MATH 0042 - BUSINESS CALCULUS

SECTION A

1. Division:	Sciences & Mathematics
2. Subject Code:	MATH
3. Course Number:	0042
4. Course Title:	BUSINESS CALCULUS
5. Semester of First Offering:	FALL 2013

SECTION B   General Course Information

1.Units: 4.0   **Variable Units:** N/A

2.This Course is: Degree-Applicable Credit - Transferable

3A. Cross-List: **3B. Formerly:**

Course Format and Duration

4. Standard Term Hours per Week		**5. Standard Term Total Semester Hours**	
Lecture/Discussion:	4	Lecture/Discussion:	72
Lab:		Lab:	
Activity:		Activity:	
By Arrangement:		By Arrangement:	
Total Hours per Week:	4	**Total Hours :**	72

6. Minimum hours per week of independent work done outside the class: 8

Course Preparation - (Supplemental form B required)

7a. Prerequisite(s): (Course and/or other preparation/experience that is <u>REQUIRED</u> to be completed previous to enrollment in this course.)

Completion of MATH D with grade of "C" or better, or placement by matriculation assessment process

7b. Co-requisite(s): (Courses and/or other preparation that is REQUIRED to be taken concurrently with this course.)

7c. Advisory: (MINIMUM preparation RECOMMENDED in order to be succesful in this course. Also known as "Course Advisory".)

Completion of MATH 12 strongly recommended, especially for students who have not recently taken MATH D

Catalog Description And Other Catalog Information:

8. Repeatability: **Not Repeatable**

Please note: Repeatability does <u>not</u> refer to repeating courses because of substandard grades or a lapse of time since the student took the course. A course may be repeated <u>only</u> if the course content differs each time it is offered and the student who repeats it is gaining an expanded educational experience as stipulated in Title V.

☐ Skills or proficiencies are enhanced by supervised repetition and practice within class periods.

☐ Active participatory experience in individual study or group assignments is the basic means by which learning objectives are attained.

☐ Course content differs each time it is offered.

Explanation for above repeatability selection:

9a. Grading Option: Standard Grade

9b. Catalog Description:

Introduction to differential and integral calculus, with particular emphasis on applications in the fields of business, economics, and social sciences. Includes: concepts of a function, limits, derivatives, integrals of polynomial, exponential and logarithmic functions, optimization problems, and calculus of functions of more than one variable. Not recommended for students with credit for MATH 30.

Course Outline Information

10. Student Performance Objectives: (Performance objectives for all credit courses must indicate that students will learn critical thinking and will be able to apply concepts at college level.Performance objectives must be related to items listed in Section 11.)

1. Construct functions of various types (linear, quadratic, rational, exponential, logarithmic, and logistic) from real world information.
2. Evaluate limits at a point, at infinity, and compute derivatives using the limit definition.
3. Calculate derivatives of polynomial, rational, radical, exponential, and logarithmic functions using basic derivative rules including product, quotient, and chain rules.
4. Solve business application problems involving demand, cost, revenue, profit, and marginality.
5. Investigate real world functions using derivatives to find such information as optimal points, rates of change, and shape of graph.
6. Solve exponential equations, logarithmic equations and application problems related to exponential growth and decay, as well as logistic and learning curves.
7. Apply integration techniques to determine the area under a curve, determine consumer and producer's surplus, and solve basic differential equations.
8. Investigate antiderivatives to infer formulas for integration, including the substitution technique.
9. Calculate partial derivatives of two variables and use to solve optimization problems in three dimensions.
10. Analyze the meaning of the derivative and the integral in the context of real world situations.

11. Course Content Outline: (Provides a comprehensive, sequential outline of the course content, including all major subject matter and the specific body of knowledge covered.)

I. Functions and Limits
A. Functions
1. Linear Functions
2. Quadratic Functions
3. Business Applications - demand, cost, revenue, profit, etc.
4. Finding Formulas for Functions
B. Limits
1. Limits at infinity
2. Limits at a point

II. Differentiation
A. Slopes of Tangents
B. Limit definition of the Derivative
C. Rules for Computing Derivatives
D. Marginal Cost, Revenue and Profit

III. Applications of Differentiation
A. Rates of Change
B. Curve Sketching
C. Optimization
D. Rational Functions
E. Percentage Rate of Change

IV. Exponential and Logarithmic Functions
A. Compound Interest
B. Exponential Functions
C. Logarithmic Functions
D. Derivatives of Exponential and Logarithmic Functions
E. Models of Growth

V. Integration
A. Antidifferentiation
B. The Definite Integral
C. Area
D. Integration using Substitution

VI. Applications of Integration
A. Consumer and Producer's Surplus
B. Differential Equations

VII. Differentiation of Functions of More than One Variable
A. Functions of More Than One Variable
B. Partial Derivatives
C. Optimization
D. Constrained Optimization
E. Lagrange Multipliers

12. Typical Out-of-Class Assignments: (Credit courses **require** two hours of independent work outside of class for each lecture hour, less lab/activity classes. List type of assignments including library assignments.)

a. Reading Assignments: (Submit at least 2 examples.)
1. Students will read selected topics throughout the course from the textbook. For example, students will read how to construct a revenue function from real world data.
2. A typical homework assignment includes many application problems that the students will read. Example as follows. A rumor about a county official's willingness to accept bribes is circulating. So far, 25,000 of the 300,000 citizens of the county have heard the rumor. Suppose the rumor spreads logistically through the county, and during the next 8 days, 10,000 more citizens will hear the rumor. How many of the county's citizens will have heard the rumor 15 days from now.

b. Writing, Problem Solving or Performance: (Submit at least 2 examples)

1. Students will complete homework problems from the textbook on topics throughout the course. Such problems may involve computation, sketching graphs and diagrams, solving equations, applying mathematical concepts, or explaining mathematical ideas.

2. Students will solve application problems in class. For example, students will use the derivative to compute the marginal cost for a real world situation, and write an explanation on what information the marginal cost conveys to the business owner.

c. Other (Term projects, research papers, porfolios, etc.)

13. Required Materials:

a. All textbooks, resources and other materials used in this course are college level?

☑   Yes
☐   No

b. Representative college-level textbooks (for degree applicable courses) or other print materials:

<u>Book 1:</u>

Author:	Soo Tang Tan
Title:	Applied Calculus for the Managerial, Life, and Social Sciences: A Brief Approach
Publisher:	Cengage Brooks/Cole
Date of Publication:	2012
Edition:	9th

c. Other materials and/or supplies required of students:

14. Check all Instructional methods used to present course content:

☑   Lecture   ☑   Activity
☑   Discussion Semminar   ☐   Distance Education (requires supplemental form)
☐   Lab   ☐   Work Experience
☑   Directed Study   ☐   Tutoring
Other: Small Groups

Give detailed examples of teaching methodology that relate to the course performance objectives:

1. In-class collaborative learning activity. Instructor will divide students into small groups and introduce the activity. Students will choose appropriate exponential and logarithmic functions to model pure data and data from business, science, and nature while instructor supports the learning. In a whole-class activity, instructor will review the small group models and lead a discussion on predictions based on the chosen models.

2. Instructor will introduce and assign reading in a prior class meeting. In class, students will be divided into small groups to compare and review the reading and associated mathematical models. Instructor will then lead a discussion on student findings. For example, many of the problems students will do require them to read real world situations such as data about the interaction of an experimental drug in the bloodstream. Students will read this information and develop a mathematical formula to model the situation and make predictions about when the patient will be cured.

15. Methods of Assessing Student Learning
15a. Methods of Evaluation:

☐	Essay Exam	☐	Reports
☐	Objective Exam	☑	Problem Solving Exam
☑	Projects	☐	Skill Demonstration
☐	Class Discussion	☐	Other

15b. (All courses must provide for measurement of student performance in terms of stated student performance objectives, Area 10, and culminate in a formal recorded grade based on uniform standards. Submit at least 2 examples.)

Example 1: Calculate the derivative of a rational function using the quotient rule. This problem is graded based on the completeness and correctness of the quotient rule, the algebra used in simplifying, and of the derivative found.

Example 2: Analyze the meaning of the derivative of a profit function. This question is graded based on the correctness of the derivative found, and a clear, concise and correct analysis.

SECTION C

1. Program Information:
- ☑ In an approved program
- ☐ Part of a new program
- ☐ Not part of an approved program

2. TOP Code Information
Program Title: Mathematics, General 170100

3. Course SAM Code:
- ☐ A - Apprenticeship Course
- ☐ B - Advanced Occupational
- ☐ C - Clearly Occupational
- ☐ D - Possibly Occupational
- ☑ E - Non-Occupational

4. Faculty Minimum Qualifications/Degrees:

Mathematics

Comments:

SECTION D

General Education Information:

1. College Associate Degree GE Applicability:

Communication & Analytic Thinking

2. CSU GE Applicability:

B-4 Mathematics/Quantitative Reasoning

3. IGETC Applicability:

2: Mathematical Concepts & Quantitative Reasoning

4. CAN :

5. LDTP:

SECTION E

1. Articulation Information: (Required for Transferable Courses Only)

☑ CSU Transferable

☑ UC Transferable

☐ CSU/UC Major Requirement.

If CSU/UC major requirement, list campus and major. (Note: Must be lower division)

2. List at least one community college and its comparable course. If requesting CSU and/or UC transferability also list a CSU/UC campus and comparable lower division course

American River College - MATH 340 Calculus for Business and Economics

Cal Poly Pomona - MAT 125 Introductory Calculus for Business

CSU Sacramento - Math 24 Modern Business Mathematics

UC Riverside - MATH 22 Calculus for Business

SECTION F

Planning and Resources: Please address the areas below:

1. Evidence of Need or Potential: recommendations of advisory committee, connection to existing or planned degrees/certificates, or regional/national developments, transfer university requirements.

AA GE degree requirements for Math Competency
CSU GE Applicability for Mathematics/Quantitative Reasoning
IGETC Applicability for Mathematical Concepts & Quantitative Reasoning

2. Appropriateness to Mission: connection to basic skills, transfer, career technical education, or lifelong learning; relationship

Transfer-Level math class.

3. Place in Program/Department: relationship to student learning outcomes identified by program, connection to general education, or articulation with other institutions.

Meets all four student learning outcomes for the math program.

4. Availability of Faculty and Facilities: minimum qualifications to teach course, special training for instructors, or long-term physical impact of course.

No special qualifications or training needed to teach the course.

5. Potential Impact on Resources: impact on library, computer support, transportation, equipment, or other needs

No additional impact.

SECTION G

1. Maximum Class Size (recommended):   35

2. If recommended class size is not standard, then provide rationale: