***Contra Costa College***

***Course Outline***

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| |  |  | | --- | --- | | **Department & Number:** | MATH 190 | | **Course Title:** | Analytic Geometry and Calculus I | | Pre-requisite: | MATH 171 or MATH 121 and MATH 135 | | Corequisite: | None | | Advisory: | None | | Entry Skill: | None | | |  |  | | --- | --- | | **Lecture Hours:** | 90.00 | | **Lab Hours:** | 0.00 | | **Composition Hours:** | 0.00 | | **Activity Hours:** | 0.00 | | **Lecture Hours By Arrangement:** | 0.00 | | **Lab Hours By Arrangement:** | 0.00 | | **Units:** | 5.00 - 5.00 | |

**Course/Catalog Description:**  
This course is the first course in differential and integral calculus of a single variable: functions; limits and continuity; techniques and applications of differentiation and integration; Fundamental Theorem of Calculus. Primarily for Science, Technology, Engineering & Math Majors.

**Course Objectives:**  
At the completion of the course the student will be able to:

1. Compute the limit of a function at a real number;
2. 2. Determine if a function is continuous at a real number
3. 3. Find the derivative of a function as a limit
4. 4. Find the equation of a tangent line to a function
5. 5. Compute derivatives using differentiation formulas
6. 6. Use differentiation to solve applications such as related rate problems and optimization problems
7. 7. Use implicit differentiation
8. 8. Graph functions using methods of calculus
9. 9. Evaluate a definite integral as a limit
10. 10. Evaluate integrals using the Fundamental Theorem of Calculus;
11. 11. Apply integration to find area.

**Student Learning Outcomes**

1. 1. Students will be able to evaluate limits of elementary functions using numerical, graphical, and algebraic methods.
2. 2. Students will be able to compute derivatives of elementary functions using the basic differentiation rules.
3. 3. Students will be able to apply derivatives to problems involving related rates, curve sketching, and optimization.
4. 4. Students will be able to compute antiderivatives of basic elementary functions using formulas and the substitution method.

**Course Content**

**Course Content (Lecture):**

Definition and computation of limits using numerical, graphical, and algebraic approaches.

Continuity and differentiability of functions.

Derivative as a limit.

Interpretation of the derivative as slope of tangent line, a rate of change.

Differentiation formulas, constants, power rule, product rule, quotient rule and chain rule.

Derivatives of transcendental functions such as trigonometric, exponential or logarithmic.

Implicit differentiation with applications, and differentiation of inverse functions.

Higher-order derivatives.

Graphing functions using first and second derivatives, concavity and asymptotes.

Maximum and minimum values, and optimization.

Mean Value Theorem

Antiderivatives and indefinite integrals.

Area under a curve.

Definite integral; Reimann sum

Properties of the integral.

Fundamental Theorem of Calculus

Integration by substitution.

Indeterminate forms and L'Hopital's Rule.

**Methods Of Instruction:**

1. Demonstration/Modeling

**Other Method:**  
Daily reading assignment Homework exercises

**Instructional Materials**

**Note:** To be UC/CSU transferable, the text must be dated within the last 7 years OR a statement of justification for a text beyond the last 7 years must be included

**Textbooks**  
Title: Calculus: Early Transcendentals   
Author: Anton, Bivens, and Davis   
Publisher: J. Wiley & Sons, Inc.   
Edition: 10th Edition   
Date: 2012

**Outside of Class Weekly Assignments**

Title 5, section 55002.5 establishes that a range of 48 -54hours of lecture, study, or lab work is required for one unit of credit. For each hour of lecture, students should be required to spend an additional two hours of study outside of class to earn one unit of credit.

* State Mandates that sample assignments must be included on the Course Outline of Record

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| **Outside of Class Weekly Assignments** | **Hours Per Week** |
| Weekly Reading *(Include detailed assignment below, if applicable)* | 3 |
| Students are responsible for reading the sections of the text corresponding to the week’s lectures. Typically, 2 – 5 sections of the text will be covered per week. This translates to approximately 30 pages of reading per week. | |
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| Weekly Math *(Include detailed assignment below, if applicable)* | 7 |
| Students are assigned approximately 8 – 20 exercises in each section of the text covered. This means that there are approximately 20 – 100 homework exercises per week; 6 – 12 hours is a minimum amount of time that students will spend solving homework problems per week. | |
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**Student Evaluation**

Computation or non-computational problem solving skills

Objective examinations

**Grading Policy**  
**Letter Grade**  
90% - 100% = A  
80% - 89% = B  
70% - 79% = C  
60% - 69% = D  
Below 59% = F

**Prepared by** Terrill Mead  
**Date** 1/1/0001

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