



12 Course Specification of Mathematics 2

I. Course Identification and General Information:						
1	Course Title:	<i>Mathematics 2</i>				
2	Course Code & Number:	FR002				
3	Credit hours:	C.H				Credit Hours
		Th.	Tu.	Pr.	Tr.	
		2	2			3
4	Study level/ semester at which this course is offered:	1 st level / 2 st semester.				
5	Pre –requisite (if any):	Mathematics 1				
6	Co –requisite (if any):	Nil.				
8	Program (s) in which the course is offered:	Civil Engineering				
9	Language of teaching the course:	English and Arabic.				
10	Location of teaching the course:	Faculty of Engineering, Sana'a University.				
11	Prepared By:	Dr. Adel Mohammed Al-Odhari				
12	Date of Approval	November 2019				

II. Course Description:
<p>This course is designed to support students of engineering in second semester of the first Year. This course is a prerequisite for Civil Engineering Department. Students are learning processes and techniques to develop mathematical models for engineering problems by applying the mathematical concepts like definite integrals and its applications. Students during learning, will do summing series, ant-derivatives, computing indefinite integrals of various functions. In additions, they will solve problems containing area of solids of revolution, volumes by using disk method and cylindrical shells, arc length, surfaces of revolution, Moments and center of mass of a lamina. Also, they will learn how to find the integrations of functions by using techniques of integrations. Moreover, they will learn how to evaluate integration to Rectilinear Motion, Work and Fluid Pressure and Force.</p>

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III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a.1	Demonstrate knowledge of Average value of nonnegative functions and Finite sums, definite and indefinite integrals, area, volume, mass, center of mass, Integration to Rectilinear Motion, Work and Fluid Pressure and Force.	A1
a.2	Define appropriate techniques to computing integrals, area, volume, mass, center of mass, Integration to Rectilinear Motion, Work and Fluid Pressure and Force.	A1, A3
b.1	Recognize of integration, the regions and equations of area, volume, arc of length, mass, center of mass, Rectilinear Motion, Work and Fluid Pressure and Force.	B1, B2
c.2	Compute of integrals, the regions and equations of Area, volume, arc of length, mass, center of mass, Rectilinear Motion, Work and Fluid Pressure and Force	C3
c.1	Use some software programing and calculators to compute the integrals and sketching regions of Area, volume, arc of length, mass, center of mass.	C3
d.1	Work as groups in assignments, discussion to another groups to checking the correct solution	D1, D3

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1- Demonstrate knowledge of Average value of nonnegative functions and Finite sums, definite and indefinite integrals, area, volume, mass, center of mass, Integration to Rectilinear Motion, Work and Fluid Pressure and Force.	Lectures and Tutorials.	coursework assignments, final exam.
a2- Define appropriate techniques to computing integrals, area, volume, mass, center		

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of mass, Integration to Rectilinear Motion, Work and Fluid Pressure and Force.		
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(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Recognize of integration, the regions and equations of area, volume, arc of length, mass, center of mass, Rectilinear Motion, Work and Fluid Pressure and Force.	Lectures and Tutorials	Examinations, tests, coursework assignments final exam

(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
C1- Use some software programing and calculators to compute the integrals and sketching regions of Area, volume, arc of length, mass, center of mass.	Lectures and Tutorials	Examinations, tests, coursework assignments final exam
c2- Compute of integrals, the regions and equations of Area, volume, arc of length, mass, center of mass, Rectilinear Motion, Work and Fluid Pressure and Force		

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Work as groups in assignments, discussion to another groups to checking the correct solution	Small group	report

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IV. Course Content:					
A – Theoretical Aspect:					
Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	Unit-1: Calculus of one variable: Integrations	a₁ , b₁ and c₂	Ant derivatives, the indefinite integral and Integration by substitution. Sigma Notation, the definite integral and the first Fundamental Theorem of integral calculus	2	4
2	Unit-2: Calculus of one variable: Techniques of Integration	a₁ ,a.2, b₁ and c₂	Fundamental Integration Formulas and integration by parts and tabular method. Integration by Trigonometric substitutions and identities. Integration by Rational functions (division Long and Partial fractions). Integration by Reeduction formulae. Improper integrals.	5	10
3	Unit-3: Calculus of one variable: Application of Definite Integral	a₁ ,a.2, b₁ ,c₁ , c₂	Area and solids of revolution. Volumes by Slicing using Disks and Washer. Arc length and surfaces of revolution. Moments and Center of Mass of a Lamina	4	8
4	Unit-4: Calculus of one variable: Further Application of Integration:	a₁ ,a.2, b₁ ,c₁ , c₂,d₁	Application of Integration to Rectilinear Motion. Work and Fluid Pressure and Force.	3	6
Number of Weeks /and Units Per Semester				14	28

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B - Tutorial Aspect:				
Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Unit-1: Solving problems about ant derivative, the integrals by substitutions, Finite sums and Fundamental Theorem of integral calculus.	2	4	a ₁ , b ₁ and c ₂
2	Unit-2: Evaluate integrals by standard formulas, integrals by parts and tabular method, integrals by Trigonometric substitutions, identities, integrals by division Long, partial fractions, integrals by reeducation formulae and improper integrals.	5	10	a ₁ ,a.2, b ₁ and c ₂
3	Unit-3: Solving problems about area and solid revolution. Evaluate volumes by using cylindrical shells and slicing. Compute Arc length and surfaces of revolution. Find Moments and Center of Mass of a Lamina	4	8	a ₁ , a.2, b ₁ ,c ₁ , c ₂
4	Unit-4: Solving problems about Integration to Rectilinear Motion. Solving problems about Work Force. Solving problems about Fluid Pressure.	3	6	a ₁ , a.2, b ₁ ,c ₁ , c ₂ ,d ₁
Number of Weeks /and Units Per Semester			14	28

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V. Teaching strategies of the course:	
Lectures ,Tutorials small group	

VI. Assignments:				
No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Assignment-unit-1	a ₁ , b ₁ and c ₂	2	3
2	Assignment-unit-2	a ₁ ,a.2, b ₁ and c ₂	5	7
3	Assignment-unit-3	a ₁ ,a.2, b ₁ ,c1, c ₂	4	3
4	Assignment-unit-4	a ₁ ,a.2, b ₁ ,c1, c ₂ ,d1	3	2

VII. Schedule of Assessment Tasks for Students During the Semester:					
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Exercises & Homework	3, 5,8,10,12	15	10%	a ₁ ,a.2, b ₁ ,c1, c ₂ ,d1
2	Mid-Term-Exam	7	30	20%	a ₁ ,a.2, b ₁ ,c1, c ₂
3	Final Exam	End of semester	105	70 %	a ₁ ,a.2, b ₁ ,c1, c ₂
Total			150	100 %	

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VIII. Learning Resources:	
<ul style="list-style-type: none"> Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher). 	
1- Required Textbook(s) (maximum two).	
	1- <u>Tomas calculus 12edition, Addison-Wesley pearson.2010.</u> 2- <u>John Bird, Engineering Mathematics. Published by Elsevier Ltd. Fifth edition 2007.</u>
2- Essential References.	
	1- <u>Mathematics for Engineers and Technologists, Elsevier (2002), 0750655445.</u> 2- <u>Calculus, Howard Anton, Fifth Edition, John Wiley & Sons, Inc. New York Chi Chester Brisbane Toronto Singapore.1995.</u>
3- Electronic Materials and Web Sites etc.	
	1- https://www.khanacademy.org/ 2- www.math.com/ 3- https://ocw.mit.edu/courses/mathematics/ 4- https://uwaterloo.ca/mathematics-online-learning/

IX. Course Policies:	
<p>All students enrolled at Sana'a University at the various levels of study are subject to disciplinary rules and regulations outlined in the common system for Yemeni Students Affairs in Universities (governmental) for the year 2007). The normal course administration policies and rules of the Faculty of Engineering apply. For the policy, see: Resolution No.284 for the year 2008 about Unified Regulation for the Students Affairs in Governmental Universities, The University Regulations on academic misconduct will be strictly enforced. Please refer to above Resolution No.284</p>	
	<p>Class Attendance:</p> <p>1 The students should have more than 75 % of attendance according to rules and regulations of the faculty.</p>
	<p>Tardy:</p> <p>2 The students should respect the timing of attending the lectures. They should attend within 10 minutes from starting of the lecture.</p>
	<p>Exam Attendance/Punctuality:</p> <p>3 The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for midterm exam and final exam.</p>

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4	<p>Assignments & Projects:</p> <p>The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.</p>
5	<p>Cheating:</p> <p>If any cheating occurred during the examination, the student is not allowed to continue and he has to face the examination committee for enquiries.</p>
6	<p>Plagiarism:</p> <p>The student will be terminated from the Faculty, if one student attends the exam on another behalf according to the policy, rules and regulations of the university.</p>
7	<p>Other policies:</p> <ul style="list-style-type: none"> - All the teaching materials should be kept out the examination hall. - The mobile phone is not allowed. - There should be a respect between the student and his teacher.

Reviewed By	<p><u>Vice Dean for Academic Affairs and Post Graduate Studies</u> <u>Dr. Tarek A. Barakat</u> <u>Dr. Mohammad Algorafi</u></p>
	<p><u>Deputy Rector for Academic Affairs Dr. Ibrahim AlMutaa</u> <u>Dr. Ahmed mujahed</u> <u>Dr. Munaser Alsubri</u></p>

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Template for Course Plan (Syllabus) of Mathematics 2

I. Information about Faculty Member Responsible for the Course:							
Name of Faculty Member	Dr. Adel Mohammed Al-Odhari	Office Hours					
Location & Telephone No.		SAT	SUN	MON	TUE	WED	THU
E-mail		8-10			8-10		

II. Course Identification and General Information:						
1-	Course Title:	<i>Mathematics 2</i>				
2-	Course Number & Code:	FR002				
3-	Credit hours:	C.H				Credit Hours
		Th.	Tu.	Pr.	Tr.	
		2	2			3
4-	Study level/year at which this course is offered:	1 st Level / 2 nd Semester.				
5-	Pre –requisite (if any):	Mathematics 1				
6-	Co –requisite (if any):	Nil.				
7-	Program (s) in which the course is offered	Civil Engineering				
8-	Language of teaching the course:	English and Arabic.				
9-	System of Study:	Regular				
10-	Mode of delivery:	Lecture				
11-	Location of teaching the course:	Lecture hall				

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III. Course Description:

This course is designed to support students of engineering in second semester of the first Year. This course is a prerequisite for Civil Engineering Department. Students are learning processes and techniques to develop mathematical models for engineering problems by applying the mathematical concepts like definite integrals and its applications. Students during learning, will understand summing series, ant-derivatives, computing indefinite integrals of various functions. In additions, they will solve problems containing area of solids of revolution, volumes by using disk method and cylindrical shells, arc length, surfaces of revolution, Moments and center of mass of a lamina. Also, they will learn how to find the integrations of functions by using techniques of integrations. Moreover, they will learn how to evaluate integration to Rectilinear Motion, Work and Fluid Pressure and Force.

IV. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop:

- a.1** Demonstrate knowledge of Average value of nonnegative functions and Finite sums, definite and indefinite integrals, area, volume, mass, center of mass, Integration to Rectilinear Motion, Work and Fluid Pressure and Force. A1
- a.2** Define appropriate techniques to computing integrals, area, volume, mass, center of mass, Integration to Rectilinear Motion, Work and Fluid Pressure and Force. A1, A3
- b.1** Recognize of integration, the regions and equations of area, volume, arc of length, mass, center of mass, Rectilinear Motion, Work and Fluid Pressure and Force. B1, B2
- c.2** Compute of integrals, the regions and equations of Area, volume, arc of length, mass, center of mass, Rectilinear Motion, Work and Fluid Pressure and Force C3
- c.1** Use some software programing and calculators to compute the integrals and sketching regions of Area, volume, arc of length, mass, center of mass. C3
- d.1** Work as groups in assignments, discussion to another groups to checking the correct solution
D1, D3

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V. Course Content:				
<ul style="list-style-type: none"> Distribution of Semester Weekly Plan of Course Topics/Items and Activities. 				
A – Theoretical Aspect:				
Order	Topics List	Sub Topics List	Week Due	Contact Hours
1	Unit-1: Calculus of one variable: Integrations	Ant derivatives, the indefinite integral and Integration by substitution. Sigma Notation, the definite integral and the first Fundamental Theorem of integral calculus	1,2	4
2	Unit-2: Calculus of one variable: Techniques of Integration	Fundamental Integration Formulas and integration by parts and tabular method. Integration by Trigonometric substitutions and identities. Integration by Rational functions (division Long and Partial fractions). Integration by Reeducation formulae. Improper integrals.	3,4,5,6,7	10
3	Midterm Exam		8	2
4	Unit-3: Calculus of one variable: Application of Definite Integral	Area and solids of revolution. Volumes by Slicing using Disks and Washer. Arc length and surfaces of revolution. Moments and Center of Mass of a Lamina	9,10,11,12	8
5	Unit-4: Calculus of one variable: Further Application of Integration:	Application of Integration to Rectilinear Motion. Work and Fluid Pressure and Force.	13,14,15	6
6	Final Exam		16	2
Number of Weeks /and Units Per Semester			16	32

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B - Tutorial Aspect:			
Order	Topics List	Week Due	Contact Hours
1	Unit-1: Solving problems about ant derivative, the integrals by substitutions, Finite sums and Fundamental Theorem of integral calculus.	2	4
2	Unit-2: Evaluate integrals by standard formulas, integrals by parts and tabular method, integrals by Trigonometric substitutions, identities, integrals by division Long, partial fractions, integrals by reeducation formulae and improper integrals.	5	10
3	Unit-3: Solving problems about area and solid revolution. Evaluate volumes by using cylindrical shells and slicing. Compute Arc length and surfaces of revolution. Find Moments and Center of Mass of a Lamina	4	8
4	Unit-4: Solving problems about Integration to Rectilinear Motion. Solving problems about Work Force. Solving problems about Fluid Pressure.	3	6
Number of Weeks /and Units Per Semester		14	28

VI. Teaching strategies of the course:
Lectures ,Tutorials small group

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VII. Assignments:				
No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Assignment-unit-1	a ₁ , b ₁ and c ₂	2	3
2	Assignment-unit-2	a ₁ ,a.2, b ₁ and c ₂	5	7
3	Assignment-unit-3	a ₁ ,a.2, b ₁ ,c1, c ₂	4	3
4	Assignment-unit-4	a ₁ ,a.2, b ₁ ,c1, c ₂ ,d1	3	2

VIII. Schedule of Assessment Tasks for Students During the Semester:				
Assessm ent	Type of Assessment Tasks	Week Due	Mark	Proportion of Final Assessment
1	Exercises & Homework	3, 5,8,10,12	15	10%
2	Mid-Term-Exam	7	30	20%
3	Final Exam	End of semester	105	70 %
Total			150	100 %

IX. Learning Resources:
• Written in the following order: (Author – Year of publication – Title – Edition – Place of publication – Publisher).
1- Required Textbook(s) (maximum two).
1-- <u>Tomas calculus 12edition, Addison-Wesley pearson.2010.</u>
2- <u>John Bird, Engineering Mathematics.</u> Published by Elsevier Ltd. Fifth edition 2007.
2- Essential References.
1- <u>Mathematics for Engineers and Technologists, Elsevier (2002), 0750655445.</u>
2- <u>Calculus, Howard Anton, Fifth Edition, John Wiley & Sons, Inc. New York Chi Chester Brisbane Toronto Singapore.1995.</u>
3- Electronic Materials and Web Sites etc.
1- <u>1-https://www.khanacademy.org/</u>
2- <u>www.math.com/</u>
3- <u>https://ocw.mit.edu/courses/mathematics/</u>
<u>https://uwaterloo.ca/mathematics-online-learning/</u>

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3	<p>Exam Attendance/Punctuality: The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for midterm exam and final exam.</p>
4	<p>Assignments & Projects: The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.</p>
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