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Mathematics (MATH) 2130 Analytic Geometry and Calculus III (4 Units) CSU:UC
[formerly Mathematics 14A]

Prerequisite: Successful completion of Mathematics 2120 with a grade of “C” or better

Prerequisite knowledge/skills: Before entering the course the student should be able to

1. Evaluate indeterminate forms using L'Hopital's Rule,
2. Find derivatives of transcendental functions,
3. Evaluate definite and indefinite integrals using a variety of integration formulas and techniques,
4. Use integration to solve applications such as work or length of a curve;
5. Evaluate improper integrals,
6. Apply convergence tests to sequences and series,
7. Represent functions as power series,
8. Graph, differentiate and integrate functions in polar and parametric form,
9. Compute standard integral forms and use corresponding tables,
10. Apply integration to selected physical problems,
11. Differentiate and integrate functions involving parametric equations, and polar coordinates, and
12. Develop and test for convergence of mathematical series.

Total Hours: 64 hours lecture

Catalog Description: This is a continuation of Mathematics 2120 including vector functions and analysis, partial differentiation, vector valued functions, calculus of functions of more than one variable, partial derivatives, multiple integration, Green's Theorem, Stokes' Theorem, divergence theorem, multiple integration and line integrals.

Type of Class/Course: Degree Credit

Text: Briggs, William, L. Cochran, and B. Gillett. *Calculus*. 1st ed. Upper Saddle River: Pearson Addison-Wesley, 2011. Print.

Additional Instructional Materials: Study and Solutions Guide for this class.

Course Objectives:

By the end of the course, a successful student will be able to

1. perform vector operations,
2. compute and apply partial derivatives,
3. compute and apply integrals over plane and solid regions,
4. compute and apply vector functions including use of Green's Theorem,
5. Perform vector operations,
6. Determine equations of lines and planes,

7. Find the limit of a function at a point,
8. Evaluate derivatives,
9. Write the equation of a tangent plane at a point,
10. Determine differentiability,
11. Find local extrema and test for saddle points,
12. Solve constraint problems using Lagrange multipliers,
13. Compute arc length,
14. Find the divergence and curl of a vector field,
15. Evaluate two and three dimensional integrals, and
16. Apply Green's, Stokes', and divergence theorems.

Course Scope and Content:

Unit I Vectors in two and Three Dimensions

- A. Dot Products
- B. Cross Products
- C. Triple products and projections
- D. Motion in Space
- E. Vector and Parametric equations of lines

Unit II Functions of Several Variables

- A. Planes and Surfaces
- B. Real-valued functions of several variables
- C. Level curves and surfaces
- D. Limits, continuity, and properties of limits and continuity
- E. Differentiability
- F. Partial Derivatives
- G. Chain Rule
- H. Higher-Order Derivatives
- I. Directional Derivatives and Gradient
- J. Vector-valued functions and their derivatives and integrals
- K. Finding velocity and acceleration
- L. Arc length and curvature
- M. Tangent, normal, binormal vectors
- N. Local and global maxima and minima extrema
- O. Saddle points
- P. Lagrange multipliers

Unit III Multiple Integration

- A. Double Integrals
- B. Triple Integrals
- C. Integrals in Polar, Cylindrical and Spherical Coordinates
- D. Applications of multiple integration such as area, volume, center of mass, or moments of inertia
- E. Change of variables theorem
- F. Integrals of real-valued functions over surfaces

Unit IV Vector Calculus

- A. Vector Fields
- B. Gradient vector fields
- C. Conservative vector fields

- D. Line and surface integrals including parametrically defined surfaces
- E. Divergence and curl
- F. Green's, Stokes', and divergence theorems
- G. Rectangular equations of a plane
- H. Vector and Parametric equations of planes

Learning Activities Required Outside of Class:

The students in this class will spend a minimum of 8 hours per week outside of the regular class time doing the following:

1. Studying,
2. Answering questions,
3. Skill practice,
4. Required reading, and
5. Problem solving activity or exercise.

Methods of Instruction:

1. Lecture-demonstrations and sample problems

Methods of Evaluation:

1. Computational or non-computational problem-solving demonstrations, including:
 - a. exams,
 - b. homework problems, and
 - c. quizzes

Supplemental Data:

TOP Code:	170100: Mathematics, General
SAM Priority Code:	E: Non-Occupational
Distance Education:	Online; Offline
Funding Agency:	Y: Not Applicable(funds not used)
Program Status:	1: Program Applicable
Noncredit Category:	Y: Not Applicable, Credit Course
Special Class Status:	N: Course is not a special class

Basic Skills Status:	N: Course is not a basic skills course
Prior to College Level:	Y: Not applicable
Cooperative Work Experience:	N: Is not part of a cooperative work experience education program
Eligible for Credit by Exam:	E: Credit By Exam
Eligible for Pass/No Pass:	C: Pass/No Pass
Taft College General Education:	NONE