

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 3
Course Code. (07.02.713)

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 3				
2.	Course Code:	07.02.713				
3.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial/ Seminar	Lab	Trainin g
		3	2	2	--	
4.	Level/ Semester at which this Course is offered:	2 nd Level / 1 st Semester				
5.	Pre –Requisite (if any):	Mathematics 1, Mathematics 2				
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 differential equations to form the foundation needed to analyze and solve real-world problems. The course aims to study differential equations and their classifications, and various methods and techniques for solving several types of differential equations. Topics include first order differential equations: Separable equations, exact equations, substitution and transformation, linear equations, Bernoulli equations, higher order linear differential equations, Laplace transform, Inverse Laplace transform of various functions, its applications, Fourier series, its complex form and enhance the problem solving.

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 solving differential equations, and Laplace and Fourier transforms together with their applications..	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 different methods of solving several types of differential equations, and Fourier and Laplace transforms to solve 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 solving differential equations, and Laplace and Fourier transforms together with their applications..	<ul style="list-style-type: none"> ▪ Interactive lectures ▪ Tutorials ▪ Seminar ▪ Project ▪ Presentation ▪ Classroom discussions ▪ Exercises and homework 	<ul style="list-style-type: none"> ▪ 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 deferent methods of solving several types of differential equations, and	<ul style="list-style-type: none"> ▪ Interactive lectures ▪ Tutorials ▪ Seminar 	<ul style="list-style-type: none"> ▪ Written tests (mid and final terms and quizzes)



	Fourier and Laplace transforms to solve problems related to Health Information Technology.	<ul style="list-style-type: none"> ▪ Project ▪ Exercises and homework ▪ Team work ▪ Problem solving 	<ul style="list-style-type: none"> ▪ 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		<ul style="list-style-type: none"> ▪ 	<ul style="list-style-type: none"> ▪
d2	Develop his professional skills to deal and cooperate with various IT and healthcare societies.	<ul style="list-style-type: none"> ▪ Lectures/ Interactive lectures ▪ Discussion ▪ Presentations ▪ Collaborative learning ▪ Problem-solving 	<ul style="list-style-type: none"> ▪ 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.	Introduction	<ul style="list-style-type: none"> – Introduction – Classification of differential equations and their origin. 	1	2	a1, c2
2.	First order differential equations part1:	<ul style="list-style-type: none"> – Separable equations – Exact equations 	1	2	a1, c2
3.	First order differential equations part2:	<ul style="list-style-type: none"> – Special integrating factors – Substitution and transformation – Linear differential equations with constants coefficients 	1	2	a1, c2, d2
4.	First order differential equations part3:	<ul style="list-style-type: none"> – Bernoulli equations, method of reduction of order. – Applications 	1	2	a1, c2
5.	Higher order differential Equation part1:	<ul style="list-style-type: none"> – Homogeneous equations. – Nonhomogeneous equations. 	1	2	a1, c2
6.	Higher order differential Equation part2:	<ul style="list-style-type: none"> – Method of variation of parameters – Undetermined coefficient method – Applications 	1	2	a1, c2
7.	Midterm Exams	–	1	2	a1, c2, d2
8.	Laplace transformations I:	<ul style="list-style-type: none"> – Definitions and properties – Inverse Laplace transformation 	1	2	a1, c2
9.	Laplace transformations II:	<ul style="list-style-type: none"> – Applications of Laplace transforms to differential equations 	1	2	a1, c2
10.	Power Series	<ul style="list-style-type: none"> – Using power series to solve 	1	2	a1, c2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		differential equation			
11.	System Of Linear Differential Equations	– Solving system of linear differential equations by elimination, matrix methods.	1	2	a1, c2, d2
12.	Fourier Transform I	– Definition of Fourier series. – Linear systems and Fourier series of periodic functions – Properties of Fourier series	1	2	a1, c2
13.	Fourier Transform II	– Aperiodic functions, Fourier integral, and Fourier Transform – Properties of the Fourier transform	1	2	a1, c2
14.	Discrete Fourier Transform	– Shannon sampling theorem – Basics of discrete Fourier transform – Applications	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 classification of D.E. – Exercises of solving first order D. E.	3	6	c2, d2
2.	– Exercises of solving higher order D. E. – Applications	3	6	c2, d2

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
3.	– Midterm Exam	1	2	a1c2, d2
4.	– Exercises of Laplace transforms.	3	6	c2, d2
5.	– Exercises of using power series to solve differential equation	1	2	c2, d2
6.	– Exercises of Fourier transform	3	6	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- Dennis G. Zill, 2009, A First Course in Differential Equations with Modeling Applications, 9th Edition, Brooks/Cole, USA.
- 2- Grewal B.S., 2014, Higher Engineering Mathematics, 43rd Edition, New Delhi, Khanna Publishers.

2- Essential References:

- 1- Bali N., Goyal M. and Watkins C., 2009, "Advanced Engineering Mathematics", 7th Edition, New Delhi, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.).
- 2- William E. Boyce and Richard C. DiPrima, 2012, "Elementary Differential Equations and Boundary Value Problems", 10th Edition, Wiley, USA.
- 3- Wylie, R.C. and Barrett, L.C., 2012, "Advanced Engineering Mathematics", 6th Edition, New Delhi, Tata McGraw Hill Education Pvt. Ltd.

3- Electronic Materials and Web Sites etc.:

Websites:

1-

Journals:

2-

3-

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.



Faculty of Medical Technology
Department of Medical Information Technology

Program of Medical Information Technology

Course Plan (Syllabus) of Mathematics 3

Course Code. 07.02.713

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 3			
	Course Code:	07.02.713			
	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours
			Lecture	Tutorial/Seminar	Lab
		3	2	2	--
	Level/ Semester at which this Course is offered:	2nd Level / 1st Semester			
	Pre –Requisite (if any):	Mathematics 1, Mathematics 2			
	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 differential equations to form the foundation needed to analyze and solve real-world problems. The course aims to study differential equations and their classifications, and various methods and techniques for solving several types of differential equations. Topics include first order differential equations: Separable equations, exact equations, substitution and transformation, linear equations, Bernoulli equations, higher order linear differential equations, Laplace transform, Inverse Laplace transform of various functions, its applications, Fourier series, its complex form and enhance the problem solving.

IV. Course Intended Learning Outcomes (CILOs) :

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

A. Knowledge and Understanding:	
a 1	Understand the various techniques of solving differential equations, and Laplace and Fourier transforms together with their applications..
a 2	
B. Intellectual Skills:	
b 1	
b 2	
C. Professional and Practical Skills:	
c 1	
c 2	Use deferent methods of solving several types of differential equations, and Fourier and Laplace transforms to solve problems related to Health Information Technology.
D. Transferable Skills:	
d 1	
d 2	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.	Introduction	Introduction Classification of differential equations and their origin.	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
2.	First order differential equations part1:	Separable equations Exact equations	1	2
3.	First order differential equations part2:	Special integrating factors Substitution and transformation Linear differential equations with constants coefficients	1	2
4.	First order differential equations part3:	Bernoulli equations, method of reduction of order. Applications	1	2
5.	Higher order differential Equation part1:	Homogeneous equations. Nonhomogeneous equations.	1	2
6.	Higher order differential Equation part2:	Method of variation of parameters Undetermined coefficient method – Applications	1	2
7.	Midterm Exams	–	1	2
8.	Laplace transformations I:	Definitions and properties Inverse Laplace transformation	1	2
9.	Laplace transformations II:	Applications of Laplace transforms to differential equations	1	2
10.	Power Series	– Using power series to solve differential equation	1	2
11.	System Of Linear Differential Equations	– Solving system of linear differential equations by elimination, matrix methods.	1	2
12.	Fourier Transform I	Definition of Fourier series. Linear systems and Fourier series of	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
		periodic functions – Properties of Fourier series		
13.	Fourier Transform II	– Aperiodic functions, Fourier integral, and Fourier Transform – Properties of the Fourier transform	1	2
14.	Discrete Fourier Transform	– Shannon sampling theorem – Basics of discrete Fourier transform – Applications	1	2
15.	Review	–	1	2
16.	Final Theoretical Exam		1	2
Number of Weeks /and Units Per Semester			16	32

B. Tutorial Aspect:

No.	Tasks/ Experiments	Number of Weeks	Contact Hours
1.	Exercises of classification of D.E. Exercises of solving first order D. E.	3	6
2.	Exercises of solving higher order D. E. Applications	3	6
3.	Midterm Exam	1	2
4.	Exercises of Laplace transforms.	3	6
5.	Exercises of using power series to solve differential equation	1	2
6.	Exercises of Fourier transform	3	6
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:		
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%
2	Quizzes 1 & 2	4, 12	10	10%
3	Mid-Term Theoretical Exam	6/7	20	20%
4	Final Theoretical Exam	16	60	60%
Total			100	100%

X. Learning Resources:

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3- Electronic Materials and Web Sites etc.:

Websites:

- 3-
- 4- Journals:
- 5-
- 6-
- 7- Other Web Sources:
- 8- 1.....
- 9- 2.....

XI. Course Policies: (Based on the Uniform Students' Bylaw (2007))

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2	<p>Tardiness: A student will be considered late if he/she is not in class after 10 minutes of the start time of class.</p>
3	<p>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.</p>
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7	<p>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.</p>

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