

**J. Sargeant Reynolds Community College
Course Content Summary**

Course Prefix and Number: MTH 264

Credits: 4

Course Title: Calculus II

Course Description: Prepares students for further study in calculus with analytic geometry by providing them with the necessary competencies in finding limits, differentiation, and integration. Continues the study of calculus of algebraic and transcendental functions, including rectangular, polar, and parametric graphing, indefinite and definite integrals, methods of integration, and power series along with applications. Designed for mathematical, physical, and engineering science programs. This course replaces MTH 174 or MTH 176 or MTH 274 and is the second course in a three-course sequence. Prerequisite: Placement in MTH 264 or completion of MTH 263 or equivalent with a grade of C or better. Lecture 4 hours per week.

General Course Purpose: Students intending to pursue an undergraduate degree in engineering, mathematics, statistics, computer science, or physical sciences will benefit from this course.

Course Prerequisites and Co-requisites:

Prerequisite: Placement in or completion of MTH 263 or equivalent with a grade of C or better

Student Learning Outcomes:

Upon completing the course, the student will be able to

1. (Applications of Integration)
 - Compute volumes by cross-section;
 - Compute volumes by disk-washer;
 - Compute volumes by shells;
 - Compute work (spring, rope);
 - Compute work (pumping liquids);
 - Compute arc length;
 - Compute areas of surfaces of revolution;
 - Compute application (center of mass);
2. (Techniques of Integration)
 - Integrate by parts;
 - Calculate trigonometric integrals;
 - Calculate integrals by trigonometric substitution;
 - Define the indeterminate form and apply L'Hopital's Rule;
 - Calculate improper integrals;
 - Integrate by partial fractions;
 - Integrate using tables and software;
 - Approximate integrals (trapezoidal, Simpson) with error estimation;
3. (Infinite Sequences and Series)
 - Write definition of and understand sequences;
 - Write definition of and understand series (intro);

- Determine convergence by integral test;
 - Determine convergence by comparison test;
 - Determine convergence of alternating series;
 - Determine absolute convergence (ratio, root tests);
 - Apply strategies for testing series;
 - Work with power series;
 - Represent functions as power series;
 - Find Taylor, Maclaurin series, and polynomials;
 - Calculate Taylor and Maclaurin series;
4. (Parametric Curves and Polar Coordinates)
- Represent curves by parametric equations;
 - Perform calculus with parametric curves;
 - Use and graph with polar system;
 - Calculate areas and lengths in polar coordinates; and
 - Define the conic forms in polar form.

Major Topics to Be Included:

1. Application of Integration
2. Techniques of Integration
3. Infinite Sequences and Series
4. Parametric Curves and Polar Coordinates

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