Course Outline

COURSE: MATH 6   DIVISION: 10   ALSO LISTED AS:

TERM EFFECTIVE: Fall 2014   CURRICULUM APPROVAL DATE: 05/12/2014

SHORT TITLE: CALCULUS BUS/SOC SC

LONG TITLE: Calculus for Business/Social Science

<table>
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<th>Units</th>
<th>Number of Weeks</th>
<th>Type</th>
<th>Contact Hours/Week</th>
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<td>3</td>
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<td>Lecture</td>
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<td>Lab</td>
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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. PREREQUISITE: Mathematics 235 or Mathematics 240 with a grade of 'C' or better.

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

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:
1. Students will be able to 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.
   Measure: Homework, quizzes, exams
   PLO:
   ILO: 2.1, 2.3, 2.5
   GE-LO:
   Year assessed or anticipated year of assessment: 2014 or 2015

2. Students will be able to find derivatives of polynomials, rational, exponential, and logarithmic functions. They will use the rules for sums as well as use product and quotient and chain rules to solve problems involving complex equations.
   Measure: Homework, quizzes, exams
   PLO:
   ILO: 2.1, 2.3, 2.5
   GE-LO:
   Year assessed or anticipated year of assessment: 2014 or 2015
3. Students will be able to 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.

Measure: Homework, quizzes, exams

PLO:
ILO: 2.1, 2.3, 2.5
GE-LO:

Year assessed or anticipated year of assessment: 2014 or 2015

4. Students will 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. They will apply this to applications in business, economics, and the life sciences.

Measure: Homework, quizzes, exams

PLO:
ILO: 2.1, 2.3, 2.5
GE-LO:

Year assessed or anticipated year of assessment: 2014 or 2015

5. Students will be able to work with the definite integral as a limit of a sum and how it relates to the fundamental theorem of calculus.

Measure: Homework, quizzes, exams

PLO:
ILO: 2.1, 2.3, 2.5
GE-LO:

Year assessed or anticipated year of assessment: 2014 or 2015

6. Students will be able to find definite and indefinite integrals by using general formulas, substitution, integration by parts, integral tables, and other integration techniques. They will use integration techniques and apply them to business and economic applications and to the life sciences.

Measure: Homework, quizzes, exams

PLO:
ILO: 2.1, 2.3, 2.5
GE-LO:

Year assessed or anticipated year of assessment: 2014 or 2015

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

Curriculum Approval Date: 05/12/2014

WEEK 1 3 HOURS

ASSIGNMENTS: Each week students will be expected to read assigned sections of the text; complete assigned homework problems. Two or more projects will be assigned.

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 comprehensive of a function. Perform transformation of a function in one
or many composite forms.

WEEK 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.

WEEK 3  3 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.

WEEK 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.

WEEK 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.

WEEK 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.

WEEK 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.

WEEK 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.

WEEK 9 3 HOURS
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.

WEEK 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.

WEEK 11 3 HOURS
SPO: Use chain rule to find derivatives of complex logarithmic function and exponential functions. Use this method to find growth rate, maximizing profit, etc.

WEEK 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.

WEEK 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.

WEEK 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.

WEEK 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.

WEEK 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.

WEEK 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.

WEEK 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 will also have two projects to demonstrate the understanding of concept of slope vs. differentiation and area vs. integration.

METHODS OF EVALUATION:
Category 1 - The types of writing assignments required:
Percent range of total grade: 0 % to %

Category 2 - The problem-solving assignments required:
Homework problems
Quizzes
Exams
Other: Project
Percent range of total grade: 95 % to 100 %

Category 3 - The types of skill demonstrations required:
Percent range of total grade: 0 % to %
Category 4 - The types of objective examinations used in the course:
Percent range of total grade: 0 % to %

Category 5 - Any other methods of evaluation:
Percent range of total grade: 0 % to 5 %

REPRESENTATIVE TEXTBOOKS:
Required:
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: A
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: 6
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