

MAC2233 Course Outline

Survey of Calculus(4) (P)

Description: This is a one semester survey course in calculus, and is not intended to be a substitute for any course(s) in the engineering calculus sequence. This course includes the study of functions; limits and continuity; derivatives for functions of one-variable including algebraic, logarithmic, and exponential functions; interpretations of the derivative; applications of derivatives to optimization, growth, decay, business and social science problems; integrals of algebraic, logarithmic, and exponential functions; introduction to methods of integration, including numerical estimation; and applications of the integral.

General Education Learning Outcome: The primary General Education Learning Outcome (GELO) for this course is Quantitative Reasoning, which is to understand and apply mathematical concepts and reasoning, and analyze and interpret various types of data. The GELO will be assessed through targeted questions on either the comprehensive final or an outside assignment.

Prerequisite: MAC1105 with a grade of “C” or better, OR the equivalent.

Rationale: In an increasingly complex world, mathematical thinking, understanding, and skill are more important than ever. *Survey of Calculus* will provide the students with the necessary tools to understand and formulate mathematical concepts as they apply to real world settings. Students wishing to major in business, social science, or technical programs are required to have overview knowledge of the calculus and its applications.

Impact Assessment: *Survey of Calculus* will provide the student with the needed working knowledge of various advanced mathematical concepts and an awareness of their relationship to complex problems. The course applies toward the General Education mathematics requirement area A for an Associate of Arts degree. MAC2233 is required for many degrees in business and social science.

Broad Course Objectives: This course supports the following goals of the Math Department:

- Engage students in sound mathematical thinking and reasoning. This should include students finding patterns, generalizing, and asking/answering relevant questions.
- Provide a setting that prepares students to read and learn mathematics on their own.
- Explore multiple representations of topics including graphical, symbolic, numerical, oral, and written. Encourage students to make connections among the various representations to gain a richer, more flexible understanding of each concept.
- Analyze the structure of real-world problems and plan solution strategies. Solve the problems using appropriate tools.
- Develop a mathematical vocabulary by expressing mathematical ideas orally and in writing.
- Enhance and reinforce the student’s understanding of concepts through the use of technology when appropriate.

MAC2233 Course Outline

As a result of successfully completing MAC2233, students should be able to demonstrate the following:

- Analyze/interpret quantitative data verbally, graphically, symbolically and numerically.
- Communicate quantitative data verbally, graphically, symbolically and numerically.
- Appropriately integrate technology into mathematical processes.
- Use mathematical concepts in problem-solving through integration of new material and modeling.

Topical Outline with Specific Course Objectives:

- I. *Review of Basic functions and Graphs*
 - A. Recognize algebraic functions in various forms.
 - B. Understand and use function notation in any setting.
- II. *Limits and Continuity*
 - A. Find limits graphically and numerically.
 - B. Use limits to describe asymptotic behavior.
 - C. Determine the continuity of functions graphically
- III. *The Derivative*
 - A. Define, discuss, and interpret the concept of the derivative algebraically, verbally, numerically, and graphically.
 - B. Find the derivative of a function using differentiation rules.
 - C. Identify the major characteristics of graphs and relate them to first and second derivatives.
 - D. Apply approximating techniques for derivatives.
- IV. *The Integral*
 - A. Demonstrate an understanding of the concept of the definite integral and describe the difference between the definite and indefinite integral.
 - B. Find the indefinite integral of a function using antidifferentiation rules.
 - C. Find and interpret the definite integral numerically, algebraically, and graphically.
 - D. State and apply the Fundamental Theorem of Calculus.
 - E. Use definite integrals to find areas.
 - F. Apply approximating techniques for integrals.

Evaluation: Each instructor will determine the specific criteria for determining the final course grade. These criteria will be delineated in the first day handout provided to each student. Each instructor will give a comprehensive final exam during the assigned final exam period.

MAC2233 Course Outline

Commonality: All instructors will use the same textbook and cover all topics in the topical outline. A computer lab with mathematical software is provided to facilitate collaboration and the use of technology. A graphing calculator will be required for this course. Either the TI-83 or the TI-84 line of calculators is recommended; any other graphing calculator will need to be approved by the instructor.