Course Specifications

Course Title:	**Mathematical Methods**
Course Code:	**344Math-3**
Program:	**B.Sc. Mathematics**
Department:	**Mathematics**
College:	**Arts and Sciences**
Institution:	**Najran University**

Table of Contents

A. Course Identification

1. Credit hours:3	
2. Course type	
a. University ☐ College ☐ Department √ Others ☐	
b. Required √ Elective ☐	
3. Level/year at which this course is offered: 6 / 3	
4. Pre-requisites for this course (if any): **241 Math-3**	
5. Co-requisites for this course (if any): Non	

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	**3**	100%
2	**Blended**	---	---
3	**E-learning**	---	---
4	**Correspondence**	---	---
5	**Other**	---	---

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	**Lecture**	45
2	**Laboratory/Studio**	---
3	**Tutorial**	---
4	**Others** (Exams)	3
	Total	48
Other Learning Hours*		
1	**Study**	30
2	**Assignments**	10
3	**Library**	10
4	**Projects/Research Essays/Theses**	---
5	**Office hours**	15
	Total	113

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

This course is designed to cover three main topics: special functions, Fourier series and integrals, and a brief sketch of the Sturm–Liouville problem and its solutions.

2. Course Main Objective

Display Sturm–Liouville theory as a way to study the special functions, and give an introduction to Fourier series and integrals.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
1.1	Define the basis terminology of mathematical method	K2
1.2	State famous elementary results of mathematical method	K1
2	**Skills :**	
2.1	Derive some formulas of special functions	S2
2.2	Solve various problems related to mathematical method	S3
2.3	Prove elementary theorems related to mathematical method	S2
3	**Competence:**	
3.1	Present the main concepts of mathematical method to others, both in oral and written form confidently.	C1

C. Course Content

No	List of Topics	Contact Hours
1	**Inner product space, convergence in** L_2, complete orthogonal set **in** L_2	3
2	**The Sturm–Liouville theory**	12
3	**Fourier series in** L_2, pointwise convergence	9
4	**Orthogonal polynomials** (Legendre, Hermite and Laguerre)	12
5	**Bessel functions** (the first and second kinds)	6
6	**Fourier** transform and its applications	3
	Total	**45**

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 the basis terminology of mathematical method	At the beginning of each lecture, some examples will be presented and discussed with students to encourage them to discover related concepts and provide definitions	Oral Exam Written Exam
1.2	State famous elementary results of mathematical method		Oral Exam Written Exam

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
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2.0	**Skills**		
2.1	Derive some formulas of special functions	Discussion and exercises during lecture time	Quiz Written Exam Homework
2.2	Give different examples of (metric, Banach, Hilbert spaces)	Discussion and exercises during lecture time	Quiz Written Exam Homework
2.3	Solve various problems related to mathematical method	Discussion and exercises during lecture time	Quiz Written Exam Homework
2.4	Prove elementary theorems related to mathematical method	Discussion and exercises during lecture time	Quiz Written Exam Homework
3.0	**Competence**		
3.1	Work as part of a team and independently	Group problems solving during tutorial	Rubrics
3.2	Present the main concepts of mathematical method to others, both in oral and written form confidently.	Homework and discussions in the classes	Oral Exam Rubrics
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2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Exercises, Homework& Assignments	Open	10%
2	Oral Exam	14th Week	5%
3	Quizzes	Open	5%
4	Written Test(1)	7th Week	15%
5	Written Test(2)	13th Week	15%
6	Final Exam	End of Semester	50%

***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 :

- Introducing the course syllabus, grading scale and the distribution of marks for the course in the first lecture of the course.
- The office hours for this course are 3 hours/ week.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	M.A.Al-Gwaiz, Sturm-Liouville Theory and its Applications, Springer-Verlag London, 2008.
Essential References Materials	- Non

Electronic Materials	• Lectures on the Department of Mathematics YouTube Channel. • Other electronic materials available on the internet
Other Learning Materials	- Non

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom with suitable seats
Technology Resources (AV, data show, Smart Board, software, etc.)	• Datashow • Smart Board • Wi Fi
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
Student course evaluation survey at the end of semester.	Students	Questionnaire (Indirect)
Effectiveness of teaching and assessment	Peer Reviewer	Rubrics (Indirect)
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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	
Reference No.	
Date	