GAVILAN COLLEGE

5055 Santa Teresa Blvd

Gilroy, CA 95023

Course Outline

COURSE: MATH 6   DIVISION: 20   ALSO LISTED AS:

TERM EFFECTIVE: Fall 2020   CURRICULUM APPROVAL DATE: 12/8/2020

SHORT TITLE: CALCULUS BUS/SOC SC

LONG TITLE: Calculus for Business and Social Science

Units	Number of Weeks	Type	Contact Hours/Week	Total Contact Hours
3	18	Lecture: 3	54
		Lab: 0	0
		Other: 0	0
		Total: 3	54

Out of Class Hrs:	108.00
Total Learning Hrs:	162.00

COURSE DESCRIPTION:

This course applies the fundamental principles and techniques of calculus to problems in business, economics, the life sciences and the social sciences. Topics will include limits, and differentiation and integration of linear, quadratic, polynomial, exponential and logarithmic functions. This course is not intended for students majoring in engineering, the physical sciences or math. Using a calculator is required. Graphing calculator is recommended. (C-ID: MATH 140) PREREQUISITE: Skills equivalent to intermediate algebra or appropriate placement.

PREREQUISITES:

Completion of MATH 233, as UG, with a grade of C or better.
OR
Completion of MATH 233B, as UG, with a grade of C or better.
OR
Completion of MATH 235, as UG, with a grade of C or better.
OR
Completion of MATH 240, as UG, with a grade of C or better.
OR
Completion of MATH 3, as UG, with a grade of C or better.
OR
Completion of MATH 5, as UG, with a grade of C or better.
OR
Completion of MATH 7, as UG, with a grade of C or better.
OR
Completion of MATH 8A, as UG, with a grade of C or better.
OR
Completion of MATH 8B, as UG, with a grade of C or better.
OR
Completion of MATH 12, as UG, with a grade of C or better.
OR
Completion of MATH 14, as UG, with a grade of C or better.
OR
Completion of MATH 1A, as UG, with a grade of C or better.
OR
Completion of MATH 1B, as UG, with a grade of C or better.
OR
Completion of MATH 1C, as UG, with a grade of C or better.
OR
Score of 33 on Intermediate Algebra
OR
Score of 13 on Pre-Calculus
OR
Score of 2700 on Accuplacer Math
OR
Score of 2600 on MM CCCApply Math
OR
Score of 2600 on MM Placement Tool Math

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES
L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

    02 - Lecture and/or discussion

    05 - Hybrid

    71 - Dist. Ed Internet Simultaneous

    72 - Dist. Ed Internet Delayed

STUDENT LEARNING OUTCOMES:

By the end of this course, a student should:

1. Analyze properties of quadratic functions and their graphs. Applications in business, social sciences and life sciences will be chosen to demonstrate knowledge in polynomial and rational functions.

2. Find derivatives of polynomials, rational, exponential, and logarithmic functions. Use the rules for sums as well as use product and quotient and chain rules to solve problems involving complex equations.

3. Use calculus to 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.

4. Analyze the marginal cost, profit and revenue when given the appropriate function; determine maxima and minima in optimization problems using the derivative; use derivatives to find rates of change and tangent lines; and use calculus to analyze revenue, cost, and profit. Apply this to applications in business, economics, and the life sciences.

5. Work with the definite integral as a limit of a sum and relate it to the fundamental theorem of calculus.

6. Find definite and indefinite integrals by using general formulas, substitution, integration by parts, integral tables, and other integration techniques. Use integration techniques and apply them to business and economic applications and to the life sciences.

COURSE CONTENT:

Curriculum Approval Date: 12/8/2020

DE MODIFICATION ONLY

TOPIC 1: 3 HOURS

CONTENT: Review Cartesian coordinate system, graphing, definitions of a

function, and these applications in business and life science. Basic

graphing of functions

and graph transformations: vertical, horizontal

shifts, reflections, expansions, and contractions.

SPO: Perform algebra operations to demonstrate understanding of

function, set theory, graph of an

function and table values as

representative of a function. Perform transformation of a function in one

or many composite forms.

COURSE CONTENT (CONTINUED):

TOPIC 2: 3 HOURS

CONTENT: Linear functions and straight lines. Concept of intercepts, slope of line and standard form of linear functions. Quadratic functions, equations and inequalities. Properties of quadratic functions and their graphs.

SPO: Demonstrate the understanding of standard form of linear equations, as well as slope-intercept form and point slope form. Be able to convert back and forth from each one of the forms. Describe the quadratic function and its graph, or parabola. Find solutions of quadratic equations and the transformation of the standard parabola.

TOPIC 3:   4 HOURS

CONTENT: Polynomial and rational functions, Polynomial root approximation, regression polynomials. Exponential functions, natural base e, growth and decay applications.

SPO: Find the root of an polynomial function. Approximate the result using graphs. Describe vertical and horizontal asymptotes. Evaluate exponential function of different bases: 10, e, etc. Graph these functions. Solve equations involving e of different exponents.

TOPIC 4:   3 HOURS

CONTENT: Inverse function of exponential function: logarithmic function. Properties of logarithmic functions and how to calculate log values. Apply these topics in finance and life sciences. Present value, future value.

SPO: Describe, compare and contrast the relationship between log functions and exp functions. Properties of logarithmic functions. Able to use calculator to evaluate logarithms and apply it in business and life science applications.

TOPIC 5   3 HOURS

CONTENT: Review rate of change and slope. Introduce instantaneous rate of change, limits. How to evaluate limits and the limits of difference quotients of various functions.

SPO: Demonstrate the use limits to calculate instantaneous rate of change, slope of a graph and slope of the tangent line. Find values of the slope of a function. Determine the existence of a limit.

COURSE CONTENT (CONTINUED):

TOPIC 6   3 HOURS
CONTENT: Apply the techniques of limits to formulate derivatives. Exam
the nonexistence of the derivatives of
certain type of functions.
Derivative of a constant function, power rule, derivative of a constant
times a function, sums and differences of functions.
SPO: Perform differentiation of a function. Use
power rule to
differentiate power functions. Describe, compare and contrast the
effect of a constant times a function, and sum and difference rule.

TOPIC 7: 3 HOURS
CONTENT: Derivatives of products and
quotients of various functions.
How to apply chain rule in power form.
SPO: Apply product and quotient rules to obtain derivatives of certain
functions. Solve real life examples. Use chain rule for
power
functions to differentiate complex functions. Combine rules of
differentiation.

TOPIC 8: 3 HOURS
CONTENT: Study marginal analysis in business and economics.
Continuity and graphs. First derivative
and graphs
SPO: Employ marginal analysis in business and economics. Use
differentiation to find, marginal profit, break-even points.
Describe, compare and contrast continuity, continuity
properties,
infinite limits and solve inequalities using continuity properties.

TOPIC 9: 3 HOURS
CONTENT: second derivative and graphs. Optimization: absolute maxima
and minima.
SPO: Find second
derivative of a function, if it exists, inflection
point, concave up and concave down. Use the information from the first and second derivatives to sketch
curves. Solve applied optimization
problems,
maximizing revenue and profit, etc.

TOPIC 10: 3 HOURS
CONTENT: The constant e and continuous compound applications.
Derivatives of logarithmic and exponential functions.
SPO: Apply various
differentiation forms that involve exponential and
logarithmic functions. Use the methods to compute growth time,
compounded interest, half-life of substance, etc.

COURSE CONTENT (CONTINUED):

TOPIC 11: 3 HOURS

CONTENT: Use chain
rule for differentiation of logarithmic and
exponentiation function. Introduction of antiderivatives and
indefinite integrals.

SPO: Use chain rule to find derivatives of complex logarithmic
function
and exponential functions. Use this method to find growth rate,
maximizing profit, etc.

TOPIC 12: 3 HOURS

CONTENT: Antiderivatives and definite and indefinite integrals. Integration by
substitution, reversing the chain rule.
Application of integration by substitution and additional substitution
techniques.

SPO: Use the substitution method, also called the change of variable
method,
to simplify complex equations. Apply this technique in various
applications.

TOPIC 13: 3 HOURS

CONTENT: Introduction to the definite integrals: rate, area and
distance. Definite integrals as limit of a
sum between upper and lower
bound.

SPO: Demonstrate the knowledge of finding limit of sum over the
interval, [a and b]. Use this technique to evaluate areas between the
upper bound, a, and lower
bound, b. Find average value of a
continuous function.

TOPIC 14: 3 HOURS

CONTENT: Area between curves and its application including area between
a curve and the x-axis, area between two curves.

SPO:
Find area between curves by evaluating the definite integral.
Determine areas between graphs crossing the x axis and curves crossing
each other. Use this in applications in business and
economics.

TOPIC 15: 3 HOURS

CONTENT: Integrations by parts. Study the formula and how to apply it
in real life examples in business and economics..

SPO: Describe, compare and contrast the relationship
between product
rule of differentiation and integration by parts. Use integration by
parts formula to solve various type of integration problems.

COURSE CONTENT (CONTINUED):

TOPIC 16: 3 HOURS

CONTENT: Integrations by tables. Learn
how to use table of integrals
and how to use the reduction formulas. Approximate definite integrals as a sum.

SPO: Identify proper formula from the table of integrals to solve
complex problems. Apply
various integration techniques.

TOPIC 17: 3 HOURS

CONTENT: Double integrals. How to calculate average value over
rectangular regions as well as volume and double integrals.
A comprehensive review of all
the material in this course.

SPO: Utilize the integration techniques to operate on functions with
two or more variables with respect to one of the variables by treating
all the other variables as
though they were constants. Perform
integration on different variable sequences.

TOPIC 18: 2 HOURS

CONTENT: Final exam.

SPO: Final exam should include all the material covered in the
semester with more
emphasis on the integration portion since the last test.

METHODS OF INSTRUCTION:

Lecture/Discussion mode of instruction. Student input is encouraged throughout presentations, i.e. students are invited to ask questions and to answer questions during the lecture. Students may also have two projects to demonstrate the understanding of concept of slope vs. differentiation and area vs. integration. Alternatively, students may have the option of presenting another topic for review.

OUT OF CLASS ASSIGNMENTS:

Required Outside Hours: 108

Assignment Description: Assignments outside of class will mainly be reading, homework, and/or take-home quizzes.

METHODS OF EVALUATION:

Problem-solving assignments

Percent of total grade: 100.00 %

Percent range of total grade: 100 % Homework problems; Quizzes; Exams; Other: Project

REPRESENTATIVE TEXTBOOKS:

Required:

Barnett, Raymond A., Ziegler, Michael R. and Byleen, Karl E.,. College Mathematics for Business, Economics, Life Sciences, and Social Sciences, 12th edition. US: Prentice Hall, 2011. Or other appropriate college level text.

Reading level of text, Grade: 11th Verified by: Microsoft Word

Other textbooks or materials to be purchased by the student: Calculator is required and graphing calculator is recommended.

ARTICULATION and CERTIFICATE INFORMATION

    Associate Degree:

        GAV B4, effective 200530

    CSU GE:

        CSU B4, effective 200530

    IGETC:

        IGETC 2A, effective 200530

    CSU TRANSFER:

        Transferable CSU, effective 200530

        Not Transferable

    UC TRANSFER:

        Transferable UC, effective 200530

        Not Transferable

SUPPLEMENTAL DATA:

Basic Skills: N

Classification: Y

Noncredit Category: Y

Cooperative Education:

Program Status: 1 Program Applicable

Special Class Status: N

CAN: MATH34

CAN Sequence: XXXXXXXX

CSU Crosswalk Course Department: MATH

CSU Crosswalk Course Number: 140

Prior to College Level: Y

Non Credit Enhanced Funding: N

Funding Agency Code: Y

In-Service: N

Occupational Course: E

Maximum Hours:

Minimum Hours:

Course Control Number: CCC000274242

Sports/Physical Education Course: N

Taxonomy of Program: 170100