

## MODULE SPECIFICATION

<b>Module Title</b>	Calculus I
<b>Module Code</b>	MTH 027
<b>Module Credits</b>	5
<b>Pre-requisites (including Year 1)</b>	College Algebra and Precalculus

### Description

<b>Course Overview</b>
This is the first course of the Calculus sequence. The courses will be focusing on the following topics: Functions and Models, Limits and Derivatives, Differentiation Rules, Taylor polynomials, Applications of Differentiation, Integrals, Applications of Integration and Techniques of Integration.
<b>Method of Teaching and Learning</b>
This module will be taught using a combination of lectures, tutorials and consultation hours. Learning will also be reinforced by appropriate readings from the course text.
<b>Syllabus</b>
<p>Modules</p> <ol style="list-style-type: none"> <li>1. Functions and Models <ul style="list-style-type: none"> <li>• Four Ways to Represent a Function</li> <li>• Mathematical Models: A Catalog of Essential Functions</li> <li>• New Functions from Old Functions</li> <li>• Exponential Functions</li> <li>• Inverse Functions and Logarithms</li> </ul> </li> <li>2. Limits and Derivatives <ul style="list-style-type: none"> <li>• The Tangent and Velocity Problems</li> <li>• The Limit of a Function</li> <li>• Calculating Limits Using the Limit Laws</li> <li>• The Precise Definition of a Limit</li> <li>• Continuity</li> <li>• Limits at Infinity; Horizontal Asymptotes</li> <li>• Derivatives and Rates of Change</li> <li>• The Derivative as a Function</li> </ul> <p style="margin-left: 40px;">Midterm Exam 1</p> </li> <li>3. Differentiation Rules <ul style="list-style-type: none"> <li>• Derivatives of Polynomials and Exponential Functions</li> <li>• The Product and Quotient Rules</li> <li>• Derivatives of Trigonometric Functions</li> <li>• The Chain Rule</li> </ul> </li> </ol>

- Implicit Differentiation
  - Derivatives of Logarithmic and Inverse Trigonometric Functions
  - Rates of Change in the Natural and Social Sciences
  - Exponential Growth and Decay
  - Related Rates
  - Linear Approximations and Differentials
  - Hyperbolic Functions
4. Applications of Differentiation
- Maximum and Minimum Values
  - The Mean Value Theorem
  - What Derivatives Tell Us about the Shape of a Graph
  - Indeterminate Forms and l'Hospital's Rule
  - Summary of Curve Sketching
  - Graphing with Calculus and Technology
  - Optimization Problems
  - Newton's Method
  - Antiderivatives
- Midterm Exam 2
5. Integrals
- The Area and Distance Problems
  - The Definite Integral
  - The Fundamental Theorem of Calculus
  - Indefinite Integrals and the Net Change Theorem
  - The Substitution Rule
6. Applications of Integration
- Areas between Curves
  - Volumes
  - Volumes by Cylindrical Shells
  - Work
  - Average Value of a Function
7. Techniques of Integration
- Integration by Parts
  - Trigonometric Integrals
  - Trigonometric Substitution
  - Integration of Rational Functions by Partial Fractions
  - Strategy for Integration
  - Using Tables and Technology
  - Approximate Integration
  - Improper Integrals
8. Taylor polynomials
- Final Exam

## Assessment

Assessment Type	% of Final Mark
Midterm Exam 1	25%
Midterm Exam 2	25%
Final Exam	30%
Homework and Quizzes	10%
Course Participation	10%

<i>Range</i>	<i>Letter Grade</i>
90% - 100%	A
80% - 89%	B
70% - 79%	C
60% - 69%	D
< 60%	U

## Textbooks

### *Mandatory Textbooks*

Title	Editor/Author	ISBN/Publisher
calculus: Early Transcendentals, 9th Edition	James Stewart	9780357687901/Cengage

### *Optional Textbooks*

Title	Author	ISBN/Publisher
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### *Reference Textbooks*

Title	Author	ISBN/Publisher
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