اعتماد
NCAAA

T4

2020

Course Specifications

Course Title:	Functional Analysis
Course Code:	MTH 483
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: 7th Semester /4th year

4. Pre-requisites for this course (if any)**:**

MTH 482

5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	75%
2	Blended	0	0%
3	E-learning	0	0%
4	Distance learning	0	0%
5	Other	15	25%

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	45
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	15
	Total	60

B. Course Objectives and Learning Outcomes

1. Course Description:

Metric spaces, continuous functions in metric spaces, Normed spaces, Operators, Functionals, Inner product spaces.

2. Course Main Objectives:

1) Studying the main properties in metric spaces.
2) Studying continuous functions in metric spaces.
3) knowing normed spaces, operators and functionals **.**
4) Having the knowledge of inner product spaces.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Reproduce fundamentals and concepts of metric spaces.	K1
1.2	Reproduce fundamentals and concepts of continuous functions in metric spaces.	K1
1.3	Construct mathematical arguments and proofs and apply the underlying structures of operators – functionals.	K4
1...		
2	**Skills :**	
2.1	Communicate Mathematical ideas for inner product spaces.	S1
2.2		
2.3		
2...		
3	**Values:**	
3.1	**Ability** to work in a team to understand the problem.	C1
3.2		
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Metric spaces.	16
2	continuous functions in metric spaces	12
3	Normed spaces.	8
4	Operators, functionals	16
5	Inner product spaces.	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 and Understanding**		
1.1	**Metric spaces** What are the metric spaces and their properties?	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.2	continuous functions in metric spaces?	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
1.3	**Normed spaces** What are the normed spaces?	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
2.0	**Skills**		
2.1	**Solve** the problems in metric spaces.	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
2.2	**Understand** the concept of normed spaces.	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
2.3	**Understanding** of operators, functionals and inner product spaces.	• Lectures/Presentations • Media Lectures • Tutorials	• Exam • Assignment • Quiz • Final Exam
3.0	**Values**		
3.1	**Ability** to work in a team to understand the problem	• Group discussion	• Exercise • Electronic MCQ Test
3.2			
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	4th Week	5%
2	Assignment/Home Work 1	5th Week	2.5%
3	Mid Term 1	7th Week	15%
4	Quiz 2	9th Week	5%
5	Assignment /Home Work 2	10th Week	2.5%
6	Class Activities/Discussions	12th Week	5%
7	Mid Term 2	13th Week	15%
8	Electronic Test	14th Week	10%
9	Final Exam	---	40%
	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:

Department of mathematics has "Student Academic Advisory Committee". This committee is responsible for students counseling and advising works in synchronization and collaboration with the Deanship of Admissions and Registration and Student Affairs. Department of mathematics Alzulfi has a continuous and standardized procedure that be associated with the student's progress until completion of degree and includes psychological, social, and behavioral guidance. This advisory committee also maintain the student's files. The students with GPA below than 50 % in Mid1 and Mid 2 are stayed under serious observation and continuous consultations with respective course instructor about their performing. The course teacher will commit to a minimum scheduled time for student consultation equivalent to 2 hours per week.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Erwin Kreyszig, Introductory Functional Analysis with Applications, John Wiley & Sons. Inc., 1978.
Essential References Materials	Erwin Kreyszig, Introductory Functional Analysis with Applications, John Wiley & Sons. Inc., 1978
Electronic Materials	MIT Open Courses Khanacadmy
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	- The size of the room should be proportional to the number of students - Provide enough seats for students. - The number of students do not exceed on 30 in the classroom
Technology Resources (AV, data show, Smart Board, software, etc.)	- Mathematics Lab is equipped with a computer. - Provide overhead projectors and related items i.e smart Board, Wi-Fi, AV. - Updated Math Software i. e Mathematica, Matlab, Maple. etc
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