



Course Specifications

Course Title:	Calculus (II)
Course Code:	48021401-4
Program:	➤ The first year common Engineering Track. ➤ Engineering students.
Department:	Natural Sciences Department
College:	Common First Year Deanship
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours:	4.2 credit hours - "2 nd Term (Semester) 3+2= 4.2 cr. hrs."
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	the first year common
4. Pre-requisites for this course (if any):	Calculus (I).
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	3*15=45	80%
2	Blended	2	5%
3	E-learning		
4	Distance learning	2	5%
5	Other	4	10%

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	3*15=45
2	Laboratory/Studio	
3	Tutorial	16
4	Practical	2*15=30
5	Others (specify)	4*15=60
	Total	151

B. Course Objectives and Learning Outcomes

1. Course Description

- Continues updating for content of lectures as a result of recent achievements and researches in the field.
- Encouraging the students to deal with electronic books, as they are using many web based reference material and by providing them with continues update for information.
- Trying to Decrease the direct theoretical teaching load of the course and putting more time for explaining correlations and student-directed learning sessions and seminars.
- Planning for elective self-studies in the course to encourage students to engage in depth study of areas of interest.
- More efforts will be exerted to develop and improve the course to enable the student to clearly understand the Calculus basis.

2. Course Main Objective

- Compute numerically the area under a curve.
- Evaluate definite integrals.
- Evaluate indefinite integrals.
- Solving separable differential equation.
- Evaluate integrals involving trigonometric functions such as $\sin x$, $\cos x$, $\tan x$, $\cot x$, $\operatorname{cosec} x$ and $\operatorname{sec} x$.
- Evaluate integrals involving rational functions.
- Evaluate integrals involving product functions.
- Obtain reduction formula for certain categories of functions.
- Compute area bounded by two intersecting curves.
- Compute the volumes of solid of revolution by different way.
- Find the distance traveled by a moving object with a constant.

Compute the work done by compressing or stretching a spring.

3. Course Learning Outcomes

CLOs		Aligned-PLOs
1	Knowledge and Understanding	
1.1	Develop the skills in the art of integration. This is easily achievable by recalling previous knowledge gained from Calculus (I). Thus in this course.	Solve some example during the lecture.
1.2	Special techniques are introduced that will make integration more of a routine than a guess work.	Ask the student to clear the misunderstanding of some Math principles.
1.3	Subject taught using the TEAL (Technology Enabled Active Learning) studio format which utilizes small group interaction and current technology to help students develop intuition about, models of problems.	Discussions with the students, and ask quality question.
1.4	The knowledge is given in form of lectures. Each lecture is accompanied by an assigned reading which is important for mastering the learning objectives	Quizzes, Mid Term Exam, Final Exam
2	Skills :	
2.1	The ability to understand integration and identify the most appropriate way to find and understand its applications.	Improvement in the overall performance of the student in consequent examinations during the course.
2.2	How to use laws and principles of Math to understand the subject.	Interaction of the course and its effect on other courses offered for the students, which can be measured by their feedback.
2.3	Ability to explain the idea with the student own words.	Midterm Exam, Exams.
2.4	How to simplify problems, analyze and integrate it.	Continuous assessment (short quizzes).
2.5	Use simple mathematical methods to integrate.	Homework.

CLOs		Aligned-PLOs
2.6	Solve some problems using multiple mathematical rules.	
2.7	Develop Problem solving skills.	
2.8	Develop Self-assessment and development.	
2.9	Develop Reading and searching.	
2.10	Develop Effective Learning skills.	
2.11	Represent the problems mathematically.	
3	Values:	
3.1	Work independently.	Those skills are reflected on the student behaviour inside and outside the class. It can be assessed by the feedback from the lecturer regard the student's interaction and behaviour.
3.2	The students learn independently and take up responsibility.	Quizzes.
3.3	Following the learner manners and ethics including; commitment, respect and communication with confidence.	Discussion and brainstorming
3.4	Self-reliance in homework and self-study.	Homework.
3.5	Follow the students through their interaction with some.	Presenting the required research on time and the degree of the quality will show the sense of responsibility.

C. Course Content

No	List of Topics	Contact Hours
1	Lesson 1: Review of Calculus (I).	3+2= 4.2
2	Lesson 2: Antiderivatives.	
3	REVIEW & SUMMARY & PROBLEMS.	
4	Lesson 3: introduction of differential equation.	3+2= 4.2
5	Lesson 4: Introduction to area.	
6	REVIEW & SUMMARY & PROBLEMS.	
7	Lesson 5: The first fundamental theorem of calculus.	3+2= 4.2
8	Lesson 6: The second fundamental theorem of calculus.	
9	REVIEW & SUMMARY & PROBLEMS.	
10	Lesson 7: Method of substitution.	
11	Lesson 8: Inverse functions and their derivatives.	3+2= 4.2
12	REVIEW & SUMMARY & PROBLEMS.	
13	Lesson 9: The natural logarithm function.	
14	Lesson 10: The natural exponential function.	3+2= 4.2
15	REVIEW & SUMMARY & PROBLEMS.	
16	Lesson 11: The general exponential and logarithmic functions.	
17	Lesson 12: The inverse trigonometric functions and their derivatives.	3+2= 4.2
18	REVIEW & SUMMARY & PROBLEMS.	
19	Lesson 13: The hyperbolic functions and their derivatives.	
20	Lesson 14: Integration by parts	3+2= 4.2
21	REVIEW & SUMMARY & PROBLEMS.	

22	Lesson 15: Rationalizing substitutions.	
23	Lesson 16: Review1.	3+2= 4.2
24	REVIEW & SUMMARY & PROBLEMS.	
25	Midterm Exam.	3+2= 4.2
26	Lesson 17: Integration of rational functions.	
27	Lesson 18: Indeterminate forms of type $\frac{0}{0}$.	
28	REVIEW & SUMMARY & PROBLEMS.	3+2= 4.2
29	Lesson 19: Other indeterminate forms.	
30	Lesson 20: Improper integrals: Infinite limits of integration.	
31	REVIEW & SUMMARY & PROBLEMS.	3+2= 4.2
32	Lesson 21: Improper integrals, infinite integrands.	
33	Lesson 22: The area of a plan region	
34	REVIEW & SUMMARY & PROBLEMS.	3+2= 4.2
35	Lesson 23: Volume of solids: Slabs, disks.	
36	Lesson 24: Volume of solids: washers	
37	REVIEW & SUMMARY & PROBLEMS.	3+2= 4.2
38	Lesson 25: Volume of solids of revolution: Shells.	
39	Lesson 26: Length of a plan curve.	
40	REVIEW & SUMMARY & PROBLEMS.	3+2= 4.2
41	Lesson 27: Review2.	
42	REVIEW & SUMMARY & PROBLEMS.	
43	Lesson 28: Review2.	3+2= 4.2
Final exam		

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 and Understanding		
1.1	Develop the skills in the art of integration. This is easily achievable by recalling previous knowledge gained from Calculus (I). Thus in this course.	Provide clear and informative lecture notes with learning objectives that focus on important points.	
1.2	Special techniques are introduced that will make integration more of a routine than a guess work.	Give clear, informative, and stimulating 50-minute lectures with PowerPoint or other visual electronic aids to enhance the learning experience for students.	
1.3	Subject taught using the TEAL (Technology Enabled Active Learning) studio format which utilizes small group interaction and current technology to help students develop intuition about, models of problems.	Answer questions either in or outside class or via e-mail or telephone	
1.4	The knowledge is given in form of lectures. Each lecture is accompanied	Compose thoughtful and fair exam questions that assess student learning and application of the	

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	by an assigned reading which is important for mastering the learning objectives	course content.	
1.5		Directing the case sessions and facilitators to provide an effective learning experience in small group, team-oriented sessions.	
1.6		Providing answers and explanations to student inquiries regarding any aspect of the course.	
1.7		Providing advice and assistance to students for improving their learning strategies and performance in the course.	
1.8		Reviewing and implementing appropriate changes in the course based on student feedback and evaluations.	
1.9		<p>Also;</p> <p>Written Homework</p> <p>There will be one homework handed in on paper each week. To receive full credit for your hardcopy homework handed in, you must prepare and submit lucid and clearly reasoned written solutions. These problems will be graded and returned.</p> <p>In-class Group and Personal Assignments</p> <p>In almost all classes, individuals and groups will submit answers to questions done in class, material covered in the lecture in that class, and so on. You must be present in class to receive credit for assignments submitted either by you or by your group.</p> <p>Group Work</p> <p>You will be assigned to a group of three for collaborative work. Your group assignment will be announced near the beginning of the term. If you are not satisfied with the way your group is working, first try to discuss it with your group members. If you cannot arrive at a satisfactory solution, then discuss the</p>	

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		problems with your instructor. Tests There is tests will be given. There will be Midterm and Final exams in the course. The final will be a comprehensive exam and will cover all of the subject material, also Quizzes and Problem sets.	
2.0	Skills		
2.1	The ability to understand integration and identify the most appropriate way to find and understand its applications.	Preparing main outlines for teaching.	Improvement in the overall performance of the student in consequent examinations during the course.
2.2	How to use laws and principles of Math to understand the subject.	Homework assignments	Interaction of the course and its effect on other courses offered for the students, which can be measured by their feedback.
2.3	Ability to explain the idea with the student own words.	Ask the student to do small research.	Midterm Exam, Exams.
2.4	How to simplify problems, analyze and integrate it.	Encourage the student to look for the information in different references.	Continuous assessment (short quizzes).
2.5	Use simple mathematical methods to integrate.	Reading the problems carefully.	Homework.
2.6	Solve some problems using multiple mathematical rules.	Use available tools (different references and calculators) to develop skills.	
2.7	Develop Problem solving skills.		
2.8	Develop Self-assessment and development.		
2.9	Develop Reading and searching.		
2.10	Develop Effective Learning skills.		
2.11	Represent the problems mathematically.		
3.0	Values		
3.1	Work independently.	Learn how to search on the internet and use the library.	Those skills are reflected on the student behaviour inside and outside the class. It can be assessed by the feedback from the lecturer regard the student's interaction and behaviour.
3.2	The students learn independently and take up responsibility.	Learn how to cover missed lectures	Quizzes.
3.3	Following the learner manners and ethics including; commitment,	Learn how to collect materials of the course.	Discussion and brainstorming

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	respect and communication with confidence.		
3.4	Self-reliance in homework and self-study.	Learn how to solve difficulties in learning: solving problems – enhance educational skills.	Homework.
3.5	Follow the students through their interaction with some.	Develop the interest in Math.	Presenting the required research on time and the degree of the quality will show the sense of responsibility.
3.6		Encourage the student to attend lectures regularly by: <ul style="list-style-type: none"> ➤ Giving bonus marks for attendance ➤ Assigning marks for attendance. ➤ Rewarding students financially and morally ➤ Give students tasks of duties. 	
3.7		Learn how to summarize lectures or to collect materials of the course.	

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Problem sets (Quizzes +Homework).	Around the semester.	10%
2	Midterm Exam	8	30%
3	Test the work of the year	13	15%
4	Final Exam	16	45%

*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 :



The student has the right to contact the lecturer or coordinators by their e-mails or during their office hours for academic advices or consultations.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Dale Varberg, Edwin Purcell and Steven Rigdon (2007) .Calculus, (Ninth Edition).oxford. British
Essential References Materials	Dummit, Evan (2012). Introduction to Integration.
Electronic Materials	<ul style="list-style-type: none"> ➤ http://www2.rps205.com/Parents/Academics/Learning/Science/Pages/Physics-First.aspx ➤ http://www-math.mit.edu/~djk/calculus_beginners/

	<ul style="list-style-type: none"> ➤ http://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx ➤ http://faculty.ncu.edu/jm/hforbes/MATHMETHODS.pdf
Other Learning Materials	<ul style="list-style-type: none"> ➤ http://en.wikipedia.org/wiki/calculus

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Audio-visual equipment for teaching (projector, microphones, speakers, board).
Technology Resources (AV, data show, Smart Board, software, etc.)	MathXpert program
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
Evaluation questionnaires of the staff at the end of the semester.	Students	Discussion.
Competition, homework, and self-learning	Faculty	Brainstorming.
Regular meeting with the staff to review the course effectiveness.	Members of staff.	Oriented Discovery.
Reviewing and implementing appropriate changes in the course based on the student feedback and evaluations.		Evaluation by the coordinator

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	Vice Dean of Common First Year for Academic Affairs, Dr Ahmad Fawzi Arbaeen
Reference No.	-
Date	27/3/2022

