



Course Specification

— (Postgraduate)

Course Title: Functional Analysis I
Course Code: MATH653
Program: Master Program in Mathematics
Department: Mathematics
College: Science
Institution: University of Tabuk, KSA
Version: 2
Last Revision Date: 1/12/1443 H



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A. General information about the course:

Course Identification

1. Credit hours: 3 H

2. Course type

a. University College Department Track Others

b. Required Elective

3. Level/year at which this course is offered:

Level-2

4. Course general Description

In this course, we will study some basic fundamentals of Functional Analysis. Some important properties, theorems, problems, and applications will be also discussed.

5. Pre-requirements for this course (if any): None

6. Co- requirements for this course (if any): None

7. Course Main Objective(s)

1. Student continues to mature in their understanding of functional analysis through the study of functions, functionals, operators, function spaces and their properties.
2. Students know the four fundamental theorems of functional analysis and their applications.
3. Student acquires cognitive skills through thinking and solving of problems.
4. Student becomes responsible for their own learning through solutions of assignments and time management.

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	45	100 %
2.	E-learning		
3.	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
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1.	Lectures	3 H /week
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding The students will be able to:			
1.1	Demonstrate deep concepts of functional analysis and related topics.	K1	Lectures, Group works, Presentations, Classroom discussion, Seminar, Case study, problem solving session	Exams, Quizzes, Research projects, presentations, interactive discussion, and participation, Survey
1.2	Describe advanced analytical methods to solve problems in normed, Banach and Hilbert spaces.	K2		
1.3	Enhance Knowledge and deep understanding of research methodology in functional analysis.	K3		
2.0	Skills The students will be able to:			
2.1	Applying the results in practical examples.	S1	Lectures, Group works, Presentations, Classroom discussion, Seminar, Case study, problem solving session	Exams, Quizzes, Home works, Assignments, Research project, presentation, interactive discussion and participation, Surveys.
2.2	Analyze complicated problems and applications of operators and functional.	S2		
2.3	Use critical and conceptual thinking in solving mathematical problems in functional analysis.	S3		
2.4	Communicate ideas concisely using presentations.	S4		
3.0	Values, autonomy, and responsibility The students will be able to:			



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Perform academic integrity and professional ethics when dealing with academic issues.	V1	Lectures, Group works, Presentations, Classroom discussion, Seminar, Case study, problem solving session	Research project, Home works, Assignments, presentation, interactive discussion and participation, Surveys.
3.2	Demonstrate responsibility for working independently.	V2		

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Normed Space	3
2	Continuous Linear Operators	3
3	Duality and Projections,	3
4	Introduction to Normed Space	3
5	Introduction to Four Fundamental Theorems of Functional Analysis	3
6	Open Mapping	3
7	Bounded Inverse Theorem	3
7	Mid-Exam #	--
8	Closed Graph Theorem	3
9	Uniform Boundedness Theorem	3
10	Uniform Boundedness Theorem	3
11	Hann Banach Theorem	3
12	Adjoint, Self-adjoint	3
13	Unitary and Normal Operators	3
14	Introduction to Spectral Theory of Operators	3
15	Spectral Properties of Bounded Linear Operators	3
16+17	Revision & Final Exam	
Total		45





D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Home works and Assignments	Weekly basis	20%
2.	Mid-term exam	7th week	25%
3.	Presentation and discussion	During the Semester	15%
4.	Final Exam	At End of Semester	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	1. Prahlad Vaidyanathan, Functional Analysis, Cambridge University Press (2022).
Supportive References	1. Nair, M.T., Functional Analysis: A First Course, Prentice Hall of India, New Delhi, 2002.
Electronic Materials	Saudi Digital Library
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture Room with capacity of 30 students and equipped with White Board, Library
Technology equipment (projector, smart board, software)	Overhead projector and internet connection.
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct and Indirect
Effectiveness of students assessment	Teacher	Direct
Quality of learning resources	Students	Indirect
The extent to which CLOs have been achieved	Teacher, Quality Committee	Direct and Indirect
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))





Assessment Methods(Direct, Indirect)

G. Specification Approval Data

Council / Committee	Approval by the Department Council
Reference No.	DEPARTMENT COUNCIL No (26)
Date	11/9/1444 H

