extra-credit is forbidden, the allowance of multiple attempts at exams is forbidden, and an approved on-site proctor for online course exams is required.

A. Summarizing Data Graphically and Numerically:
- i. Levels of measurement
- ii. Characteristics of data and types of graphs
- iii Measures of relative position and boxplots

B. Descriptive Statistics - Measurement, Measures of Central Tendency, and Variation:
- i. Mean and standard deviation
- ii. Population vs. sample statistics

C. Probability:
- i. Sample spaces and probability
- ii. Relative frequency
- iii. Conditional probability and independence
- iv. Graphical and computational approaches

D. Random Variables and Expected Value:

i. Mean and standard deviation for critical thinking

E. Sampling and Sampling Distributions:
i. Biased and unbiased estimators

F. Discrete Distributions:
i. Binomial Distribution
ii. Poisson Distribution

G. Continuous Distributions:
i. Uniform Distribution
ii. Normal Distribution

H. The Central Limit Theorem:
i. Assessing normality
ii. Normal Distribution as an approximation to the Binomial Distribution

I. Estimation and Confidence Intervals:
i. Proportions
ii Means
iii Standard deviation and variance

J. Hypothesis Testing and Inference - T-tests for One and Two Populations and Chi-Square test:
i. Example: Test the claim that the mean pulse rate of adult females in a data set is less than 75 bpm.
ii. Z-test
iii. T-test
iv. Chi-Square Distribution
v. Power of a Hypothesis Test
vi. Two populations
a. means to include both independent samples and matched pairs
b. two population proportions
c. two population variances

K. Correlation and Regression Lines:
i. Example: From a set of Consumer Price Index/ subway fare data, determine if there is a linear correlation.
ii. Coefficient of determination

L. Analysis of Variance (ANOVA);
i. Introduction of Fisher's F-distribution
ii. One-way ANOVA
iii.Two-way ANOVA

M. Applications Using Data from at Least Four of the Following Disciplines: Business, Economics, Social Science, Psychology, Political Science, Administration of Justice, Life Science, Physical Science, Health Science, Information Technology, and Education

N. Technology-Based Statistical Analysis:
i. Completion of a statistical analysis using StatCrunch, Minitab, Excel or a graphing calculator

O. Assignments and Projects Specific to the Honors Section:
i. Discussion of current media releases dealing with statistical data

ii. Treatment of more advanced statistical tests and their applicability
iii. Demonstrations of several statistical software packages such as Excel, StatCrunch or Minitab
iv. Individual or collaborative student projects exploring a particular facet of the subject with a report of results to the group or a comprehensive research paper addressing the application of inferential statistics to a topic or issue of the twentieth century or later

Lab Outline

Students analyze real-life applications using the methods presented in the lecture portion of the class along with computational software to solve various problems.Computational packages to be used may include but are not limited to Minitab, Excel, StatCrunch, and the TI-84 graphing calculator.

Delivery Methods and Distance Education

Delivery Method: Please list all that apply -Face to face -Online (purely online no face-to-face contact) -Online with some required face-to-face meetings ("Hybrid") -Online course with on ground testing -iTV – Interactive video = Face to face course with significant required activities in a distance modality -Other

Face 2 Face
hybrid to allow online students to take the honors section on ground.

Rigor Statement: Assignments and evaluations should be of the same rigor as those used in the on-ground course. If they are not the same as those noted in the COR on the Methods of Evaluation and out-of-class assignments pages, indicate what the differences are and why they are being used. For instance, if labs, field trips, or site visits are required in the face to face section of this course, how will these requirements be met with the same rigor in the Distance Education section?

It is not the intention of the Math Department for MATH C121H to be offered online. However, a student in an online section of MATH C121 could enroll in the honors section and attend its on-ground meetings. The rigor requirements of any online section of MATH C121 are specified below.

Rigor:
The assignments and evaluations will be the same no matter what delivery method is used. The outcomes for this course, both for on-ground and online classes, will be evaluated and assessed by exam.

Effective Student-Instructor Contact: Good practice requires both asynchronous and synchronous contact for effective contact. List the methods expected of all instructors teaching the course. -Learning Management System -Discussion Forums -Moodle Message -Other Contact -Chat/Instant Messaging -E-mail -Face-to-face meeting(s) -Newsgroup/Discussion Board -Proctored Exam -Telephone -iTV -Interactive Video -Other (specify)

Student-Instructor contact will include the following: discussion forums, learning management system messages, announcements, and feedback for each student's work.
Student-Instructor contact MAY include the following: chat/Zoom, newsgroup/discussion board, phone, and iTV.
Student-Student contact will include the following: discussion forums.
Student-Student contact MAY include the following: chat/Zoom, learning management system messages, group work, and peer reviewed projects.

Software and Equipment: What additional software or hardware, if any, is required for this course purely because of its delivery mode? How is technical support to be provided?

For online courses a Pearson access code may be required. There is a toll free student technical support line included with the access code

Accessibility: Section 508 of the Rehabilitation Act requires access to the Federal government's electronic and information technology. The law covers all types of electronic and information technology in the Federal sector and is not limited to assistive technologies used by people with disabilities. It applies to all Federal agencies when they develop, procure, maintain, or use such technology. Federal agencies must ensure that this technology is accessible to employees and the public to the extent it does not pose an "undue burden". I am using -iTV—Interactive Video only -Learning management system -Publisher course with learning management system interface.

Faculty will use the Canvas accessibility checker, along with other resources provided by our Distance Education Director, to ensure all learning materials are accessible, including but not limited to documents, pdfs, OERs, external websites, and videos.

Class Size: Good practice is that section size should be no greater in distance ed modes than in regular face-to-face versions of the course. Will the recommended section size be lower than in on-ground sections? If so, explain why.

NA