



# Course Specification

— (Bachelor)

**Course Title:** Calculus I

**Course Code:** MATH101

**Program:** Bachelor of Mathematics

**Department:** Mathematics

**College:** College of Science

**Institution:** Northern Border University

**Version:** 3

**Last Revision Date:** 04/02/2024





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## A. General information about the course:

### 1. Course Identification

1. Credit hours: ( 4 )

#### 2. Course type

A. ☐ University ☒ College ☐ Department ☐ Track ☐ Others  
B. ☒ Required ☐ Elective

3. Level/year at which this course is offered: Level 2 / First year

#### 4. Course general Description:

This course is considered as a first course in differential calculus, dealing mainly with differentiations of elementary functions and their applications

5. Pre-requirements for this course (if any):

6. Pre-requirements for this course (if any):

#### 7. Course Main Objective(s):

By the end of this course the student will be able to demonstrate the idea of limit, continuity, and differentiability, evaluate the derivatives of fundamental functions, compute the extrema of functions, and apply the concepts of monotonicity and concavity in sketching the plane curves

### 2. Teaching mode (mark all that apply)

| No | Mode of Instruction                                                                                | Contact Hours | Percentage |
|----|----------------------------------------------------------------------------------------------------|---------------|------------|
| 1  | Traditional classroom                                                                              | 5             | 100%       |
| 2  | E-learning                                                                                         |               |            |
| 3  | Hybrid <ul style="list-style-type: none"> <li>Traditional classroom</li> <li>E-learning</li> </ul> |               |            |
| 4  | Distance learning                                                                                  |               |            |



### 3. Contact Hours (based on the academic semester)

| No    | Activity          | Contact Hours |
|-------|-------------------|---------------|
| 1.    | Lectures          | 45            |
| 2.    | Laboratory/Studio |               |
| 3.    | Field             |               |
| 4.    | Tutorial          | 30            |
| 5.    | Others (specify)  |               |
| Total |                   | 75            |

### B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes                                                                            | Code of CLOs aligned with program | Teaching Strategies                                                                                                             | Assessment Methods                                                                                           |
|------|-----------------------------------------------------------------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| 1.0  | Knowledge and understanding                                                                         |                                   |                                                                                                                                 |                                                                                                              |
| 1.1  | Demonstrate the basic and fundamental concepts of calculus                                          | K1                                | <ul style="list-style-type: none"> <li>Class/Group discussion</li> <li>Collaborative learning</li> <li>Self-learning</li> </ul> | <ul style="list-style-type: none"> <li>Written exam (Essay)</li> <li>Assignments</li> </ul>                  |
| 1.2  | Discuss the principles and different theorems of differentiation for real functions.                | K2                                | <ul style="list-style-type: none"> <li>Class/Group discussion</li> <li>Collaborative learning</li> <li>Self-learning</li> </ul> | <ul style="list-style-type: none"> <li>Written exam (Essay)</li> <li>Assignment</li> <li>Reports.</li> </ul> |
| 2.0  | Skills                                                                                              |                                   |                                                                                                                                 |                                                                                                              |
| 2.1  | Utilize definitions of differentiation in evaluating differentiation of several types of functions. | S1                                | <ul style="list-style-type: none"> <li>Problem-based learning</li> <li>Collaborative learning</li> <li>Self-learning</li> </ul> | <ul style="list-style-type: none"> <li>Written exam (Essay)</li> <li>Assignments</li> </ul>                  |
| 2.2  |                                                                                                     |                                   |                                                                                                                                 |                                                                                                              |
| 3.0  | Values, autonomy, and responsibility                                                                |                                   |                                                                                                                                 |                                                                                                              |
| 3.1  |                                                                                                     |                                   |                                                                                                                                 |                                                                                                              |

## C. Course Content

| No    | List of Topics                                         | Contact Hours |
|-------|--------------------------------------------------------|---------------|
| 1.    | Basic functions and their properties                   | 15            |
| 2.    | Limits and continuity                                  | 20            |
| 3.    | Derivatives, evaluation differentiations of functions. | 25            |
| 4.    | Applications of differentiations                       | 15            |
| Total |                                                        | 75            |

## D. Students Assessment Activities

| No | Assessment Activities *     | Assessment timing (in week no) | Percentage of Total Assessment Score |
|----|-----------------------------|--------------------------------|--------------------------------------|
| 1. | Homework1                   | 2                              | 5                                    |
| 2. | Quiz 1 (written test)       | 4                              | 5                                    |
| 3. | Homework2                   | 5                              | 5                                    |
| 4. | Midterm Exam (written test) | 8-9                            | 30                                   |
| 5. | Homework3                   | 10                             | 5                                    |
| 6. | Quiz 2 (written test)       | 11                             | 5                                    |
| 7. | Homework4                   | 14                             | 5                                    |
| 8. | Final Exam (written test)   | 16-17                          | 40                                   |

\*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

## E. Learning Resources and Facilities

### 1. References and Learning Resources

|                          |                                                                                                                                                                                                |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Essential References     | Anton, H., Bivens, I., & Davis, S. (2021). Calculus: Early Transcendental (11 <sup>th</sup> ed.). John Wiley & Sons.                                                                           |
| Supportive References    | 1- Stewart, J. (2016) Calculus: Early Transcendental (8 <sup>th</sup> ed.). Cengage Learning.<br>2- Adams, R., & Essex, C. (2017). Calculus: A Complete Course (9 <sup>th</sup> ed.). Pearson. |
| Electronic Materials     |                                                                                                                                                                                                |
| Other Learning Materials |                                                                                                                                                                                                |



## 2. Required Facilities and equipment

| Items                                                                                     | Resources                                                                                |
|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <b>facilities</b><br>(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | Classrooms with sufficient number of seats depending on the number of enrolled students. |
| <b>Technology equipment</b><br>(projector, smart board, software)                         | Smart Board, Data show                                                                   |
| <b>Other equipment</b><br>(depending on the nature of the specialty)                      | Printer, Photocopier, Papers A4, Whiteboard markers of different colors.                 |

## F. Assessment of Course Quality

| Assessment Areas/Issues              | Assessor                                               | Assessment Methods                                |
|--------------------------------------|--------------------------------------------------------|---------------------------------------------------|
| Effectiveness of teaching            | Student<br>Faculty<br>Program Leaders                  | Indirect<br>Direct / Indirect<br>Indirect         |
| Effectiveness of Students assessment | Student<br>Faculty<br>Peer Reviewer<br>Program Leaders | Indirect<br>Direct<br>Direct<br>Direct / Indirect |
| Quality of learning resources        | Faculty                                                | Direct                                            |
| Effectiveness of students assessment | Student<br>Faculty                                     | Indirect<br>Direct                                |
| Other                                |                                                        |                                                   |

**Assessors** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval

|                           |                                        |
|---------------------------|----------------------------------------|
| <b>COUNCIL /COMMITTEE</b> | MATHEMATICS DEPARTMENT COUNCIL         |
| <b>REFERENCE NO.</b>      | MEETING NO 9, ACCADEMIC YEAR 1444-1445 |
| <b>DATE</b>               | 02/11/2024                             |

