

Course Outline

Course Title: Calculus For Business, Social And Life Sciences

Common Course Title: MAC2233

Effective Term: Fall 2021 (Aug 9, 2021)

Credit Hours: 3 Units

Next Review : Aug 8, 2026

Contact Hour Breakdown: *(Per 16 week Term)*

Total: 48

Lecture:

Lab:

Clinic:

Other:

Requirements

Pre-requisite(s) with minimum grade required

MAC1105 (C) **OR** MAC1105C (C) **OR** MAC1114 (C) **OR** MAC1140 (C) **OR** MAC2311 (C) **OR** MAC2312 (C) **OR** MAC2313 (C) **OR** MAP2302 (C) **OR** MAS2103 (C)

Course Description:

This is a general education course that includes the college-level skills of calculus such as: functions, graphs, limits, differentiation, integration, average and instantaneous rates of change, and other applications. Recommendation of the Mathematics Department or at least a grade of C in the prerequisite course is required.

Course Outline

Alignment of General Education Competencies with General Outcomes of this Course (for general education assessment purposes)

1.0 Critical Thinking

- 2.0

2.0 Effective Communication

- 3.0

3.0 Ethical Reasoning

4.0 Global Awareness

5.0 Information Literacy

6.0 Mathematical and Scientific Reasoning

- 3.0, 4.0

UNITS

Unit 1: Functions, Graphs, Limits

General Outcome

1.0 Demonstrate knowledge of the concepts of functions, graphing, and limits.

Specific Learning Outcomes

- 1.1 Define, graph, and write the equation for a linear function in the form $f(x) = mx + b$.
- 1.2 Calculate the slope and intercepts of a linear function.
- 1.3 Evaluate the limit of a function, including limits at infinity and one-sided limits.
- 1.4 Determine the continuity of a function at a point or on an interval.
- 1.5 Read and analyze functions to solve applied problems including, but not restricted to:
 - 1.5.1 Fixed and variable costs
 - 1.5.2 Revenue and profit
 - 1.5.3 Supply and demand
 - 1.5.4 Break-even and equilibrium points

Unit 2: Derivatives

General Outcome

- 2.0 Demonstrate knowledge of the meaning of derivatives, their applications, and rules of differentiation.

Specific Learning Outcomes

- 2.1 Demonstrate knowledge of the meaning of a derivative.
- 2.2 State and apply the definition of derivative.
- 2.3 Recognize the different derivative notations.
- 2.4 State and apply the rules of differentiation.
- 2.5 Calculate higher order derivatives with or without technology as appropriate.
- 2.6 Determine increasing and decreasing intervals, concavity, critical values, relative extrema, points of inflection, and absolute extrema using first and second derivatives.
- 2.7 Identify and cursorily sketch vertical and horizontal asymptotes of a rational function.
- 2.8 Analyze and sketch polynomial functions with optional technology support for arithmetic as needed.
- 2.9 Read and use derivatives to solve applied problems including, but not restricted to:
 - 2.9.1 Equation of tangent line
 - 2.9.2 Marginal analysis
 - 2.9.3 Price elasticity of demand
 - 2.9.4 Optimization in the context of business applications, e.g., maximizing profit, etc.
 - 2.9.5 Average cost and profit

Unit 3: Integration

General Outcome

- 3.0 Demonstrate knowledge of integrals and their applications.

Specific Learning Outcomes

- 3.1 State and apply the rules of integration.
- 3.2 Perform indefinite integration.
- 3.3 Evaluate definite integrals.
- 3.4 Read and use integrals to solve problems including, but not restricted to:
 - 3.4.1 Area
 - 3.4.2 Evaluating the constant of integration to derive cost and revenue functions from marginal functions
 - 3.4.3 Calculate and interpret consumer and producer surplus

Unit 4: Exponential and Logarithmic Functions

General Outcome

- 4.0 Demonstrate knowledge of derivatives, integrals, and applications of exponential and logarithmic functions.

Specific Learning Outcomes

- 4.1 Sketch the graph of $f(x) = e^x$ and related functions using technology as appropriate.
- 4.2 Sketch the graph of $f(x) = \ln x$ and related functions using technology as appropriate.
- 4.3 State and apply the properties of logarithms.
- 4.4 Solve logarithmic and exponential equations.
- 4.5 Find derivatives of exponential and logarithmic functions.
- 4.6 Find integrals of exponential functions.
- 4.7 Find integrals resulting in logarithmic functions.
- 4.8 Read and apply exponential and logarithmic functions to discrete and continuous problems including, but not limited to:
 - 4.8.1 Present value and future value including compounding
 - 4.8.2 Effective rate
 - 4.8.3 Finding C (initial value) and k (proportionality constant) in exponential growth and decay