



CREDIT COURSE OUTLINE

I. COVER PAGE

(1) MATH 22

(2) APPLIED CALCULUS FOR THE MANAGERIAL, LIFE AND SOCIAL SCIENCES

(3) 4

Number _____ Title _____ Units _____

(4) Lecture / Lab Hours:			(8) Classification:		
Course Hours					
	Weekly Lec hours:	4.00	Degree applicable:		X
	Weekly Lab hours:	0	Non-degree applicable:		
	Total Contact hours:	72.00	Basic skills:		
Lec will generate __ hour(s) outside work.			(9) RC Fulfills AS/AA degree requirement: (area)		
Lab will generate __ hour(s) outside work.			General education category:		
			Major:		
			Certificate of:		
			Certificate in:		
(5) Grading Basis:	Grading Scale Only		(10) CSU Baccalaureate:		
	Pass/No Pass option	X	X		
	Pass/No Pass only		(11) Repeatable: (A course may be repeated three times)		
(6) Advisories:			0		
(7) Pre-requisites (requires C grade or better):			(12) C-ID:		
Corequisites:			Proposed Start Date:		
			Fall 2012		

(12) Catalog Description:
 This course provides an introduction to the techniques of calculus with emphasis placed on the application of these concepts to managerial, life and social sciences. Topics include the applications of derivatives and integrals of functions including polynomials, rational, exponential and logarithmic functions. Applications will include, but not be limited to, consumer supply and demand, production analysis, population growth, income distribution, exponential decay, drug absorption rates and blood velocity.

II. COURSE OUTCOMES:

(Specify the learning skills the student demonstrates through completing the course and link critical thinking skills to specific course content and objectives.)

Upon completion of this course, students will be able to:

- I. Solve real world applications using the concepts of an average or instantaneous rate of change.
- II. Apply and interpret multiple representations (graphic, symbolic, numerical/data, verbal/applied) of the derivative and its applications
- III. Apply the derivative to variety of application problems.
- IV. Evaluate both indenfinite and definite intergals by a variety of methods.

III. COURSE OBJECTIVES:

(Specify major objectives in terms of the observable knowledge and/or skills to be attained.)

In the process of completing this course, students will:

- I. review and apply fundamental operations of algebra and precalculus necessary for future topics in the course.
- II. investigate the characteristics of functions and their graphs.
- III. develop the definition of the derivative through the graphical model.
- IV. develop the basic derivative rules through the use of limits.
- V. use the derivative to aid in sketching the graphs of functions.
- VI. apply the derivative to a variety of application problems.
- VII. evaluate both indefinite and definite integrals by a variety of methods.

IV. COURSE OUTLINE:

Lecture Content:

A. Review of Algebra of Precalculus

1. Intervals, absolute value, powers and roots
2. Factoring, polynomial roots, rational expressions
3. The Cartesian coordinate system
4. Straight lines

B. Functions, Limits and the Derivative

1. Functions and their graphs
2. The algebra of functions
3. Functions and mathematical models
4. Limits
5. One-sided limits and continuity
6. The derivative

C. Differentiation

1. Basic rules of differentiation; studying rates of change in population growth, conservation of species, consumer demand and supply functions
2. The Product and Quotient Rules; rate of change of sales, oxygen levels, and learning curves
3. The Chain Rule
4. Marginal Functions in Economics; marginal cost, revenue, profit, propensity to save or consume and elasticity of demand.
5. Higher-order derivatives; crime rates and gross domestic product of developing countries
6. Implicit differentiation and related rates; rate of change of housing starts with respect to mortgage rates, rate of change of oil spill area, effect of price on supply.
7. Differentials; estimating errors in calculating volume of tumors, estimating change in gross domestic product, approximating time needed to learn an additional number of items.

D. Applications of the Derivative

1. Applications of the First Derivative; determining increasing and decreasing intervals for profit functions, levels of air pollution, and drug concentrations in the blood
2. Applications of the Second Derivative; determining critical points of water pollution levels, forecasting when profits will increase and decrease, and the effects of advertising on sales.
3. Optimization I
4. Optimization II

E. Exponential and Logarithmic Functions

1. Exponential Functions
2. Logarithmic Functions
3. Compound Interest
4. Differentiation of Exponential Functions
5. Differentiation of Logarithmic Functions
6. Exponential Functions as Mathematical Models

F. Integration

1. Antiderivatives and the rules of integration
2. Integration by substitution
3. Area and the definite integral
4. Fundamental Theorem of Calculus
5. Evaluating Definite Integrals
6. Area between two curves; the effects of advertising on revenue, exercise on pulse rate, and increasing energy needs on the use of alternative energy sources
7. Applications of the definite integral to business and economics; present value of an investment, future value of an annuity, income distribution for a specific population group or a country

V. APPROPRIATE READINGS

Reading assignments may include but are not limited to the following:

I. Sample Text Title:

1. Recommended - Soo T. Tan *Applied Calculus for the Managerial, Life and Social Sciences: A Brief Approach*, ed. 8th Brooks/Cole Publisher, 2008,

II. Other Readings

Global or international materials or concepts are appropriately included in this course

Multicultural materials and concepts are appropriately included in this course

If either line is checked, write a paragraph indicating specifically how global/international and/or multicultural materials and concepts relate to content outline and/or readings.

VI. METHODS TO MEASURE STUDENT ACHIEVEMENT AND DETERMINE GRADES:

Students in this course will be graded in at least one of the following four categories. Please check those appropriate. A degree applicable course must have a minimum of one response in category A, B, or C.

A. Writing	
Check either 1 or 2 below	
	1. <i>Substantial writing assignments are required. Check the appropriate boxes below and provide a written description in the space provided.</i>
X	2. <i>Substantial writing assignments are NOT required. If this box is checked leave this section blank. For degree applicable courses you must complete category B and/or C.</i>
	a) essay exam(s) <input type="checkbox"/> d) written homework <input type="checkbox"/>
	b) term or other paper(s) <input type="checkbox"/> e) reading reports <input type="checkbox"/>
	c) laboratory report(s) <input type="checkbox"/> f) other (specify) <input type="checkbox"/>

Required assignments may include but are not limited to the following:

B. Problem Solving	
Computational or non-computational problem-solving demonstrations, including:	
X	a) exam(s) <input type="checkbox"/> d) laboratory reports <input type="checkbox"/>
X	b) quizzes <input type="checkbox"/> e) field work <input type="checkbox"/>
X	c) homework problems <input type="checkbox"/> f) other (specify): <input type="checkbox"/>

Required assignments may include but are not limited to the following:

1. Problems assigned from the problem sets found in each chapter of the textbook.
2. Worksheets generated by the instructor to reinforce or clarify concepts presented in the text.

C. Skill demonstrations, including:	
	a) class performance(s) <input type="checkbox"/> c) performance exams(s) <input type="checkbox"/>
	b) field work <input type="checkbox"/> d) other (specify) <input type="checkbox"/>

Required assignments may include but are not limited to the following:

D. Objective examinations including:	
X	a) multiple choice <input type="checkbox"/> d) completion <input type="checkbox"/>
X	b) true/false <input type="checkbox"/> e) other (specify): <input type="checkbox"/>
X	c) matching items <input type="checkbox"/>

COURSE GRADE DETERMINATION:

Description/explanation: Based on the categories checked in A-D, it is the recommendation of the department that the instructor's grading methods fall within the following departmental guidelines; however, the final method of grading is still at the discretion of the individual instructor. The instructor's syllabus must reflect the criteria by which the student's grade has been determined. (A minimum of five (5) grades must be recorded on the final roster.)

If several methods to measure student achievement are used, indicate here the approximate weight or percentage each has in determining student final grades.

The final grade MAY be based on total points or grade average over various activities, as follows: 85%Exams/Quizzes 15%Homework problems

VII. EDUCATIONAL MATERIALS

For degree applicable courses, the adopted texts, as listed in the college bookstore, or instructor-prepared materials have been certified to contain college-level materials.

Validation Language Level (check where applicable):	College-Level Criteria Met	
	YES	NO
Textbook	<u> X </u>	<u> </u>
Reference materials	<u> X </u>	<u> </u>
Instructor-prepared materials	<u> X </u>	<u> </u>
Audio-visual materials	<u> </u>	<u> X </u>

Indicate Method of evaluation:	
Used readability formulae (grade level 10 or higher)	<u> </u>
Text is used in a college-level course	<u> X </u>
Used grading provided by publisher	<u> </u>
Other: (please explain; relate to Skills Levels)	<u> </u>

Computation Level (Eligible for MATH 101 level or higher where applicable)	<u> X </u>	<u> </u>
Content		
Breadth of ideas covered clearly meets college-level learning objectives of this course	<u> X </u>	<u> </u>
Presentation of content and/or exercises/projects:		

Requires a variety of problem-solving strategies including inductive and deductive reasoning.

Requires independent thought and study

Applies transferring knowledge and skills appropriately and efficiently to new situations or problems.

List of Reading/Educational Materials
 Recommended - Soo T. Tan *Applied Calculus for the Managerial, Life and Social Sciences: A Brief Approach*, ed. 8th Brooks/Cole
 Publisher, 2008,

Comments:

This course requires special or additional library materials (list attached).
 This course requires special facilities:
 Classroom with access to computers.

Attached Files:

BASIC SKILLS ADVISORIES PAGE The skills listed are those needed for eligibility for English 125, 126, and Math 201. These skills are listed as the outcomes from English 252, 262, and Math 250. In the right hand column, list at least three major basic skills needed at the beginning of the target course and check off the corresponding basic skills listed at the left.

Check the appropriate spaces.

Eligibility for Math 201 is advisory for the target course.
 Eligibility for English 126 is advisory for the target course.
 Eligibility for English 125 is advisory for the target course.

If the reviewers determine that an advisory or advisories in Basic Skills are all that are necessary for success in the target course, stop here, provide the required signatures, and forward this form to the department chair, the appropriate associate dean, and the curriculum committee.

REQUISITES

Prerequisite -- MATH 4B Precalculus

1. Knowledge of how to graph functions, both linear and nonlinear.	1. Student must understand graphing in order to develop the definition of the derivative using the graphical model.
2. Knowledge of Solving Polynomial and Rational Equations.	2. Student must be able to solve both polynomial and rational equations in order to determine possible points of extrema after taking the derivative of the function.
3. Knowledge of Exponential and Logarithmic Functions.	3. Student must be familiar with Exponential and Logarithmic functions in order to solve compound interest problems.

ESTABLISHING PREREQUISITES OR COREQUISITES

Every prerequisite or corequisite requires content review plus justification of at least one of the seven kinds below. Prerequisite courses in communication and math outside of their disciplines require justification through statistical evidence. Kinds of justification that may establish a prerequisite are listed below.

Check one of the following that apply. Documentation may be attached.

Significant statistical evidence indicates that the absence of the prerequisite course is related to unsatisfactory performance in the target course.
 Justification: Indicate how this is so.

The health or safety of the students in this course requires the prerequisite.
 Justification: Indicate how this is so.

The prerequisite course is part of a sequence of courses within or across a discipline.

The prerequisite is required in order for the course to be accepted for transfer to the UC or CSU systems.
 Justification: Indicate how this is so.

The prerequisite/corequisite is required by law or government regulations.
 Explain or cite regulation numbers:

The safety or equipment operation skills learned in the prerequisite course are required for the successful or safe completion of this course.
 Justification: Indicate how this is so.

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 Justification: Indicate how this is so.

Three CSU/UC campuses require an equivalent prerequisite or corequisite for a course equivalent to the target course:

Justification:**Prerequisite -- MATH 4C TRIGONOMETRY/PRECALCULUS**

1. Knowledge of how to graph functions, both linear and nonlinear.
 2. Knowledge of Solving Polynomial and Rational Equations.
 3. Knowledge of Exponential and Logarithmic Functions.

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Check one of the following that apply. Documentation may be attached.

_____ Significant statistical evidence indicates that the absence of the prerequisite course is related to unsatisfactory performance in the target course.

Justification: Indicate how this is so.

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Justification: Indicate how this is so.

_____ Three CSU/UC campuses require an equivalent prerequisite or corequisite for a course equivalent to the target course:

Justification:**JUSTIFICATION OF LIMITATION ON ENROLLMENT**

Enrollment in courses or blocks of courses may be limited based on performance, honors, or other performance based criteria. Be mindful of the disproportionate impact the limitation will have on specific groups of students. It is important to determine if the limitation will disproportionately keep under-represented students from enrolling in the course or block of courses.

Describe the reasons for limiting the enrollment.

Course Designator: MATH 22

Course Title(s): APPLIED CALCULUS FOR THE MANAGERIAL, LIFE AND SOCIAL SCIENCES

Rationale for Limiting Enrollment:

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