هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA
2023
TPG-153

Course Specification

(Postgraduate)

Course Title: **Measure Theory II**
Course Code: **MATH654**
Program: **Master Program in Mathematics**
Department: **Mathematics**
College: **Science**
Institution: **University of Tabuk, KSA**
Version: **2**
Last Revision Date:**1/12/1443 H**

Table of Contents:

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-3 or higher					
4. Course general description Product measured spaces. Fubini's theorem. Infinite product probability spaces, Kolmogorov's consistency theorem. Radon-Nikodym theorem. Conditional probability, Conditional expectation. Daniel's integral. Riesz- Representation Theorem. Haar measure on a compact group.					
5. Pre-requirements for this course (if any): MATH642					
6. Co-requirements for this course (if any): Real Analysis - Functional Analysis (Master Courses)					
7. Course Main Objective(s) Upon completion of the course students will be able to: a. Understand and apply concepts of product-measured spaces. (finite and infinite cases) b. Understand, prove, and apply the main theorems; Fubini, Kolmogorov, Radon-Nikodym, Riesz-representation theorems. c. Interpret, generalize, and manipulate measure theory on compact groups. d. Understand and manipulate the passage from measure theory to probability theory. e. Developing advanced topics and familiarize to technical methods in advanced measure theory					

1. Teaching mode (Mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	45	100 %
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
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	Identify products of measure spaces	K1	Lectures, Group works, Presentations, Classroom discussion, Seminar, Case study, problem solving session	Exams, Quizzes, Research project, presentation, interactive discussion and participation, Survey.
1.2	Manipulate well the main theorems and their variants: Fubini, Radon, Riesz, and Kolmogorov.	K2		
1.3	Enhance the concept of infinite probability spaces and their properties	K3		
2.0	Skills: The students will be able to:			
2.1	Solve and analyze problems using techniques and methods from advanced measure theory.	**S1**	Lectures, Group works, Presentations, Classroom discussion, Seminar, Case study, problem solving sessions	Exams, Quizzes, Home works, Assignments, Research project, presentation, interactive discussion and participation, Surveys.
2.2	Prove theorems and interpret results using advanced measure theory.	S2		
2.3	Clearly and apply advanced measure theory to solve concrete problems.	S3		
3.0	Values, autonomy, and responsibility: The students will be able to:			
3.1	Work in teams/groups with great consideration of ethics.	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	Manage duties and time adequately.	V2		

C. Course Content

No	List of Topics	Contact Hours
1	Recall the concepts of measure spaces	3
2	Product measure spaces	3
3	Definitions and Examples of Fubini's theorem and its variants	3
4	Results on Fubini's theorem and its variants	3
5	Definitions and Examples of probability spaces	3
6	Results of probability spaces	3
7	Infinite product of probability spaces	3
7	**Mid-Exam #**	-
8	Kolmogorov's consistency theorem	3
9		3
10	The Radon-Nikodym theorem.	3
11	Conditional probability, conditional expectation.	3
12		3
13	The Daniel's integral.	3
14	Riesz- Representation Theorem.	3
15	Haar measure on a compact group.	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	6th week	25%
3.	Presentation and discussion	During the semester	15%
4.	Final exam	At the end of the 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	Measure Theory, By Vladimir I. Bogachev, Springer 2007.
Supportive References	Donald L. Cohn, Measure Theory, Springer New York (2013)
Electronic Materials	Saudi electronic 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 15 students at most 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)	

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**