

University of Arkansas – Fort Smith
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General Syllabus

MATH 25004 Calculus II

Credit Hours: 4

Lecture Hours: 4 Prerequisite: Laboratory Hours: 0

MATH 24004 Calculus I

Effective Catalog: 2018~2019

I. Course Information

A. Catalogue Description

Physical applications of integration, techniques of integration, sequences and series, conic sections, parametric equations in two and three dimensions, and polar coordinates. Appropriate technology is used to discover relationships and work problems not usually possible to work by hand. (ACTS: MATH 2505)

B. Additional Information - None

II. Student Learning Outcomes

A. Subject Matter

Upon completion of this course, the student will be able to:

1. Find centroids of planar lamina and calculate the work done by a variable force.
2. Use as needed the following techniques to integrate functions: integration by parts, trigonometric substitution, and decomposition into partial fractions.
3. Utilize tabulated integration formulas to obtain antiderivatives.
4. Graph conic sections.
5. Evaluate limits of indeterminate form using L'Hopital's rule.
6. Recognize and evaluate improper integrals.
7. Determine the existence of limits of infinite sequences.
8. Utilize the following tests appropriately to determine the convergence or divergence infinite series: direct comparison, limit comparison, alternating series, ratio, and root tests.
9. Expand transcendental functions as Taylor series representations and determine the relevant interval of convergence.
10. Determine parametric equations of curves in the plane and lines in space and use these parametric representations to determine arclength.

11. Convert two dimensional points and equations between rectangular and polar coordinates.

B. University Learning Outcomes

This course enhances student abilities in the following areas:

Analytical Skills

Critical Thinking Skills: Students will identify problems or issues and develop solutions and analyses. Students will identify a problem or issue; research, evaluate, and compare information from varying sources in order to evaluate authority, accuracy, and bias relevant to the problems/issues; generate solutions/analysis of problems/issues evaluated; and assess and justify the solutions and/or analysis.

Quantitative Reasoning: Students will assign and use numbers, read and analyze data, create models, draw inferences, and support conclusions based on sound mathematical reasoning. Student will apply appropriate mathematical models to solve problems; represent mathematical information symbolically, visually, numerically, verbally, and interpret models and data to draw inferences; and recognize limits of quantitative analysis.

Communication Skills (written and oral)

Students will communicate proficiently by composing coherent documents which are appropriate for the intended audience and will effectively communicate orally in a public setting, such as presentation for peers or at conferences.

III. Major Course Topics

- A. Physical Applications of Integration
 1. Work
 2. Hydrostatic Pressure and Force
 3. Moments and Centers of Mass
- B. Methods of Integration, Integration by Parts, and Tables of Integration
 1. Integration by parts
 2. Trigonometric Integrals
 3. Trigonometric substitution
 4. Integration by partial fractions
 5. Integration using tables
- C. Indeterminate Forms and Improper Integrals.
 1. Infinite intervals
 2. Discontinuous integrands
- D. Infinite Sequences and Series, Tests for Convergence of a Series, Taylor and Maclaurin Series.
 1. The integral test
 2. The comparison test
 3. Alternating series
 4. Ratio and Root tests
 5. Power series

- 6. Taylor and Maclaurin series
- E. Conic Sections and Graphs
 - 1. Conic sections
 - 2. Coordinate system and vector in 3-space
 - 3. The dot product and cross product
- F. Polar Coordinates and Graphs of Polar Equations
 - 1. Polar coordinates
 - 2. Areas and lengths in polar coordinates
 - 3. Polar equations
- G. Parametric Equations
 - 1. Curves defined by parametric equations
 - 2. Calculus with parametric equations