T-104

Course Specification

Course Title:	Differentiation and Integration -2
Course Code	MATH 1312-3
Program:	Bachelor in Engineering
Department:	Engineering
College:	Science
Institution:	King Khalid University
Version:	2
Last Revision Date:	25/03/2023

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	5				
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					
This course is focus on **concept of integration:** Identify the correct rule to integrate and use rules to integrate. Identify non-algebraic integrals. Analyze rounding methods and numerical integration. This course introduces students to the basics of integration. It starts with a quick review of derivatives then students learn about antiderivatives of a function. Then students learn some elementary functions which were not covered in Calculus 1 such as exponential and inverse trigonometric functions. Moreover, various integration methods are introduced. Applications of integration are introduced such as finding area, volume, and arc length.					
5. Pre-requirements for this course (if any):					
MATH 1511					
6. Co- requirements for this course (if any):					
None					
7. Course Main Objective(s)					
On successful completion of this course, students should be able to: ○ **Analyze the relationship between differentiation and integration.** ○ **Calculate integrals of basic functions and find area and volume.** ○ **Compare different integration methods and justify the choice for each method.**					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
5.	Traditional classroom	--	--
6.	E-learning	--	--
7.	Hybrid • Traditional classroom • E-learning	5	100
8.	Distance learning	--	--

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
6.	Lectures	60
7.	Laboratory/Studio	--
8.	Field	--
9.	Tutorial	
10.	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			
1.1	Understand differences between integration methods.	K1		
1.2	State and recognize properties of elementary functions.	K2		
1.3	Write integrals as the opposite process of differentiation.	K3		
1.4	Outline the applications of integration.	K4		
1.5	Familiar to integration methods	K5		
2.0	Skills			
2.1	Solve basic integrals.	S1		
2.2	Recognize integrals in terms of area and use integrals to find area under curves	S2		
2.3	Choose and use different integration methods.	S3		
2.4	Justify the choice of an integration method for a particular integral. And use the properties of elementary functions to find integrals	S4		
3.0	Values, autonomy, and responsibility			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Adhere to ethical values and excellence in professional practices.	V1	Feedback, experiential learning, structured experiences in groups, self-assessment, profiling.	Critical assessment, self-assessment, Rubrics
3.2	Able to articulate awareness of and demonstrate personal characteristics and critical thinking that positively impact the learning process.	V2		
3.3	Take full responsibility for initiating, identifying, amending, and achieving aims.	V3		

C. Course Content

No	List of Topics	Contact Hours
3.	***A general review of knowledge learned in MATH 1511*** • ***Differentiation rules*** • ***Studying and drawing functions using first and second derivative***	**10**
4.	***Anti-derivatives and integrals:*** • ***Integration and differential equations*** • ***Definite and indefinite integration, Riemann sums and integral*** • ***Relation between area and integration*** • ***Mean value theorem and the fundamental theorem of calculus.*** • ***Integration by basic substitution (change of variables).***	**10**
3	***Applications of integration:*** • ***Area bounded by a set of curves.*** • ***Types of areas: Rx and Ry*** • ***Rotational volumes***	**5**
4	***Inverse functions and some elementary functions*** ***a. Injective, surjective, and bijective functions*** ***b. Inverse function*** ***c. Logarithmic function*** ***d. Exponential function*** ***e. Inverse trigonometric functions*** ***f. Hyperbolic functions, inverse hyperbolic functions***	**10**
5	***Integration methods:*** • ***Integration by parts***	**5**

	• ***Integration using trigonometric substitution and completing the square.***	
6	***Integration of rational functions.***	**10**
7	***Applications of integration***	**5**
8	***General review***	**5**
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	Practical applications (solutions exercises), quizzes, and homework	Weekly	35
5.	Partial exam (Mid Term Exam)	7	25
6.	Final exam	13	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	**E. W. Swokowski, M. Olinick, D. Pence & J. A. Cole, *Calculus*, 6thEdition, PWS Publishing Company, Boston. 1994.**
Supportive References	
Electronic Materials	• Websites on the internet that are relevant to the topics of the course. • E-learning lms.kku.edu.sa
Other Learning Materials	NA.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for 50 students
Technology equipment (Projector, smart board, software)	• Data show device, Video Conference system and Smart boards • Computers loaded with modern software and connected to Internet service
Other equipment (Depending on the nature of the specialty)	Not Applicable

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer Reviewer + Students	Direct
Effectiveness of students' assessment	Peer Reviewer + Q&D Committee	Direct
Quality of learning resources	Programs & Curricula Committee + Q&D Committee	Direct
The extent to which CLOs have been achieved	Quality and Development Committee	Indirect
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	