Republic of Yemen

Ministry of Higher Education & Scientific Research

Council of Academic Accreditation & Quality Assurance of Higher Education(CAQA)

21 September University for Medical and Applied Sciences

Faculty of Engineering and Computer

Department of Information Technology

Program of Information Technology

Course Specification of

Mathematics 2

Course Code. (07.02.712)

2024

T4: This Template is Developed and Approved by CAQA-Yemen, 2024

Prepared by:	Reviewed by:	Head of the Department:	Quality Unit:	Dean
Dr. Abdulghani Hamid Muhyi	Dr. Walid Alfaqih			Dr.

I. General Information:

1.	Course Title:	Mathematics 2				
2.	Course Code:	07.02.712				
3.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial/ Seminar	Lab	Training
		3	2	2	--	
4.	Level/ Semester at which this Course is offered:	1st Level / 2nd Semester				
5.	Pre –Requisite (if any):	Mathematics 1				
6.	Co –Requisite (if any):	------				
7.	Program (s) in which the Course is Offered:	Bachelor of …….				
8.	Language of Teaching the Course:	English				
9.	Location of Teaching the Course:	Faculty of Medical Technology				
10.	Prepared by:	Dr. Abdulghani Hamid Muhyi				
11	Date and Number of Approval by Council:					

II. Course Description:

This course introduces the advanced concepts of calculus to form the foundation needed to analyze and solve real-world problems. The course aims to study integration methods and techniques for functions of one variable, convergence/divergence of sequences and series and representations of a given function using power series. Topics include different methods of integration, improper integrals, sequences and series including alternating series, power series: Taylor and Maclurine series, differentiation and integration of power series, and applications of the definite integral to area, volume, areas in polar coordinates, arc length and surface of revolution.

III. Course Intended Learning Outcomes (CILOs): Upon successful completion of the course, students will be able to:		Referenced PILOs		
	A. Knowledge and Understanding:	**I, P or M/A**		
a1	Understand the various techniques of integration including the methods of substitution, integration by parts, trigonometric substitution, partial fractions.	I	A1	Demonstrate an understanding of appropriate models, theories, mathematical foundations, and techniques related to Health Information Technology discipline.
a2			A2	
	B. Intellectual Skills:			
b1			B1	
b2			B2	
	C. Professional and Practical Skills:			
c1			C1	
c2	Use integration to find the volume of solids of revolution, the area of surface of revolution, the arc length of graphs of a function, and to solve many problems related to Health Information Technology.	P	C2	Design, implement, and test a computing-based solution to meet a given set of computing requirement in the context of Health Information Technology.

	D. Transferable Skills:			
d1			D1	
d2	Develop his professional skills to deal and cooperate with various IT and healthcare societies.	M	D2	Commit to professional ethics, responsibilities, and norms of professional IT practices.
I= Introduced, P=Practiced or M/A= Mastered/Advanced				

	(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:		
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
a1	Understand the various techniques of integration including the methods of substitution, integration by parts, trigonometric substitution, partial fractions.	▪ Interactive lectures ▪ Tutorials ▪ Seminar ▪ Project ▪ Presentation ▪ Classroom discussions ▪ Exercises and homework	▪ Written tests (mid and final terms and quizzes) ▪ Written assignments ▪ Project Report ▪ Homework and assignments ▪ Case studies
a2		▪	▪
	(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:		
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
b1		▪	▪
b2		▪	▪
	(C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:		
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
c1		▪	▪
c2	Use integration to find the volume of solids of revolution, the area of	▪ Interactive lectures ▪ Tutorials ▪ Seminar	▪ Written tests (mid and final terms and quizzes)

	surface of revolution, the arc length of graphs of a function, and to solve many problems related to Health Information Technology.	▪ Project ▪ Exercises and homework ▪ Team work ▪ Problem solving	▪ Written assignments ▪ Project Report ▪ Homework and assignments ▪ Case studies
	Translate the algorithm of problem solution using of procedural programming languages.		
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
d1		▪	▪
d2	Develop his professional skills to deal and cooperate with various IT and healthcare societies.	▪ Lectures/ Interactive lectures ▪ Discussion ▪ Presentations ▪ Collaborative learning ▪ Problem-solving	▪ Written tests (mid and final terms and quizzes) ▪ Written assignments ▪ Project Report ▪ Homework and assignments ▪ Case studies

IV. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1.	**Definite Integrals**	– The Definition of the Integral – The Anti-derivative – Riemann concept of integration – Definite integral properties	1	2	a1, c2
2.	**Integral Theorems**	– The Mean Value Theorem for Integrals – The Fundamental Theorem of Calculus	1	2	a1, c2
3.	**Integral Formulas**	Basic formulas in functions integral: – Polynomials – Rational – Rooted –	1	2	a1, c2, d2
4.	**Exponential and Logarithmic Integrals**	– Exponential Integrals – Logarithmic Integrals	1	2	a1, c2
5.	**Trigonometric Formulas**	– Trigonometric (trigonometric, – hyperbolic, inverse hyperbolic, …)	1	2	a1, c2
6.	**Techniques of Integration1**	– Integration by substitution – Integration by parts	1	2	a1, c2
7.	**Midterm Exams**	–	1	2	a1, c2, d2
8.	**Techniques of Integration2**	– Integration using partial fraction – Trigonometric Integrals.	1	2	a1, c2
9.	**Techniques of Integration3**	– Trigonometric Substitutions. – Improper Integrals	1	2	a1, c2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
10.	Improper Integrals1	– Improper integral of type I	1	2	a1, c2
11.	Improper Integrals2	– -Improper integral of type II	1	2	a1, c2, d2
12.	Area and Volume	– Areas between two curves. – Volumes	1	2	a1, c2
13.	Areas in Polar Coordinates	– Polar Coordinates – Areas in Polar Coordinates.	1	2	a1, c2
14.	Arc. length	– Arc. Length – Area of a surface of revolution.	1	2	a1, c2, d2
15.	Review	–	1	2	all
16.	Final Theoretical Exam		1	2	all
Number of Weeks /and Units Per Semester			16	32	

B. Tutorial Aspect:

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1.	– Exercises of definite integrals, integral theorems and integral formulas.	3	6	c2, d2
2.	– Exercises of Integral of exponential, logarithmic, and trigonometric functions.	3	6	c2, d2
3.	– Midterm Exam	1	2	a1c2, d2
4.	– Exercises of Integration by substitution and by parts.	3	6	c2, d2
5.	– Exercises of Integration using partial fraction, trigonometric Integrals, trigonometric Substitutions. – Improper integrals – Areas between two curves.	3	6	c2, d2

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
	– Volumes			
6.	– Polar Coordinates – Areas in Polar Coordinates. – Arc. Length. – Area of a surface of revolution.	1	2	c2, d2
7.	- Final Exam	1	2	a1c2, d2
Number of Weeks /and Units Per Semester		15	30	

C. Practical Aspect (Lab/Clinical) (if any):

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1				
2				
Number of Weeks /and Units Per Semester				

VII. Assignments:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	Assignment 1: Several Assignments on all topics learnt in the lectures	1^{st}-15^{th}	10	all
2	Assignment 2:			
3	Assignment 3:			
Total				

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments	1-15	10	10%	a1, a2, b1, b2
2	Quizzes 1 & 2	4, 12	10	10%	a1, a2, b1, b2
3	Mid-Term Theoretical Exam	6/7	20	20%	a1, a2, b1, b2
4	Final Theoretical Exam	16	60	60%	a1, a2, b1, b2
Total			100	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- James Stewart, Daniel K. Clegg, Saleem Watson, Lothar Redlin, 2021, Calculus: Early Transcendentals. 9th edition, USA, Cengage Learning.

2- Haas, J., Heil, C. and Weir, M.D., 2018. Thomas' Calculus, USA, Pearson

2- Essential References:

1- Chris McMullen, 2018, Essential Calculus Skills Practice Workbook with Full Solutions, Zishka Publishing

3- Electronic Materials and Web Sites etc.:

Websites:

1- https://www.sagemath.org/calctut/index.html

2- https://www.geeksforgeeks.org/calculus/

3-

Journals:

4- …….

5- ……..

Other Web Sources:

1……

2……

X. Course Policies: (Based on the Uniform Students' By law (2007)

1	**Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	**Tardiness:** A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	**Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	**Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	**Cheating:** Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	**Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

Republic of Yemen
Ministry of Higher Education & Scientific Research
University: 21 September University for Medical & Applied Sciences

الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة: جامعة 21سبتمبر للعلوم الطبية والتطبيقية

Faculty of Medical Technology

Department of Medical Information Technology

Program of Medical Information Technology

Course Plan (Syllabus) of Mathematics 2

Course Code. 07.02.712

I. Information about Faculty Member Responsible for the Course:								
Name of Faculty Member:	Dr. Abdulghani Hamid Muhyi	Office Hours						
Location& Telephone No.:	—-							
E-mail:	muhyi2007@gmail.com	SAT	SUN	MON	TUE	WED	THU	

2024

II. Course Identification and General Information:

	Course Title:	Mathematics 2				
	Course Code:	07.02.712				
	Credit Hours:	**Credit Hours**	**Theory Contact Hours**		**Practical Contact Hours**	
			Lecture	**Tutorial/Seminar**	**Lab**	**Training**
		3	2	2	--	
	Level/ Semester at which this Course is offered:	1st Level / 2nd Semester				
	Pre –Requisite (if any):	Mathematics 1				
	Co –Requisite (if any):	------				
	Program (s) in which the Course is Offered:	Bachelor of …….				
	Language of Teaching the Course:	English				
	Location of Teaching the Course:	Faculty of Medical Technology				
	Prepared by:	Dr. Abdulghani Hamid Muhyi				
11	**Date and Number of Approval by Council:**					

III. Course Description:

This course introduces the advanced concepts of calculus to form the foundation needed to analyze and solve real-world problems. The course aims to study integration methods and techniques for functions of one variable, convergence/divergence of sequences and series and representations of a given function using power series. Topics include different methods of integration, improper integrals, sequences and series including alternating series, power series: Taylor and Maclurine series, differentiation and integration of power series, and applications of the definite integral to area, volume, areas in polar coordinates, arc length and surface of revolution.

IV. Course Intended Learning Outcomes (CILOs) :

Upon successful completion of the Course, student will be able to:

A. Knowledge and Understanding:	
a1	Understand the various techniques of integration including the methods of substitution, integration by parts, trigonometric substitution, partial fractions.
a2	
B. Intellectual Skills:	
b1	
b2	
	C. Professional and Practical Skills:
c1	
c2	Use integration to find the volume of solids of revolution, the area of surface of revolution, the arc length of graphs of a function, and to solve many problems related to Health Information Technology.
	D. Transferable Skills:
d1	
d2	Develop his professional skills to deal and cooperate with various IT and healthcare societies.
I= Introduced, P=Practiced or M/A= Mastered/Advanced	

V. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1.	**Definite Integrals**	The Definition of the Integral The Anti-derivative Riemann concept of integration – Definite integral properties	1	2
2.	**Integral Theorems**	The Mean Value Theorem for Integrals – The Fundamental Theorem of Calculus	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
3.	Integral Formulas	– Basic formulas in functions integral: – Polynomials – Rational – Rooted –	1	2
4.	Exponential and Logarithmic Integrals	– Exponential Integrals – Logarithmic Integrals	1	2
5.	Trigonometric Formulas	– Trigonometric (trigonometric, – hyperbolic, inverse hyperbolic, …)	1	2
6.	Techniques of Integration1	Integration by substitution Integration by parts	1	2
7.	Midterm Exams	–	1	2
8.	Techniques of Integration2	– Integration using partial fraction – Trigonometric Integrals.	1	2
9.	Techniques of Integration3	– Trigonometric Substitutions. – Improper Integrals	1	2
10.	Improper Integrals1	– Improper integral of type I	1	2
11.	Improper Integrals2	– -Improper integral of type II	1	2
12.	Area and Volume	Areas between two curves. Volumes	1	2
13.	Areas in Polar Coordinates	– Polar Coordinates – Areas in Polar Coordinates.	1	2
14.	Arc. length	– Arc. Length – Area of a surface of revolution.	1	2
15.	Review	–	1	2
16.	Final Theoretical Exam		1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
Number of Weeks /and Units Per Semester			16	32

B. Tutorial Aspect:

No.	Tasks/ Experiments	Number of Weeks	Contact Hours
1.	Exercises of definite **integrals**, integral theorems and integral formulas.	3	6
2.	Exercises of Integral **of** exponential, logarithmic, and trigonometric functions.	3	6
3.	Midterm Exam	1	2
4.	Exercises of Integration **by** substitution and by parts.	3	6
5.	Exercises of Integration **using** partial fraction, trigonometric Integrals, trigonometric Substitutions. – Improper integrals – Areas between two curves. – Volumes	3	6
6.	Polar Coordinates Areas in Polar Coordinates. – Arc. Length. – Area of a surface of revolution.	1	2
7.	Final Exam	1	2
Number of Weeks /and Units Per Semester		15	30

No.	Tasks/ Experiments	Week Due	Contact Hours
1			
Number of Weeks /and Units Per Semester			

C. Case Studies and Practical Aspect:

No.	Tutorial	Number of Weeks	Contact Hours
1			
Number of Weeks /and Units Per Semester			

VI. Teaching Strategies of the Course:

- Interactive lectures
- Tutorials
- Laboratory based session
- Seminar
- Project
- Presentation
- Classroom discussions
- Exercises and homework
- Problem solving
- Team work

VII. Assessment Methods of the Course:

- Written tests (mid and final terms and quizzes)
- Written assignments
- Project Report
- Homework and assignments
- Case studies

VIII. Assignments:

No.	Assignments	Week Due	Mark
1	Assignment 1: Several Assignments on all topics learnt in the lectures	1st-15th	10
2	Assignment 2:		
3	Assignment 3:		

No.	Assignments	Week Due	Mark
Total			

IX. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments	1-15	10	10%
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Total			100	100%

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1- Required Textbook(s) (maximum two):

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2- Essential References:

1- Chris McMullen, 2018, Essential Calculus Skills Practice Workbook with Full Solutions, Zishka Publishing

3- Electronic Materials and Web Sites etc.:

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Journals:

8- ……..

9- ……..

10-Other Web Sources:

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