# MATH-115: APPLIED CALCULUS

**Effective Term**
Fall 2026

**CC Approval**
12/05/2025

**AS Approval**
12/11/2025

**BOT Approval**
12/18/2025

## SECTION A - Course Data Elements

**Send Workflow to Initiator**
No

**CB04 Credit Status**
Credit - Degree Applicable

**Discipline**

| Minimum Qualifications | And/Or |
|---|---|
| Mathematics (Master's Degree) | |

**Subject Code**
MATH - Mathematics

**Course Number**
115

**Department**
Mathematics

**Division**
Mathematics (MATH)

**Full Course Title**
Applied Calculus

**Short Title**
Applied Calculus

**CB03 TOP Code**
1701.00 - Mathematics, General

**CIP Code**
27.0101

**CB08 Basic Skills Status**
NBS - Not Basic Skills

**CB09 SAM Code**
E - Non-Occupational

**Rationale**
Regular review and update.

## SECTION B - Course Description

**Catalog Course Description**
This course presents a study of the techniques of calculus with emphasis on applications to business, life sciences and social sciences. Topics include modeling, applications of derivatives and integrals for polynomial, rational, exponential and logarithmic functions.

## SECTION C - Conditions on Enrollment

**Open Entry/Open Exit**
No

**Repeatability**
Not Repeatable

**Grading Options**
Letter Grade Only

**Allow Audit**
Yes

## Requisites

**Prerequisite(s)**
Placement as determined by the college's multiple measures assessment process or completion of a course taught at or above the level of college algebra.

## Requisite Justification

**Requisite Description**
Non-course Requisite

**Level of Scrutiny**
Requisite Established by Statute/Regulation

**Explanation**
Placement in accordance with AB 1705.

Upon entering this course, students should be able to:

1. Graph and analyze functions.
2. Simplify expressions .
3. Solve equations.

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## SECTION D - Course Standards

**Is this course variable unit?**
No

**Units**
5.00

**Lecture Hours**
90.00

**Outside of Class Hours**
180

**Total Contact Hours**
90

**Total Student Hours**
270

## Distance Education Approval

**Is this course offered through Distance Education?**
Yes

**Online Delivery Methods**

| DE Modalities | Permanent or Emergency Only? |
|---|---|
| Hybrid | Permanent |
| Online with Proctored Exams | Permanent |
| Entirely Online | Emergency Only |

## SECTION E - Course Content

**Student Learning Outcomes**

| | Upon satisfactory completion of the course, students will be able to: |
|---|---|
| 1. | Compute derivatives of elementary functions and their algebraic combinations. |
| 2. | Solve applications by differentiation and integration. |
| 3. | Evaluate definite and indefinite integrals. |
| 4. | Write mathematical proofs. |

**Course Objectives**

| | Upon satisfactory completion of the course, students will be able to: |
|---|---|
| 1. | Find the derivatives of polynomial, rational, exponential, and logarithmic functions. |
| 2. | Find the derivatives of functions involving constants, sums, differences, products, quotients, and the chain rule. |
| 3. | Sketch the graph of functions using horizontal and vertical asymptotes, intercepts, and first and second derivatives to determine intervals where the function is increasing and decreasing, maximum and minimum values, intervals of concavity and points of inflection. |
| 4. | Analyze the marginal cost, profit and revenue when given the appropriate function. |
| 5. | Determine maxima and minima in optimization problems using the derivative. |
| 6. | Use derivatives to find rates of change and tangent lines. |
| 7. | Use calculus to analyze revenue, cost, and profit. |
| 8. | Find definite and indefinite integrals by using the general integral formulas, integration by substitution, and other integration techniques. |
| 9. | Use integration in business, economics, and life-science applications. |

**Course Content**

1. Functions and their graphs, including exponential and logarithmic functions.
2. Limits and intuitive limit definition of derivative.
3. Increments, tangent lines, and rate of change.
4. Rules of differentiation including sum, product, quotient, and the chain rule.
5. Implicit differentiation.
6. Applications of differentiation such as marginal analysis, growth and decay models, optimization, and curve sketching.
7. Antiderivatives, indefinite and definite integrals.
8. Multiple techniques of integration including substitution.
9. Area between curves.
10. Approximating definite integral as a sum.
11. Applications of integration in business, economics, and life-sciences.

## Methods of Instruction

**Methods of Instruction**

| Types | Examples of learning activities |
|---|---|
| Lecture | Lecture Examples:<br>Lecture on real-world applications of exponential growth in finance and population dynamics. Lecture on using the chain rule.<br><br>Explore how derivatives model marginal cost and revenue in economics, reaction rates in chemistry, and velocity and acceleration in physics. |
| Discussion | Discussion Examples: Meet with your group to discuss how you would set up and solve an optimization problem for a real-world scenario, such as minimizing material costs for packaging or maximizing crop yield.<br><br>Compare and discuss how derivatives are used to describe change in different fields, such as velocity in physics, marginal cost in economics, and reaction rates in chemistry. |
| Activity | Activity Examples: Find the price that maximizes revenue for a given demand function. Evaluate the area under a given curve.<br><br>Use derivatives to determine when profit is maximized in a business scenario. |

**Online Adaptation**

| Types | Examples of learning activities |
|---|---|
| Lecture | View pre-recorded lectures or attend synchronous zoom lecture on course content.<br><br>For example, examine real-world applications of exponential growth in finance and population dynamics, as well as decay in physics and biology.<br><br>Explore how derivatives model marginal cost and revenue in economics, reaction rates in chemistry, and velocity and acceleration in physics. |
| Discussion | Discussion Examples:<br>In your group, discuss how you would set up and solve an optimization problem for a real-world scenario, such as minimizing material costs for packaging or maximizing crop yield.<br><br>Compare and discuss how derivatives are used to describe change in different fields, such as velocity in physics, marginal cost in economics, and reaction rates in chemistry. |
| Activity | Find the price that maximizes revenue for a given demand function.<br><br>Use derivatives to determine when profit is maximized in a business scenario. |

**Instructor-Initiated Online Contact Types**

Announcements/Bulletin Boards
Chat Rooms
Discussion Boards
E-mail Communication
Video or Teleconferencing

**Student-Initiated Online Contact Types**

Chat Rooms
Discussions
Group Work

**Course design is accessible**

Yes

## Methods of Evaluation

**Methods of Evaluation**

| Types | Examples of classroom assessments |
|---|---|
| Exams/Tests | Traditional exams including a final exam. Except in the event of an emergency, exams should be proctored in person.<br><br>Exams could include finding derivatives of various functions.<br><br>Exams could include finding the area under a curve. |
| Quizzes | Quizzes on class material. |
| Projects | Group or individual profit optimization project. |
| Homework | Homework problems from textbook. |
| Other | Additional Assessment Information:<br>The Mathematics Department maintains a commitment to diverse teaching methods in courses emphasizing vital quantitative skills and qualitative reasoning ability. To that end, it is expected that sufficient formative assessments will be given to students that in frequency, length and rigor adequately assess both quantitative skills and qualitative reasoning.<br><br>Sample assessment questions:<br><br>A company determines that its revenue grows continuously at a rate given by R'(t)=3e^(3t), where t is the number of days since an innovation was introduced. Find the definite integral of R'(t) from 0 to 4 and interpret the value in context.<br><br>A small business sells handmade candles at local markets and online. Based on market research, the owner finds that the price per candle, in dollars, for her candles is approximately p(x)=100-2x where x is the number of candles sold in a month.<br>(a) Write a function for the monthly profit, , in terms of x, the number of candles sold.<br><br>(b) Use Calculus to find the number of candles that maximizes profit.<br><br>(c) Use Calculus to find the number of candles that maximizes profit. |

## Assignments

**Reading Assignments**

Read sections from the textbook, for example:

1. Read the section on The Chain Rule
2. Read the section on growth models

**Writing Assignments**

Writing Assignment Examples:

Complete online or paper homework exercises from assigned section in the text.

Analyze given restrictions to create a model and optimize profits.

## SECTION F - Textbooks and Instructional Materials

**Material Type**

Textbook

**Author**

Bittinger, Ellenbogen, Surgent, Kramer

**Title**

Calculus & Its Applications

**Edition/Version**
3rd Edition

**Publisher**
Pearson

**Year**
2024

**Rationale**
Standard text for Applied Calculus

**ISBN #**
9780138235284

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## SECTION G - Diversity, Equity and Inclusivity

**How does your course and/or course outline of record reflect strategies for accommodating and engaging diverse student populations, advancing equitable outcomes, and fostering inclusion for all students?**
This course supports diverse student populations through the use of multiple representations of concepts, varied applications, and technology. Strategies may also include collaborative learning, transparent assessment practices, low-cost resources, and opportunities for students to connect course material to their own experiences, fostering equitable outcomes and an inclusive classroom environment.

## Course Codes (Admin Only)

**CB00 State ID**
CCC000285813

**CB10 Cooperative Work Experience Status**
N - Is Not Part of a Cooperative Work Experience Education Program

**CB11 Course Classification Status**
Y - Credit Course

**CB13 Special Class Status**
N - The Course is Not an Approved Special Class

**CB23 Funding Agency Category**
Y - Not Applicable (Funding Not Used)

**CB24 Program Course Status**
Program Applicable

**Allow Pass/No Pass**
No

**Only Pass/No Pass**
No