Course Specification

▬ (Bachelor)

Course Title:	**Calculus** II
Course Code:	**212MATH-3**
Program:	**B. Sc. in Mathematics**
Department:	**Mathematics**
College:	**Science**
Institution:	**Jazan University**
Version:	**2024**
Last Revision Date:	**9/2024**

Table of Contents

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:

Level 4/Year 2

4. Course general Description:

This course is designed to provide students with

- **Integrals (Definite and Indefinite Integrals).**
- **Techniques integration.**
- **Application of Integration.**
- **Improper Integrals.**
- **Infinite sequence and series**

5. Pre-requirements for this course (if any): Calculus1 (Math 211).

6. Co- requirements for this course (if any): None.

7. Course Main Objective(s):

After finishing the course, the student is expected to be familiar with the following:

- The various rules of differentiation and integration methods.
- To compute area, volume, arc length and surface area of the curves.
- To evaluate improper integral and their applications.
- To analyze convergence of infinite sequences and series.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	45	100%
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours

1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	3
5.	Others (specify)	
	Total	**45**

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	Distinguish mathematical concepts relevant to pure and applied Mathematics. Demonstrate information relevant to mathematical knowledge of integrals, techniques and applications of integration, improper integrals and infinite sequences and series.	K1	Lectures, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments.
1.2	Identify background science, features and structure of mathematical problem in integrals, techniques and applications of integration, improper integrals and infinite sequences and series.	K2	Lectures, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments.
1.3	Explain notations and concepts required for the solution of Mathematical problem of integrals, techniques and applications of integration, improper integrals and infinite sequences and series.	K3	Lectures, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments.
2.0	**Skills**			
2.1	Apply theoretical, computational or practical aspect relevant to integrals, techniques and applications of integration, improper		Lectures, solving problem, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments.

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	integrals and infinite sequences and series.	S1		
2.2	Compute numerical quantities for various parameters to approximate the solution of integrals, techniques and applications of integration, improper integrals and infinite sequences and series.	S2	Lectures, solving problem, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments.
2.3	Apply various mathematical rules, techniques and theorems in Application of integrals, techniques and applications of integration, improper integrals and infinite sequences and series.	S3	Lectures, solving problem, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments.
2.4	Solve mathematical problem using critical thinking in integrals, techniques and applications of integration, improper integrals and infinite sequences and series.	S4	Lectures, solving problem, Classroom discussions.	Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments.
3.0	Values, autonomy, and responsibility			
3.1	Cultivate a mathematical attitude and nurture the interest.	V1	Group work and interactive discussion.	Assignments, Discussion.
3.2	Realize the importance of responsibilities through different modes of practice, competition, and related activities.	V2	Group work and interactive discussion.	Assignments, Discussion.
3.3	Inculcating values and ethics in thought, expression and deed.	V3	Group work and interactive discussion.	Assignments, Discussion.

C. Course Content

No	List of Topics	Contact Hours
1.	**Methods of integration:** Integration by substitution, Integration by Parts, Integration by Partial Fractions, integration in other ways.	10
2.	**Indefinite Integration:** Properties of Indefinite Integration Brief Table of Indefinite Integration, some theorems of integration.	11
3.	**Definite Integration:** Fundamental theorem of calculus, change of variables, properties of definite integral.	10
4.	**Application of Integration:** Area calculations, Solids of Revolution, Arc Length and surfaces of Revolution.	6
5.	**Improper Integrals:** Types of Improper Integrals, examples, applications.	8
	Total	45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework and Quiz	3	5
2.	First exam	6	20
3.	Homework and Quiz	10	5
	Second exam	12	20
	Final exam	15	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	J. Stewart, Calculus, Early Transcendentals Sixth Edition.
Supportive References	- Calculus, J. Stewart, 5 Edition, Brooks/ Cle Publishing Company, (2003). - Calculus, R. E. Larson, R. P. Hostetler, and B. H. Edwards, 7 Edition, Houghton Mifflin Company, (2002). - Calculus, G. B. Thomas, Early Transcendentals, 11 Edition, Addition-Wesley, New York (2006). - Calculus,E. Swokowski, M. Olinic, and D. Pence, 6 Edition, PWS Publishing Company, (1994).
Electronic Materials	- E-Mathematics LibereTexts https://math.libretexts.org/Courses/Mount_Royal_University/MATH_2200%3A_Calculus_for_Scientists_II/6%3A_Mulitvariable_Calculus/6.1%3A_Functions_of_Several_Variables **Calcworkshop https://calcworkshop.com/**

Other Learning Materials	• **Khan Academy https://www.khanacademy.org/** • **Saylor Academy https://learn.saylor.org/course**/

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Computer Lab.
Technology equipment (projector, smart board, software)	Data show; Smart Board, Mathematics software.
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Peer and program leader.	Indirect (Course Evaluation Survey)- Indirect peer evaluation.
Effectiveness of students assessment	Students, Program assessment committee.	Direct/Indirect.
Quality of learning resources	Instructor.	Direct/Indirect.
The extent to which CLOs have been achieved	Students, Faculty members.	Indirect.
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	**Board Of Mathematics Department**
REFERENCE NO.	**2417**
DATE	**29/03/1446 A. H.; 2/10/2024 A. D.**