

Course Outline

COURSE: MATH 6 **DIVISION:** 10 **ALSO LISTED AS:**

TERM EFFECTIVE: Fall 2020 **CURRICULUM APPROVAL DATE:** 03/10/2020

SHORT TITLE: CALCULUS BUS/SOC SC

LONG TITLE: Calculus for Business and Social Science

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

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

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.

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Curriculum Approval Date: 03/10/2020

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.

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 a 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.

TOPIC 6 3 HOURS

CONTENT: Apply the techniques of limits to formulate derivatives. Examine 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.

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.

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

UC TRANSFER:

Transferable UC, effective 200530

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