Course Description Form

1. Course Name: FUNCTIONAL ANALYSIS II

2. Course Code: MATH517

3. Semester / Year: SECOND/M.SC.

4. Description Preparation Date: MARCH 2024

5. Available Attendance Forms: Attendance lectures in the classroom

6. Number of Credit Hours (30) / Number of Units (30)

7. Course administrator's name (mention all, if more than one name)

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8. Course Objectives

Course Objectives	➢ **Normed space (Banach space).** ➢ **Further properties of normed spaces.** ➢ **Convergent and absolutely convergent series.** ➢ **Schauder basis and separable space.** ➢ **Finite dimensional and its applications.** ➢ **Linear operators with basic examples.** ➢ **Functional and dual spaces.** ➢ **Reflexive spaces.** ➢ **More advanced theory of normed and Banach spaces with out which the usefulness of these spaces and their applications.**

9. Teaching and Learning Strategies

Strategy	1. Attend classroom lectures, electronic homework, and various activities and assignments. 2. Adopting the interactive aspect between the teacher and the student when explaining the subject. 3. Direct questions to students to test their understanding of the topic. 4. Adopting the principle of preparing reports by students in various subject areas.

3. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2	Giving the basics definitions of norm spaces (Banach Spaces)	Normed Space (Banach Space)	Attendance Interactive lectures	Ask questions and Give assignments
2	2	Study the basic algebraic operations with examples	Further Properties of Normed spaces	Attendance Interactive lectures	Ask questions and Give assignments
3	2	study the subspace of normed space	Subspace of normed space and closedness	Attendance interactive lectures	Ask questions and Give assignments
4	2	Explain the convergent and absolutely convergent series of Normed spaces.	Convergent and Absolutely convergent series terminologies	Attendance interactive lectures	Ask questions and give assignments
5	2	Study Schauder basis and separable	Schauder basis of normed spaces and separable spaces	Attendance interactive lectures	Ask questions and give assignments
6	2	-	-	-	1st attended mid exam
7	2	To know the general form of bounded linear functionals on various spaces	Linear functional with its examples	Attendance interactive lectures	Ask questions and give assignments
8	2	It also helps to define a dual space	Dual space and its applications	Attendance interactive lectures	Ask questions and give assignments
9	2	Study their crucial characteristics	Further applications of dual space and reflexive space	Attendance interactive lectures	Ask questions and give assignments
10	2	Study the compactness on fin dimensional	Compactness terminology on finite dimensional normed space	Attendance interactive lectures	Ask questions and give assignments
11	2	Study bidual space	Bidual space and embedding concept	Attendance interactive lectures	Ask questions and give assignments
12	2	-	-	-	2nd attended mid exam
13	2	Study the basics of more advanced theory of normed and Banach spaces without	Fundamental Theorems for Normed and Banach Spaces	Attendance interactive lectures	Ask questions and give assignments

		which the usefulness of these spaces and their applications would be somewhat limited.			
14	2	Study the basics of the more advanced theory of normed and Banach spaces without which the usefulness of these spaces and their applications would be somewhat limited.	Fundamental Theorems for Normed and Banach Spaces Fundamental Theorems for Normed and Banach Spaces	Attendance interactive lectures	Ask questions and give assignments
15	2	Study the basics of more advanced theory of normed and Banach spaces without which the usefulness of these spaces and their applications would be somewhat limited.	Fundamental Theorems for Normed and Banach Spaces Fundamental Theorems for Normed and Banach Spaces	Attendance interactive lectures	Ask questions and give assignments

4. Course Evaluation	
30% (mid exams) and 70% (final exam)	
5. Learning and Teaching Resources	
Required textbooks (curricular books any)	
Main references (sources)	Introductory Functional analysis with Applications by Erw Kreyszig.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	➢ https://www.youtube.com/playlist?list=PLUl4u3cNGP6icsJp_--fRAjZXPrQzW. ➢ https://www.math.uci.edu/~rvershyn/teaching/2010-11/602/functional-analysis.pdf ➢ https://ocw.mit.edu/courses/18-102-introduction-to-functional-analysis-spring-2009/pages/lecture-notes.