



UNITED STATES INTERNATIONAL UNIVERSITY

## MTH 1110: CALCULUS

Credit: 3 Hours

*Pre-requisite: MTH1109*

### 3.22.2 Purpose of the Course

The purpose of the course is to introduce the student to the principles of differential and integral calculus and their applications

### 3.22.3 Expected Learning Outcomes of the Course

Upon completion of this course, students will be able to:

1. Calculate limits and continuity of the given functions
2. Compute the derivatives of elementary functions using both the definition of a derivative and differentiation formulas.
3. Apply integration techniques effectively to solve definite and indefinite integrals for a diverse set of functions.
4. Solve first-order differential equations and apply them to real-world scenarios.
5. Apply integration in practical situations to analyze and solve problems in diverse fields.

### 3.22.4 Course Content

**Limits and Continuity:** Definition and Properties of Limits, Evaluating Limits, Limits at Infinity, Continuity. **Derivative and its Application:** Definition and Basic Concepts, Derivative Rules and Formulas, higher-Order Derivatives, Implicit Differentiation Equation of line, rates of change, Maximum and minimum points. **Introduction to integration and integration techniques:** Review of Basic Integration Concepts, Integration by Substitution, Integration by Parts, Partial Fractions Decomposition, Trigonometric Integrals and Trigonometric Substitution, Improper Integrals, Numerical Integration.. **Solution of First Order Differential Equations:** Separable Differential Equations, Linear Differential Equations, Exact Differential Equations, Integrating Factors, Bernoulli Differential Equations, First-Order Linear Systems

**Applications of Integration:** Kinematics: Position, Velocity, and Acceleration, Arc Length of Curves, Surface of Revolution, Volume of Revolution, Area between Curves, Applications in Physics, Engineering, and Economics.

### 3.22.5 Instructional Methods

Micro-lectures, instructional videos, posting course notes, online discussion forums, written assignments, self-directed learning, reflective portfolios, and group work projects.

### 3.22.6 Instructional Materials/Equipment

Learning Management System, Internet and Web-based materials, microcomputer devices e.g. desktop, laptop, core course textbooks, articles, e-books, e-journals, and suggested readings.

### 3.22.7 Student Assessment at Course Level

Student assessment at course level will comprise the following

Assessment type	% score
Attendance and Participation	10
Quizzes	10
Class Assignments	20
Term Paper/presentations	10
Mid-Semester Exam	20
End-Semester Exam	30
Total	100

### 3.22.8 Core Reading Material for the Course

#### a) Textbooks

1. Joel, R., Pearson C, & Christopher E. (2022). Thomas' Calculus : *Early Transcendentals* (15<sup>th</sup> edition). Pearson
2. Saraswat P & Rudraman (2022). Differential Calculus & Integral Calculus, 1<sup>st</sup> Edition. Thakur Publication Pvt. Ltd

#### b) Journals

1. Kenya Journal of Science and Technology. Kenya Academy of Sciences Nairobi. Kenya.

***c) E-materials***

1. James S. (2022). Calculus: Early Transcendentals.

**3.22.9 Recommended Reference Materials**

***a) Textbooks***

1. James S. (2021). Calculus: Early Transcendentals. Cengage Learning.

***b) Journals***

1. Discovery and Innovations. Journal of African Academy of Sciences Nairobi, Kenya.

***c) E-materials***