TAFTCOLLEGE

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Mathematics (MATH) 2120 Analytic Geometry and Calculus II (4 Units) CSU:UC
[formerly Mathematics 3B]

Prerequisite: Successful completion of Mathematics 2100 with a grade of "C" or better

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

1. understand the use of functional notation,
2. plot and interpret graphs of functions,
3. differentiate algebraic, trigonometric, exponential, logarithmic and hyperbolic functions,
4. apply derivatives,
5. find the integrals of basic functions,
6. complete items 1-5 above by both hand computations and computer assisted (Maple),
7. Compute the limit of a function at a real number,
8. Determine if a function is continuous at a real number,
9. Find the derivative of a function as a limit,
10. Find the equation of a tangent line to a function,
11. Compute derivatives using differentiation formulas,
12. Use differentiation to solve applications such as related rate problems and optimization problems,
13. Use implicit differentiation,
14. Graph functions using methods of calculus,
15. Evaluate a definite integral as a limit,
16. Evaluate integrals using the Fundamental Theorem of Calculus, and
17. Use the definite integral to find areas and volumes

Total Hours: 64 hours lecture

Catalog Description: A continuation of Mathematics 2100, this course includes integration; techniques of integration; infinite sequences and series; polar and parametric equations; applications of integration. Primarily for Science, Technology, Engineering & Math Majors. C-ID: MATH 221

Type of Class/Course: Degree Credit

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

Additional Instructional Materials:

Course Objectives:

Upon successful completion of the course, students will be able to:

1. Compute standard integral forms and use corresponding tables,
2. Apply integration to selected physical problems,
3. Differentiate and integrate functions involving parametric, equations, and polar coordinates,

4. Develop and test for convergence of mathematical series,
5. Evaluate indeterminate forms using L'Hopital's Rule,
6. Find derivatives of transcendental functions,
7. Evaluate definite and indefinite integrals using a variety of integration formulas and techniques,
8. Use integration to solve applications such as work or length of a curve, areas, and volume.
9. Evaluate improper integrals,
10. Apply convergence tests to sequences and series,
11. Represent functions as power series, and
12. Graph, differentiate and integrate functions in polar and parametric form.

Course Scope and Content:

Unit I Computation and Application of Integrals
- A. Apply a wide range of integration techniques, such as by parts, partial fractions and trigonometric substitution to solving problems
- B. Interpret the results of integration
- C. Identify indeterminate forms and properly apply L'Hopital's Rule
- D. Properly evaluate improper integrals
- E. Numerical integration techniques including trapezoidal and Simpson's rule
- F. Compute the derivatives and integrals of inverse functions, inverse trigonometric functions, exponential functions and logarithmic functions
- G. Use derivatives and integrals to compute arc length
- H. Applications of derivatives and integrals such as work, areas between curves, volume, volume of a solid of revolution, applications of integration to areas and volumes, surface area, moments and centers of mass, growth and decay, separable differential equations

Unit II Series
- A. Identify the various forms of series and sequences and determine convergence when appropriate employing techniques such as the integral test, p-series, alternating series, ratio and root tests along with comparison tests
- B. Demonstrate a working knowledge of the Taylor and Maclaurin series and representation of functions with a power series
- C. Demonstrate a working knowledge and practical application of Taylor Polynomial approximations
- D. Determine radius and interval of convergence for power series
- E. Differentiation and integration of power series

Unit III Plane Curves and Polar Coordinates
- A. Apply calculus techniques to a variety of problems involving conics
- B. Apply calculus techniques to a variety of problems involving parametric equations
- C. Apply calculus techniques to a variety of problems involving area and arc length in polar coordinates

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. Completing required reading
5. Problem solving activity or exercise

Methods of Instruction:
1. Lecture demonstrations and sample problems solved by the instructor

Methods of Evaluation:

1. Computational or non-computational problem-solving demonstrations, including:
   a. exams
   b. homework problems
   c. quizzes
2. Other examinations, including:
   a. multiple choice items

Supplemental Data:

TOP Code:	170100 Mathematics
SAM Priority Code:	E: Non-Occupational
Funding Agency:	Y: Not Applicable
Program Status:	1: Program Applicable
Noncredit Category:	Y: Not Applicable
Special Class Status:	N: Course is not a special class
Basic Skills Status:	N: Not Applicable
Prior to College Level:	Y: Not Applicable
Cooperative Work Experience:	N: Course is not a part of a cooperative education program
Eligible for Credit by Exam:	Yes
Eligible for Pass/No Pass:	Yes