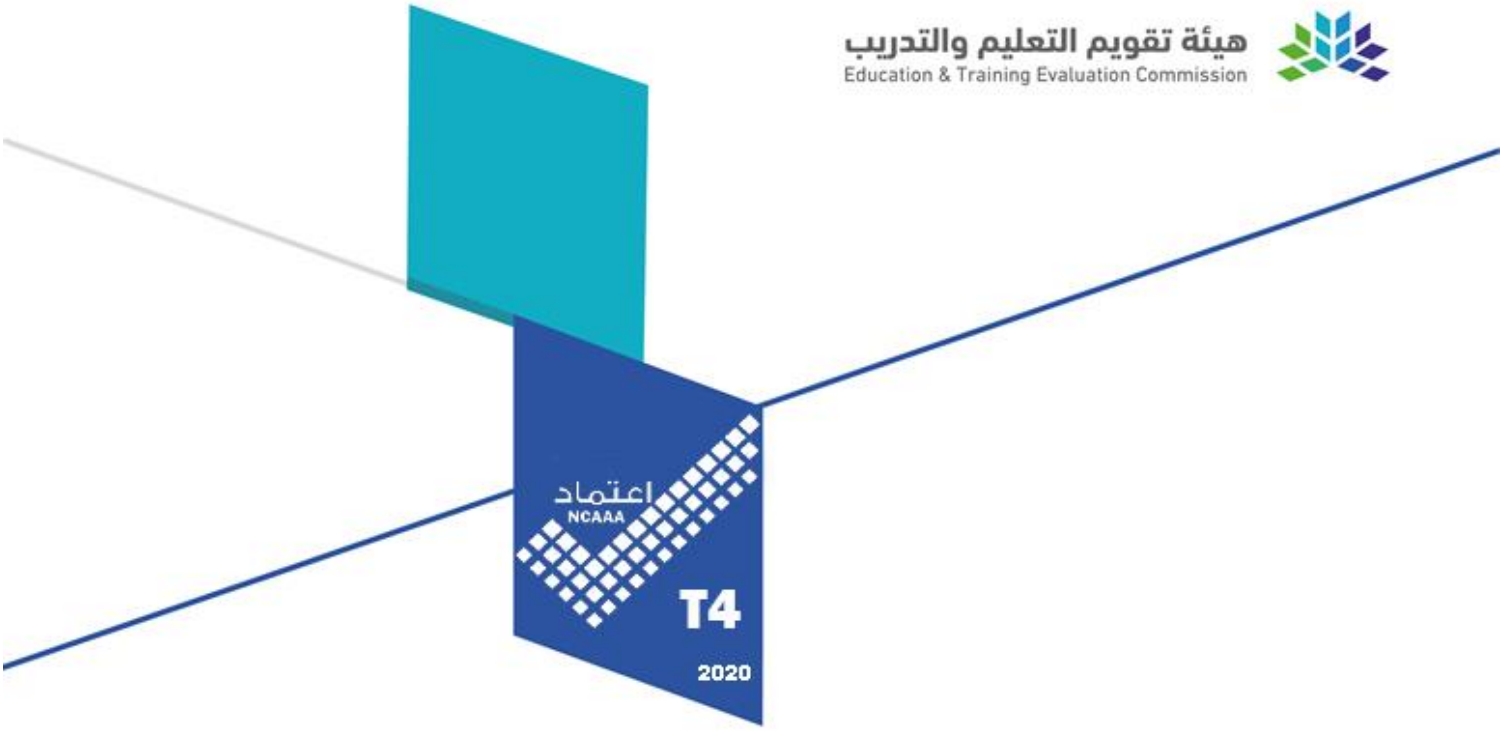
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	Mathematical Methods
Course Code:	MTH 322
Program:	BS-Mathematics
Department:	Mathematics
College:	College of Sciences, AlZulfi
Institution:	Majmaah University, Saudi Arabia

Table of Contents

A. Course Identification

1. Credit hours: 4 (3+1)
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: Second Level/First year
4. Pre-requisites for this course (if any)**:** **MTH 221**
5. Co-requisites for this course (if any)**:** N/A

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	45	75%
2	**Blended**	15	25%
3	**E-learning**		
4	**Correspondence**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	45
2	**Laboratory/Studio**	0
3	**Tutorial**	30
4	**Others** (specify)	30
	Total	105

B. Course Objectives and Learning Outcomes

1. Course Description

1. Course Description

- Series Solutions of Ordinary differential equations with variable coefficients- Inner product space of - self-adjoint operator- SturmLiouville theory- Orthogonal polynomials and special functions(Gamma, Beta, Legendre, Bessel, Hermit, Lagurre)- Generalized theory of Fourier series - Fourier integral.

2. Course Main Objective

The student has the knowledge of

1- Series Solutions of Ordinary differential equations with variable coefficients
2- Inner product space of functions- self-adjoint operator
3- Sturm-Liouville theory
4- Orthogonal polynomials and special functions (Legender, Hermite, gamma, Beta, Bessel)
5- Generalized theory of Fourier series - Fourier integral.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
1.1	Define and write the basic fundamentals in Mathematical Methods Series Solutions of Ordinary differential equations with variable coefficients- Inner product space of functions-self-adjoint operator-	K4
1.2	Recall and reproduce fundamentals and concepts in Mathematical Methods Sturm-Liouville theory- Orthogonal polynomials.	K4
1.3	Outline mathematical concepts to models of real world problems Special functions (Legender- Hermite, Gamma, Beta, Bessel)- Generalized theory of Fourier series- Fourier integral.	K4
1.4		
2	**Skills :**	
2.1	The students will **Construct** mathematical arguments and proofs and **apply** the underlying unifying structures of Mathematical Methods..	S4
2.2	Students will have the ability to **Develop** and **explain** critical thinking skills to solve problems that can be modeled mathematically.	S4
2.3		
2...		
3	**Competence:**	
3.1	Enable students to **analyses** the mathematical problems.	C2
3.2		
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Series Solutions of Ordinary differential equations with variable coefficients.	12
2	Inner product space of functions- self-adjoint operator	8
3	Sturm-Liouville theory	8
4	special functions (gamma, beta)	8
5	Orthogonal polynomials and special functions (Legendre, Hermite, , Bessel)	16
6	Generalized theory of Fourier series - Fourier integral.	8
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	Define and write the basic fundamentals in Mathematical Methods Series Solutions of Ordinary differential equations with variable coefficients- Inner product space of functions-self-adjoint operator.	**Begin** each topic with the explanation of various basic ideas giving plenty of examples **Start** each section by general idea and the benefit of it. **Demonstrate** the course information and principles through lectures.	Exams Midterms Final examination.
1.2	Recall and reproduce fundamentals and concepts in Mathematical Methods Sturm-Liouville theory-Orthogonal polynomials.	Provide several ways to deal with the exercises.	Home work. Classroom activities Working in groups.
1.3	Outline mathematical concepts to models of real world problems Special functions (Legender- Hermite, Gamma, Beta, Bessel)-Generalized theory of Fourier series- Fourier integral.	Solve some examples during the lectures.	Continuous discussions with the students during the lectures.
2.0	**Skills**		
2.1	The students will **Construct** mathematical arguments and proofs and **apply** the underlying unifying structures of Mathematical Methods..	Provide main ways to deal with exercises.	Oral and written exams Quizzes.
2.2	Students will have the ability to **Develop** and **explain** critical thinking skills to solve problems Enable students to	Ask the student to attend lectures for practice solving problem.	Discussion of how to simplify or analyses some problems.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	analyses the mathematical problems.		
…			
3.0	**Competence**		
3.1	State the Physical problems by mathematical method	**Ask** the student to attend lectures for practice solving problem.	Doing homework. Check the problems solution.
3.2			
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm Exam 1	7	20
2	Midterm Exam 2	12	20
3	Homework	Through of semester	5
4	Team work and Presentation	Through of semester	5
5	Quizzes	Through of semester	5
6	E-Tests	12	5
7	Final Examination	15	60
	Total		100

***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.

2- The contact with students by e-mail and website.

1- Activation of the virtual classrooms and academic guidance via Black Board **LMS**.

F. Learning Resources and Facilities

Required Textbooks	1. Fourier Analysis and its Applications, Geral B. F Fourier Folland, Pacific Grove, 1992. 2. Walter Rudin: Principle of Mathematical Analysis, 2nd ed., New York, 1964.
Essential References Materials	

Electronic Materials	• http://WWW.cmi.univ-mrs.fr// • http://WWW.arxiv.org// • http://WWW.Ims.ac.u/
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom with capacity of 20 students Library
Technology Resources (AV, data show, Smart Board, software, etc.)	Blackboard
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students/ internal committee	Direct (Students evaluation electronically organized by Deanship of registration and admission)/ Verification of students' papers
Extent of achievement of course learning outcomes	Staff members (Peer Reviewer)	Indirect (Frequent meetings consultation among the teaching staffs)
Quality of learning resources.	Staff members (course coordinators)	Direct (Meeting between course coordinators and the tutors)

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	Mathematics Department
Reference No.	27
Date	8/8/1442 H-21/3/2021 G Head of Department

Dr. Muqrin Almuqrin