Cerro Coso College

Course Outline of Record Report

05/07/2020

MATHC131 : Basic Functions and Calculus for Business

General Information

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Course Code (CB01) (CB01) :	MATHC131
Course Title (CB02) (CB02) :	Basic Functions and Calculus for Business
Department:	Mathematics
Proposal Start:	Fall 2020
TOP Code (CB03) :	(1701.00) Mathematics, General
SAM Code (CB09) (CB09) :	Non-occupational
Distance Education Approved:	Yes
Course Control Number (CB00) (CB00) :	CCC000313087
Curriculum Committee Approval Date:	01/31/2020
Board of Trustees Approval Date:	03/12/2020
External Review Approval Date:	03/12/2020
Course Description:	This course emphasizes the concepts of differential calculus and integral calculus as they relate to business and economics. The course integrates rates of change, interest formulas, concepts of demand and elasticity, as well as exponential and logarithmic applications.
Submission Type:	Mandatory Revision This is coming through because course was on the red list. Cyclical review. Last assessment was spring 2019 and did not have any impact on this revision.The following were added: C-ID descriptor, addition of examples under methods of instruction, distance education to methods of evaluation, and some general wording to the distance education section under delivery methods.

Faculty Minimum Qualifications

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

Course Formerly Known As

Course Formerly Known As

No Value

Course Development Options

Basic Skills Status (CB08) (CB08)

Course is not a basic skills course.

Course Special Class Status (CB13) (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

Associated Programs

☑ Course is part of a program (CB24)

Associated Program	Award Type
CC Associate in Science in Business Administration for Transfer	A.A. Degree for Transfer
CC Liberal Arts: Mathematics & Science	A.A. Degree Major
CC Computer Information Systems-	Certificate of Achievement
CC Computer Information Systems	A.S. Degree Major
Cyber Security Technology	A.S. Degree Major
Cyber Security Technician	Certificate of Achievement

CC Information Technology	Certificate of Achievement
CC Information Technology	A.S. Degree Major
Economics Associate in Arts Degree for Transfer (AA-T)	A.A. Degree for Transfer
CSU General Education (CSU GE Breadth)	CSU General Education (CSU GE Breadth)
Intersegmental General Education Transfer Curriculum Certificate of Achievement	Intersegmental General Education Transfer Curriculum Certificate of Achievement
Economics Associate in Arts Degree for Transfer	A.A. Degree for Transfer
Liberal Arts: Mathematics & Science Associate in Arts Degree	Liberal Arts: Mathematics & Science Associate in Arts Degree
Business Administration Associate in Science Degree for Transfer	A.A. Degree for Transfer

Transferability & Gen. Ed. Options

Transferability

Transferable to both UC and CSU

Transferability Status

Approved

Cerro Coso General Education Requirements	Categories	Transferability Status	Comparable Course
Area 4.2	Language & Rationality Analytical Thinking	Approved	No Comparable Course defined.

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

	Quantitative Reasoning		

Intersegmental General Education Transfer Curriculum	Categories	Transferability Status	Comparable Course
Area 2	Mathematical Concepts & Quantitative Reasoning	Approved	No Comparable Course defined.

C-ID	Categories	Transferability Status	Comparable Course
Mathematics	C-ID discipline	Pending	140

Units and Hours

Summary

Minimum Credit Units (CB07) (CB07)	4	**Total Course In-Class (Contact) Hours**	72	**Total Student Learning Hours**	216
Maximum Credit Units (CB06) (CB06)	4	**Total Course Out-of-Class Hours**	144	**Faculty Load**	-

Credit / Non-Credit Options

Course Credit Status (CB04) (CB04)	Course Non Credit Category (CB22) (CB22)	Non-Credit Characteristics
Credit - Degree Applicable	Credit Course.	No value

Course Classification Code (CB11) (CB11)	Funding Agency Category (CB23) (CB23)	
Credit Course.	Not Applicable.	☐ Cooperative Work Experience Education Status (CB10) (CB10)

☐ Variable Credit Course

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	4	8
Lab Hours	-	-
Activity Hours	-	-

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	54
Course In-Class (Contact) Hours	
Lecture	72
Lab	-
Activity	-
Total	72

Course Out-Of-Class Hours

Lecture	144
Lab	-
Activity	-
Total	144

Time Commitment Notes for Students

No value

Faculty Load

Extra Duty: -

Faculty Load: -

Units and Hours - Weekly Specialty Hours

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

Requisites

Prerequisite

MATHC055 - Intermediate Algebra

In Math C055 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 C131.

Entrance Skills

Skill	Content Review
No value	No value

Limitations on Enrollment

Limitation	Provide Rationale
No value	No value

Specifications

Methods of Instruction	Methods of Instruction Rationale
Lecture	Lecture Example: Lecture on how to find the derivative of a function.
Group Work	In Class Assignments: Example: Students work collaboratively to determine a volume of revolution using the integral.

Assignments

A. Daily homework assignments As an example, given the revenue and cost equations as functions of x homes maintained by a landscaping business, students determine an instantaneous rate of change in a) total revenue, b) total cost, and c) total profit. B. Online Course Management System
Example: Assignments on MyMathLab.

Methods of Evaluation	Methods of Evaluation Rationale
Participation	A. Daily in-class assignments Example: Students work mathematics problems assigned from the text and from hand- outs to reinforce concepts and skills discussed in lecture.
Tests	B. Weekly Quizzes Weekly quizzes over the previous week's lecture material, homework, and in-class assignments assess the student's understanding. C. Chapter Exams Chapter exams over the previous chapter's lecture material, homework, and in-class assignments assess the student's understanding.
Distance Education Description: how outcomes are evaluated	Mastery of outcomes will be assessed by online proctored exams and online homework.

Equipment

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Bittinger	Calculus and Its Applications, 11th edition,	Addison-Wesley Publishing Company	2019	9780133862386

Other Instructional Materials

Description	Software: Pearson Education, Inc.. MyLabMastering, 10th ed. -Course Management System /Moodle
Author	
Citation	Basic Functions and Calculus for Business

Materials Fee

No

Learning Outcomes and Objectives

Course Objectives

No value

CSLOs

Find the derivatives of polynomial, rational, exponential, and logarithmic functions. Expected SLO Performance: 70.0

Find the derivatives of functions involving constants, sums, differences, products, quotients, and the chain rule. Expected SLO Performance: 70.0

Sketch the graph of functions using horizontal and vertical asymptotes, intercepts, and first and second derivatives to determine intervals where the function is increasing and decreasing, maximum and minimum values, intervals of concavity, and points of inflection. Expected SLO Performance: 70.0

Analyze the marginal cost, profit, and revenue when given the appropriate function. Expected SLO Performance: 70.0

Use derivatives to find rates of change and tangent lines. Expected SLO Performance: 70.0

Interpret a "word problem" and utilize the concepts of maximization, demand, consumer and producer surplus, and elasticity. Expected SLO Performance: 70.0

Science Liberal Arts: Mathematics & Science AA Degree	1. Demonstrate a general understanding of the nature of science, the methods applied in scientific investigations, and the value of those methods in developing a rigorous understanding of the physical world. Assessment:This will be assessed with an exam scored with a rubric.

Find the maximum and minimum in more than two variables by the second derivative test and LaGrange Multipliers. Expected SLO Performance: 70.0

Use calculus to analyze revenue, cost, and profit. Expected SLO Performance: 70.0

Find definite and indefinite integrals by using the general integral formulas, integration by substitution, and other integration techniques. Expected SLO Performance: 70.0

Use integration in business and economics applications. Expected SLO Performance: 70.0

Outline

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. Functions and their graphs

1. Variables and constants
2. Graphing a linear and quadratic equations
3. Range, domain, and vertical line test
4. Polynomials
5. Composition of functions

B. Derivatives/Differentiation and Applications
1. Derivatives
    a. Limits
    b. Rates of Change
    c. Velocity and Acceleration
    d. Continuity
    e. Constant Rule, Sum, and Difference Rules
    f. Product and Quotient Rules
    g. Chain Rule
    h. Higher Order Derivatives
2. Applications
    a. First Derivative Test: Increasing and Decreasing
    b. Second Derivative Tests For Increasing/Decreasing, Concavity/Inflection
    c. Graphing Strategy: Asymptotes and Rational Functions
    d. Marginal Cost, Revenue, and Profit
    e. Absolute Maxima and Minima
    f. The Extreme Value Theorem
    g. Inventory and Economics Problems
    h. Differentials
    i. Implicit Differentiation and Related Rates

C. Integrals/Integration and Applications
1. Anit-differentiation
2. The Indefinite Integral
    a. Rules for Integration
    b. Constants of Integration
    c. Fundamental Theorem of Calculus
3. The Definite Integral
    a. Properties
    b. As the limit of Riemann sums
4. Techniques and Applications
    a. Substitution
    b. Integration by Parts
    c. Tables of Integrals
    d. Areas between Curves
    e. Improper Integrals
5. Applications
    a. Consumer and Producer Surplus
    b. Probability
    c. Expected Value and the Normal Distribution
    d. Applications Using Differential Equations

D. Exponential and Logarithmic Functions
1. Graphing and Computing Exponential and Logarithmic Functions
2. Growth and Decay
3. Derivatives and Integrals of Exponential and Logarithmic Functions

E. Functions of Several Variables
1. Partial Derivatives
2. Maximum and Minimum Problems
3. Lagrange Multipliers
4. Multiple Integration

Delivery Methods

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 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

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? Describe the ways in which instructor-student contact and student-student contact will be facilitated in the distance ed environments.

All assignments in distance education courses (online, hybrid and iTV) are the same as those in the on-ground course, except that students in purely online sections will submit all of their assignments virtually, and students in hybrid sections will submit some of their assignments virtually. Instructor evaluation of student work in distance education courses is the same as in the on-ground course, except that evaluation of student work in online and hybrid courses is presented virtually. Instead of onsite lectures, hybrid and online courses will use videos and written lecture notes.

As with any on-ground class, the instructor must provide substantive critiques of all submitted material and at least general responses to discussion posts. Instructor assigns the completion of math problems in a publisher site as an exercise including check figures and assistance when needed. The publisher’s site will reinforce the course's SLO's.

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

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 -Message -Other Contact - Chat/Instant Messaging -E-mail -Face-to-face meeting(s) -Newsgroup/Discussion Board -Proctored Exam -Telephone -iTV - Interactive Video -Other

- Discussion Forums
- Chat/Instant Messaging
- E-mail
- Newsgroup/Discussion Board
- Proctored Exam

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 student technical support chat 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.

- Publisher course with learning management system interface.

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.

class_size Online 45, face- face 35