



Course Specification

— (Bachelor)

Course Title: **Calculus 2**

Course Code: **MATH26214**

Program: **BSc in Mathematics**

Department: **Mathematics**

College: **Science**

Institution: **University of Bisha**

Version: **3**

Last Revision Date: **25 July 2023**



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A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A. University College Department Track Others
B. Required Elective

3. Level/year at which this course is offered: (3rd level/ 2nd year)

4. Course general Description:

The fundamental principles of calculus were made independently by Isaac Newton (English) and Gottfried Leibniz (German) in the late seventeenth century. This course provides the most important theorems and methods of integration and its applications. It is designed as an advanced course of the course presented in the first year. The topics include, Maclaurin and Taylor Polynomials, Indefinite Integration, Methods of Integration, Hyperbolic Functions and Their Inverse, Definite Integration and Its Applications, and Improper Integrals.

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

MATH26111

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

Nil

7. Course Main Objective(s):

The main purpose of this course is to develop theoretical and practical knowledge, skills and attitudes of students in calculus with emphasis on the methods of integration and its applications.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%





No	Mode of Instruction	Contact Hours	Percentage
2	E-learning	-----	-----
3	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 	-----	-----
4	Distance learning	-----	-----

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	60
2.	Laboratory/Studio	-----
3.	Field	-----
4.	Tutorial	-----
5.	Others (specify)	-----
Total		60

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: By successfully completing this course it is expected that the student will be able to:			
1.1	State definitions and theorems about approximations and Taylor polynomials.	K2	Lecture Discussion Active Learning Cooperative Learning	Exercises or Written Tests
1.2	Define basic concepts of indefinite integration. Understand methods of integration.	K2	Lecture Discussion Active Learning Cooperative Learning	Exercises or Written Tests
1.3	State definitions and properties of	K2	Lecture Discussion	Exercises or



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	transcendental functions and their inverses. State definitions, theorems and applications about definite integrals. Recognize basic concepts of improper integrals.		Active Learning Cooperative Learning	Written Tests
2.0	Skills: By successfully completing this course it is expected that the student will be able to:			
2.1	Solve problems related to applications of Taylor polynomial and mean-value theorem. Calculate definite, indefinite and improper integrals.	S2	Lecture Discussion Active Learning Cooperative Learning	Exercises or Written Tests
2.2	Apply methods of integrations. Apply problems related to transcendental functions and their inverses.	S2	Lecture Discussion Active Learning Cooperative Learning	Exercises or Written Tests
2.3	Prove theorems and properties of integrals. Test convergence of improper integrals using comparison.	S2	Lecture Discussion Active Learning Cooperative Learning	Exercises or Written Tests
3.0	Values, autonomy, and responsibility: By successfully completing this course it is expected that the student will be able to:			
3.1	Think logically, make decisions and apply theoretical ideas in real life problems.	V1	Lecture Discussion Active Learning Cooperative Learning	Exercises or Written Tests



C. Course Content

No	List of Topics	Contact Hours
1.	Local Quadratic Approximations Formula for the local quadratic approximation of a function at zero.	4
2.	Maclaurin Polynomials:	4
3.	Taylor Polynomials: Taylor polynomial for a differentiable function and the nth reminder.	4
4.	Indefinite Integration: Antiderivative, indefinite integral, integration formula,	4
5.	Properties of indefinite integral.	4
6.	Methods of Integration: Substitution method, trigonometric substitution.	4
7.	Integration by parts.	4
8.	Integrating fractional functions by partial fractions.	4
9.	Hyperbolic Functions and Their Inverse: Hyperbolic functions, inverse of hyperbolic functions, hyperbolic identities, derivatives and integrals of hyperbolic functions.	4
10.	Derivatives and integrals of inverse hyperbolic functions, the relation between inverse hyperbolic functions and natural logarithms.	4
11.	Definite Integration and Its Applications: Integrable function on a closed interval, definite integral, natural logarithm, the geometric meaning of definite integral,	4
12.	The properties of definite integral, the fundamental theorem of calculus.	4
13.	The mean-value theorem for integrals.	4
14.	Improper Integrals: Improper integrals, improper integral over finite interval, comparison theorems for improper integrals.	4
15.	Improper integral over infinite interval.	4
Total		60

The matrix of consistency between the content and the learning outcomes of the course





Course Learning Outcomes							
Topics	1.1	1.2	1.3	2.1	2.2	2.3	3.1
1	√			√			√
2	√			√			√
3	√			√			√
4		√			√		√
5		√			√		√
6		√			√		√
7		√			√		√
8		√			√		√
9		√			√		√
10		√			√		√
11			√			√	√
12			√			√	√
13			√			√	√
14			√			√	√
15			√			√	√

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Exercises	6 th , 13 th	10%
2.	Quiz 1	5 th	5%
3.	Exam I	7 th	15%
4.	Quiz 2	10 th	5%
5.	Exam II	12 th	15%
5.	Final Exam	End of Semester	50%

*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	Howard Anton, Ir Bivens and Stephen Davis, "Calculus Early Transcendentals" 11 th Ed., John Wiley & Sons, Inc, USA, (2016).
Supportive References	James Stewart, Daniel Clegg, Saleem watson, Lothar Redlin "Calculus Early Transcendentals" 9 th Ed. Cengage Learning, USA, (2020).
Electronic Materials	-----
Other Learning Materials	-----

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms for 30 students.
Technology equipment (projector, smart board, software)	Smart board.
Other equipment (depending on the nature of the specialty)	-----

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of Students assessment	Peer Reviewer	Indirect
Quality of learning resources	Student	Indirect
The extent to which CLOs have been achieved	Program Leader	Direct
Other	-----	-----

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	FACULTY COUNCIL
REFERENCE NO.	20
DATE	17 AUGUST 2023

