

COURSE SYLLABUS

LAST REVIEW	Fall 2021
COURSE TITLE	Calculus II (Non-Engineering)
COURSE NUMBER	MATH 0121
DIVISION	Math, Science, Business & Technology
DEPARTMENT	Mathematics
CIP CODE	24.0101
CREDIT HOURS	3
CONTACT HOURS/WEEK	Class: 3
PREREQUISITES	Have a grade of "C" or higher in MATH-0120 Calculus I (Non-Engineering).
COURSE PLACEMENT	None

COURSE DESCRIPTION

Calculus II is designed for students in business, life science, or social science. Content includes a review of Calculus I with an emphasis on applications involving elementary functions, functions of several variables, trigonometric functions, integration techniques, and differential equations. Students will be expected to use appropriate technology as one tool to achieve competency in Calculus II.

KANSAS SYSTEMWIDE TRANSFER: MAT 1050

The learning outcomes and competencies detailed in this course outline or syllabus meet or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved by the Kansas Board of Regents.

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. Analyzing Accumulated Change
 - A. Area of a region under a curve
 - B. Interpret area under a curve
 - C. Sketch a graph of a function
 - D. Anti-derivative of a function
 - E. Fundamental Theorem of Calculus
 - F. Definite integral
 - G. Differential equations
- II. Analyzing Change Using Integrals
 - A. Area between two curves
 - B. Improper integrals
 - C. Investments and biological populations
 - D. Economic problems
 - E. Average value
- III. Ingredients of Multivariable Change
 - A. Cross-sections of data
 - B. Cross-sections of multivariable functions
 - C. Sketch contours of data
 - D. Sketch contours of multivariable functions
 - E. Critical points on multi-variable functions
- IV. Analyzing Multivariable Change
 - A. Relative and absolute extrema and saddle points
 - B. Critical points on three-dimensional functions
 - C. Identify critical points on multi-variable functions

- D. Interpret critical points on multi-variable functions
 - E. Contour graph
- V. Trigonometric Functions
- A. Sine and cosine functions
 - B. Derivatives of the sine and cosine functions
 - C. Integrals of the sine and cosine functions
 - D. Other trigonometric functions

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

- A. Be able to evaluate limits of functions.
 - 1. Be able to describe the sine and cosine functions.
- B. Be able to use limits to determine continuity of a function at a point.
 - 2. Be able to fit models to cross-sections of data.
 - 3. Be able to interpret cross-sections of multivariable functions.
 - 4. Be able to sketch contours using tables of data.
 - 5. Be able to sketch contours of multivariable functions.
 - 6. Be able to read and interpret points on contour graphs.
- C. Be able to determine differentiability of a function at a point.
- D. Be able to differentiate algebraic, exponential, and logarithmic functions.
 - 7. Be able to calculate the derivatives of the sine and cosine functions.
- E. Be able to interpret derivatives as the slopes of tangent lines, instantaneous rates of change, and marginals.
 - 8. Be able to identify and interpret critical points on multivariable functions.
- F. Be able to use derivatives to describe the behavior of a function.
 - 9. Be able to identify critical points on graphs of three-dimensional functions.
 - 10. Be able to identify relative and absolute extrema and saddle points on tables and contour graphs.
 - 11. Be able to use contour graphs to identify the type of critical point.
- G. Be able to apply derivatives to problems in economics, business, and the physical, social, and life sciences.
- H. Be able to antidifferentiate algebraic and exponential functions.
 - 12. Be able to write algebraic anti-derivatives of functions.
 - 13. Be able to calculate the integrals of the sine and cosine functions.
- I. Be able to evaluate definite integrals.
 - 14. Be able to interpret and demonstrate the Fundamental Theorem of Calculus.
 - 15. Be able to calculate the definite integral of a function.

16. Be able to approximate the area of a region using left rectangle, right rectangle, trapezoids, and midpoint rectangles.
 17. Be able to label and interpret the area of a region.
 18. Be able to sketch a graph of an accumulated function.
 19. Use definite integrals to calculate and interpret the area of a region between two curves.
 20. Be able to interpret an improper integral.
- J. Be able to apply antiderivatives to problems in economics, business, and the physical, social, and life sciences.
21. Be able to solve differential equations.
 22. Be able to use definite integrals to estimate future and present values of investments or biological populations.
 23. Be able to interpret the average value of a function.

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>.