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| **Contra Costa College** |

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| **Course Outline** |

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| **Department & Number** | MATH-290 | **Number of Weeks** | 18 |
| **Course Title** | Analytic Geometry and Calculus III | **Lecture Hours By Term** | 90 |
| **Prerequisite** | MATH-191 | **Lab Hours By Term** | 0 |
| **Challenge Policy** | Satisfactory completion of an equivalent course. | **\*Hours By Arrangement** | 0 |
| **Co-requisite** |  | **Units** | 5 |
| **Challenge Policy** |  |  |  |
| **Advisory** |  |

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| **\*HOURS BY ARRANGEMENT:** | | 0 | Hours per term. |
| **ACTIVITIES:** (Please provide a list of the activities students will perform in order to satisfy the HBA requirement): | | | | |
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| **COURSE/CATALOG DESCRIPTION** |

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| This course presents vector valued functions, calculus of functions of more than one variable, partial derivatives, multiple integration, Green’s Theorem, Stokes’ Theorem, divergence theorem. |

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| **COURSE OBJECTIVES:** | |
| At the completion of the course the student will be able to: | |

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| 1. Perform vector operations; |
| 1. Determine equations of lines and planes; |
| 1. Find the limit of a function at a point; |
| 1. Evaluate derivatives; |
| 1. Write the equation of a tangent plane at a point; |
| 1. Determine differentiability; |
| 1. Find local extrema and test for saddle points; |
| 1. Solve constraint problems using Lagrange multipliers; |
| 1. Compute arc length; |
| 1. Find the divergence and curl of a vector field; |
| 1. Evaluate two and three dimensional integrals; and |
| 1. Apply Green’s, Stokes’, and divergence theorems. |

**INTENDED STUDENT LEARNING OUTCOMES:**

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| 1. Students will demonstrate understanding of vectors and the geometry of 3-dimensional space, including lines, planes, and other surfaces. |
| 1. Students will understand and apply the methods of calculus to vector valued functions and their geometric and physical applications. |
| 1. Students will demonstrate proficiency differentiating functions of several variables, and applying differentiation to 3-dimensional geometry. |
| 1. Students will understand and be able to integrate functions of several variables, and apply the technique to problems of geometry and physics in 3-dimensional space. |
| 1. Students will demonstrate understanding of the 4 major theorems of vector calculus |

**COURSE CONTENT (Lecture):**

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| 1. Vectors and vector operations in two and three dimensions; |
| 1. Vector and parametric equations of lines and planes; rectangular equation of a plane; |
| 1. Dot, cross, and triple products and projections; |
| 1. Differentiability and differentiation including partial derivatives, chain rule, higher-order derivatives, directional derivatives, and the gradient; |
| 1. Arc length and curvature; tangent, normal, binormal vectors; |
| 1. Vector-valued functions and their derivatives and integrals; finding velocity and acceleration; |
| 1. Real-valued functions of several variables, level curves and surfaces; |
| 1. Limits, continuity, and properties of limits and continuity; |
| 1. Local and global maxima and minima extrema, saddle points, and Lagrange multipliers; |
| 1. Vector fields including the gradient vector field and conservative fields; |
| 1. Double and triple integrals; |
| 1. Applications of multiple integration such as area, volume, center of mass, or moments of inertia; |
| 1. Change of variables theorem; |
| 1. Integrals in polar, cylindrical, and spherical coordinates; |
| 1. Line and surface integrals including parametrically defined surfaces; |
| 1. Integrals of real-valued functions over surfaces; |
| 1. Divergence and curl; and |
| 1. Green’s, Stokes’, and divergence theorems. |

**COURSE CONTENT (Lab):**

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| **METHODS OF INSTRUCTION:** | |
| Lecture and discussion | |
| Demonstration and collaboration | |
| Daily reading assignments | |
| Homework exercises | |

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| **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.

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| Textbook Title: | Calculus : Early Transcendentals |
| Author: | Anton, Bivens, and Davis |
| Publisher: | John Wiley & Sons, Inc. |
| Edition/Date: | 10th Edition / 2012 |
| Textbook Reading Level: |  |
| Justification Statement: | *(For textbook beyond 7 years)* |
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| Lab Manual Title | (*if applicable*): |
| Author: |  |
| Publisher: |  |
| Edition/Date: |  |

**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** |

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| Weekly Reading Assignments *(Include detailed assignment below, if applicable)* | 2 |

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| Students are responsible for reading the section(s) of the text corresponding to the week’s lectures. The number of sections covered per week may vary between 2 and 4. For the adopted text listed above, this translates to approximately 20 pages of reading per week. |

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| Weekly Writing Assignments *(Include detailed assignment below, if applicable)* |  |

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| Weekly Math Problems *(Include detailed assignment below, if applicable)* | 8 - 12 |

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| Students are assigned homework exercises in each section, and are expected to complete the assigned exercises as the material is covered in lecture. A typical assignment may include 8 – 15 exercises per section, which translates to approximately 16 – 60 exercises per week. Note: 8 – 12 hours per week represents the minimum amount of time a student will spend on homework exercises. |

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| Lab or Software Application Assignments *(Include detailed assignment below, if applicable)* |  |

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| Other Performance Assignments *(Include detailed assignment below, if applicable)* |  |

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**STUDENT EVALUATION**: **(Show percentage breakdown for evaluation instruments)**

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| * Course must require use of critical thinking, college-level concepts & college-level learning skills. * For degree credit, course requires essay writing unless that requirement would be inappropriate to the course objectives. If writing is inappropriate, there must be a requirement of problem-solving or skills demonstration. |

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|  | **%** | Essay (If essay is not included in assessment, explain below.) |
| N/A |
| 25 | **%** | Computation or Non-computational Problem Solving Skills |
|  | **%** | Skills Demonstration |
| 75 | **%** | Objective Examinations |
|  |  | Other (describe) |
|  | **%** |  |
|  | **%** |  |
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| **GRADING POLICY: (Choose LG, P/NP, or SC)** | | | | | |
| **X** | **Letter Grade** | |  | **Pass / No Pass** | | |  | **Student Choice** |
| 90% - 100% = A | | | 70% and above = Pass | | | | 90% - 100% = A |
| 80% - 89% = B | | | Below 70% = No Pass | | | | 80% - 89% = B |
| 70% - 79% = C | | |  | | | | 70% - 79% = C |
| 60% - 69% = D | | |  | | | | 60% - 69% = D |
| Below 60% = F | | |  | | | | Below 60% = F |
| *or* |
| 70% and above = Pass |
| Below 70% = No Pass |
| **Prepared by:** | | | | Carol Stanton | | | |

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| **Date:** | Spring 2014 |

*Revised form 01/14*