Course Specifications

Course Title:	**Calculus (2)**
Course Code:	**30112501-4**
Program:	**B. Sc. Mathematics**
Department:	Mathematical Science
College:	Applied Sciences
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours:	4 hours
2. Course type	
a.	University ☐ College ☐ Department ■ Others ☐
b.	Required ■ Elective ☐
3. Level/year at which this course is offered:	3rd Level / Second Year
4. Pre-requisites for this course (if any)**:**	Calculus (30111101-4)
5. Co-requisites for this course (if any)**:**	None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	4 hours per week	100%
2	**Blended**		0%
3	**E-learning**		0%
4	**Correspondence**		0%
5	**Other**		0%

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	**Lecture**	(4 hours) x (15 weeks)
2	**Laboratory/Studio**	0
3	**Tutorial**	0
4	**Others** (specify)	0
	Total	60 hours
Other Learning Hours*		
1	**Study**	(1 hour) x (15 weeks)
2	**Assignments**	(1 hour) x (15 weeks)
3	**Library**	(1 hour) x (15 weeks)
4	**Projects/Research Essays/Theses**	0
5	**Others** (specify)	0
	Total	45 hours

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

Calculus is the first of the required courses in the mathematics program. This course provides a unique introduction to a course in single-variable calculus. Key topics of the course include exponential, logarithmic, inverse trigonometric functions, integral evaluation, improper integrals, area of the plane region, area between two curves, volumes by slicing, disk and washers, volumes by cylindrical shells.

2. Course Main Objective

The primary objective of the course is to introduce students to the concepts of calculus and to develop the student's confidence and skill in dealing with mathematical expressions. Students will see that there is an important connection between the derivative of a function and the derivative of its inverse. In addition students will recognize systematic procedure from attacking unfamiliar integrals. Among the objectives we can cite the understanding of the role of definite integrals in the calculation of volumes and surfaces of solids.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
1.1	Recall the relation between the derivative of a function and the derivative of its inverse	
1.2	State basic properties of exponential and logarithmic functions	
1.3	Recognize principles of integral evaluation	
1.4	Present definite integral as the limit of Riemann sums	
2	**Skills :**	
2.1	Express logarithmic forms of inverse hyperbolic functions	
2.2	Distinguish methods for approaching integration problems	
2.3	Calculate integrals over infinite intervals	
2.4	Apply the definite integral in geometry and engineering	
3	**Competence:**	
3.1	Develop connections of calculus with other disciplines.	
3.2	Solve problems using a range of formats and approaches in basic science.	
3.3	Show the ability to work independently and within groups.	

C. Course Content

No	List of Topics	Contact Hours
1	**Exponential, Logarithmic and inverse trigonometric functions** • Exponential and Logarithmic functions • Derivatives and Integrals involving Inverse Trigonometric functions • Hyperbolic functions	20
2	**Principal of Integral Evaluation** • An overview of integration methods • Integration by parts • Trigonometric integrals • Trigonometric substitutions • Integrating rational functions by partial fractions	16
3	**Improper integrals**	12
4	**Applications of the definite integral** • Area between two curves • Volumes by Slicing, Disks and Washers • Volumes by Cylindrical Shells • Length of a plane curve • Area of a surface of revolution	12
	Total	60

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge**		
1.1	Recall the relation between the derivative of a function and the derivative of its inverse	Lectures Problem Solving Memorization Lectures, tutorials and internet	Exams Homework assignments Quizzes Periodic exams and final exam
1.2	State basic properties of exponential and logarithmic functions		
1.3	Recognize principles of integral evaluation		
1.4	Present definite integral as the limit of Riemann sums		
2.0	**Skills**		
2.1	Express logarithmic forms of inverse hyperbolic functions	Lectures Solving Problems Small group work Lectures, tutorials and internet	Exams Quizzes Portfolios Periodic exams and final exam
2.2	Distinguish methods for approaching integration problems		
2.3	Calculate integrals over infinite intervals		
2.4	Apply the definite integral in geometry and engineering		
3.0	**Competence**		
3.1	Develop connections of calculus with other disciplines.	Class discussions Small group work Research activities	Reports Quizzes Discussion
3.2	Solve problems using a range of formats and approaches in basic science.		
3.3	Show the ability to work independently and within groups.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm Test (1)	7^{th} week	20%
2	Midterm Test (2)	12^{th} week	20%
3	Homework + Reports +Quizzes	During the semester	10%
4	Final Examination	End of semester	50%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

1- Office hours per week in the lecturer schedule (4 hrs\week).

2- Contact with students by e-mail, and e-learning facilities.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Calculus (Ninth Edition)by Dale Varberg, Edwin Purcell and Steven Rigdon, chapters 4-8
Essential References Materials	Calculus (Ninth Edition)by Dale Varberg, Edwin Purcell and Steven Rigdon
Electronic Materials	http://en.wikipedia.org/wiki/Calculus
Other Learning Materials	Maple

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom with capacity of 25-students. Library
Technology Resources (AV, data show, Smart Board, software, etc.)	Data Show, Smart Board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Direct
Quality of learning resources	Students	Direct
Extent of achievement of course learning outcomes	Faculty Member	Direct

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Council of the Mathematics Department
Reference No.	
Date	