COURSE SYLLABUS

LAST REVIEW	Fall 2021
COURSE TITLE	Calculus and Analytic Geometry II
COURSE NUMBER	MATH 0123
DIVISION	Math, Science, Business & Technology
DEPARTMENT	Mathematics
CIP CODE	24.0101
CREDIT HOURS	5
CONTACT HOURS/WEEK	Class: 5
PREREQUISITES	Receive a grade of "C" or higher in MATH0122 Calculus and Analytic Geometry I.
COURSE PLACEMENT	None

COURSE DESCRIPTION
Calculus & Analytic Geometry II is designed for students in mathematics, hard sciences, and engineering. Content includes calculus of transcendental functions, differential equations, applications of integration, integration techniques, infinite series, conic sections, and parametric and polar equations. Students will be expected to use appropriate technology as one tool to achieve competency in Calculus and Analytic Geometry II.

GENERAL EDUCATION LEARNING OUTCOME
☐ Basic Skills for Communication
☒ Mathematics
☐ Humanities
☐ Natural and Physical Sciences
☐ Social and Behavioral Sciences

INSTITUTIONAL LEARNING OUTCOMES
☐ Communication
☒ Computation and Financial Literacy
☒ Critical Reasoning
☒ Technology and Information Literacy
☐ Community and Civic Responsibility
☐ Personal and Interpersonal Skills

TEXTBOOKS
http://kckccbookstore.com/

METHODS OF INSTRUCTION

A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

COURSE OUTLINE

I. Applications of Integration
   - A. Area
   - B. Volume
     1. Disk and washer
     2. Shell
   - C. Arc length
   - D. Surface area
   - E. Work
   - F. Moments, centroid, and center of mass
   - G. Fluid pressure and force

II. Integration Techniques, L'Hopital's rule, and Improper Integrals
   - A. Basic rules
   - B. Integration by parts
   - C. Trigonometric integrals
   - D. Trigonometric substitution
   - E. Partial fractions
   - F. Tables
   - G. L'Hopital's rule
   - H. Indeterminate forms
   - I. Improper integrals
     1. Infinite limits
     2. Infinite discontinuities

III. Infinite Series
   - A. Sequences
   - B. Convergence of series
     1. Nth term test
     2. Integral test
     3. Comparison tests
     4. Alternating series test
     5. Ratio and root tests
   - C. Geometric series
   - D. Harmonic and p-series
   - E. Alternating series

F. Conditional convergence
G. Taylor and Maclaurin polynomials
H. Power series
I. Application of power series
J. Binomial series

IV. Rectangular and Parametric Equations, and Polar Coordinates
A. Conic sections
B. Parametric equations
C. Calculus of parametric equation
1. Differentiation
2. Arc length and surface area
D. Polar coordinates and equations
E. Calculus of polar equations
1. Differentiation
2. Area
3. Arc length and surface area
F. Polar equation of conics

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

A. be able to solve a variety of applications using definite integrals.
1. to find the area of a region bounded by curves using a definite integral.
2. to find the volume of a solid of revolution using the disk or washer method.
3. to find the volume of a solid of revolution using the shell method.
4. to find the arc length of a graph over a given interval.
5. to find the area of a surface of revolution.
6. to determine the work done by a constant or a variable force.
7. to find the moments, centroid, and the center of mass for a given system.
8. to find the fluid pressure and fluid force on a surface.

B. be able to evaluate a variety of integrals using integration techniques.
9. to fit integrands to basic rules.
10. to evaluate integrals using integration by parts.
11. to evaluate integrals involving trigonometric functions.
12. to evaluate integrals using trigonometric substitutions.
13. to evaluate integrals using partial fractions with linear and quadratic factors.
14. to evaluate integrals using tables.
15. to apply L'Hopital's rule to limits of indeterminate forms.

16. to evaluate limits of indeterminate forms.
17. to evaluate improper integrals with infinite limits.
18. to evaluate improper integrals with infinite discontinuities.

C. be able to represent functions with power, Taylor, and Maclaurin series.
19. to list the terms and find the limit of a sequence.
20. to determine if a series is convergent or divergent using the n-th term test.
21. to determine if a series is convergent or divergent using the integral test.
22. to determine if a series is convergent or divergent using comparison tests.
23. to determine if a series is convergent or divergent using the alternating series test.
24. to determine if a series is convergent or divergent using the ratio and root tests.
25. to identify a geometric series and find its sum if convergent.
26. to identify the p-series and the harmonic series.
27. to use the alternating series test.
28. to classify a series as absolutely or conditionally convergent.
29. to find Taylor and Maclaurin polynomials.
30. to find the radius and interval of convergence of a power series.
31. to differentiate and integrate power series.
32. to use the binomial series.

D. be able to represent curves with rectangular and parametric equations and polar coordinates.
33. to identify main characteristics of the conic sections.
34. to sketch a curve described by parametric equations.
35. to differentiate parametric equations to find slope and concavity of a parametric curve.
36. to differentiate parametric equations to find arc length and surface area.
37. to describe the graphs of polar curves.
38. to differentiate and integrate a polar function to find the slope of a polar curve.
39. to differentiate and integrate a polar function to find the area bounded by a polar curve.
40. to differentiate and integrate a polar function to find arc length and surface area.

ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES

Student progress is evaluated through both formative and summative assessment methods. Specific details may be found in the instructor's course information document.

COLLEGE POLICIES AND PROCEDURES

Student Handbook
https://www.kckcc.edu/files/docs/student-resources/student-handbook-and-code-of-conduct.pdf

College Catalog
https://www.kckcc.edu/academics/catalog/index.html

College Policies and Statements
https://www.kckcc.edu/about/policies-statements/index.html

Accessibility and Accommodations
https://www.kckcc.edu/academics/resources/student-accessibility-support-services/index.html.