Course Specification

(Postgraduate Programs)

Course Title:	**Topology**
Course Code:	**MAT 6171**
Program:	**Master of Science in Mathematics**
Department:	**Mathematics and Statistics**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**2024 – V1**
Last Revision Date:	**1446/04/05 (08/10/2024)**

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A. General information about the course:

1. Course Identification:

1. Credit hours: (.....)				
4 (3 Lectures, 0 Lab, 2 Tutorial)				
2. Course type				
A.	☐University	☐ College	☒ Program	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: Level 1 / Year 1				
4. Course General Description:				
This course describes the most important ideas, theoretical results, and applications in general topology. The course starts from the basic notions of topological and metric spaces. It includes the essential fundamentals of compactness and connectedness with applications to R^n. It also covers classical topics in countability and separation theory.				
5. Pre-requirements for this course (if any)**:**				
None.				
6. Pre-requirements for this course (if any)**:**				
None.				
7. Course Main Objective(s):				
The main objective of this course is to provide the student with the basic concepts and main theorems in topology in order to enable the student to have strong knowledge in general topology and to continue more advanced study in this area.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	0	0%
4	Distance learning	0	0%

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	0
3.	Field	0
4.	Tutorial	30
5.	Others (specify).....	0
	Total	75

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

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	To recall the main properties of the topological spaces and metric spaces.	K1, K2	3 lecture hours\week	Direct: Regular Exams
1.2	To define concepts of connectedness and compactness in topological spaces.	K1, K2	• 2 tutorial hours\week • Self-study	• Assignments • Short Quizzes
...				
2.0	Skills			
2.1	To develop techniques of proof for complete metric spaces.	S1, S2	Deep problems	Short Quizzes
2.2	To produce oral communication and technical writing skills through Hausdorff spaces.	S4	Self-study	Participations
2.3	To use Internet in searching for Tychonoff and Stone-Cech theorems.	S3	Deep problems	Short Quizzes
2.4	To explain deep and not short proofs for normal spaces.	S1, S2	Self-study	Participations
3.0	Values, autonomy, and responsibility			

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.1	**To work with independence and responsibility.**	**V1, V2**	**Personal questions**	**Participation**
3.2	**To collaborate and cooperate with team works.**	**V1, V3**	**Team work**	**Homework and Mini-projects**
...				

C. Course Content:

No	List of Topics	Contact Hours
1.	**Basics:** Basic set theory; Topological spaces and equivalent topologies; Order topology, Closure of a set and dense sets; Basis and sub-basis, Subspaces, Hausdorff spaces, Continuous functions, Open and closed mappings, Quotient topology, Homeomorphisms and topological properties, Product and box topologies.	**19**
2.	**Metric Spaces:** Definition and important examples, Metrics on $\mathbb{R}^{\omega}$, The Induced metric topology, Metrizable topological spaces; Sequences and the sequence lemma, Cauchy sequences and complete metric Spaces, Uniform convergence.	**19**
3.	**Connectedness & Compactness:** Connected topological spaces, Basic properties, Products of connected spaces, Path connectedness, Connectedness in R. Compact spaces and basic properties, Hausdorff compact spaces, Compactness in $\mathbb{R}$, Lebesgue number lemma and the uniform convergence theorem, Compactness in $\mathbb{R}^n$, Limit and sequentially compactness, Local compactness and the one-point compactification, Tychonoff Theorem, Stone-Cech compactification Theorem.	**20**
4.	**Countability and Separation Axioms:** Countability axioms, Separation axioms, Normal spaces, Urysohn Lemma and Urysohn Metrization Theorem.	**17**
	Total	**75**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**HomeWorks, Quizzes, Mini projects**	**During the semester**	**30%**
2.	**Midterm**	**Week 9-10**	**30%**
3.	**Final Exam**	**Week 16-17**	**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	• **J. R. Munkres, Topology; Pearson, 2nd Ed. 2000. (Main Reference)** • **B. Mendelson, Introduction to Topology; Dover Publications; 3rd Ed. 1990.**
Supportive References	1. **S. Willard, General Topology; Dover Publications 2004.** 2. **Fred H. Croom, Basic Concepts of Algebraic Topology; Undergraduate Texts in Mathematics, Springer Verlag, 1978.**
Electronic Materials	**None**
Other Learning Materials	**None**

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	▪ **Each class room should be equipped with a whiteboard and a projector.** ▪ **Laboratories should be equipped with computers and an internet connection.**
Technology equipment (Projector, smart board, software)	**The rooms are equipped with data show and Smart Board.**
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:** Questionnaire.
	Course Responsible	**Direct:** Course e-Portfolio. **Indirect:** Second examiner checklist-Course report.
	Peer Reviewer	**Direct:** Questionnaire. **Indirect:** External assessor report.
Effectiveness of students' assessment	Program Leaders	**Direct:** Course e-Portfolio. **Indirect:** Course report.
Quality of learning resources	Students	**Indirect:** Second examiner checklist-Course report.
	Faculty (Academic Advisory-GCC)	**Direct:** course Entrance/Exit. **Indirect:** Observations - Accreditation review.

Assessment Areas/Issues	Assessor	Assessment Methods
	Program Leaders	**Direct:** Course e-Portfolio. **Indirect:** Course evaluation survey- Observations- Syllabus review- Accreditation review.
	Course Responsible	
The extent to which CLOs have been achieved	Course Responsible	**Direct:** Exams - Course e-Portfolio. **Indirect:** Second examiner checklist-Course report.
	Program Leaders	**Indirect:** Exams.
Other	**None**	

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**MATHEMATICS AND STATISTICS DEPARTMENT COUNCIL**
REFERENCE NO.	**8/1446**
DATE	**05/04/1446 (08/10/2024)**