



SYLLABUS

<i>Course Code</i>	<i>Course Num.</i>	<i>Course Name</i>	<i>Credit Hours</i>	<i>Lec.</i>	<i>Lab.</i>	<i>Tut.</i>	<i>Private study</i>	<i>Pre-requisites</i>	<i>Course Level</i>	<i>Teaching Language</i>
MAT	671	Topology	4	3	0	1	9		2¹	English

¹Level 2 for the B.Sc. in Applied Mathematics and Chemistry, and Level 3 for Physics



A. Course 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 \mathbb{R}^n . It also covers classical topics in countability and separation theory. The last chapter concerns an introduction to homotopy theory with application to the computations of some special fundamental groups.

B. Course Outcomes

At the end of this course the student will be able to :

1. Master the basic concepts and main theorems in topology,
2. Have strong knowledge in general topology,
3. Continue more advanced study in this area.

C. References:

1. *J.R. Munkres, Topology; Pearson, 2nd Ed. 2000. (Main Reference)*

Required Textbook

2. *B. Mendelson, Introduction to Topology; Dover Publications; 3rd Ed. 1990.*
3. *S. Willard, General Topology; Dover Publications 2004.*

Course Website: Google Classroom Webpage: <http://www.imamm.org/>



D. Topics Outline

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.
2. **Metric Spaces:** Definition and important examples, Metrics on \mathbb{R}^ω , The Induced metric topology, Metrizable topological spaces; Sequences and the sequence lemma, Cauchy sequences and complete metric Spaces, Uniform convergence.
3. **Connectedness & Compactness:** Connected topological spaces, Basic properties, Products of connected spaces, Path connectedness, Connectedness in \mathbb{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.
4. **Countability and Separation Axioms:** Countability axioms, Separation axioms, Normal spaces, Urysohn Lemma and Urysohn Metrization Theorem.
5. **Homotopy Theory:** Homotopy of Paths, The Fundamental Group of the Circle, Covering Spaces, Retractions and Fixed Points, Brouwer Fixed Point Theorem, Fundamental Groups of S^n .

E. Office Hours

Office hours give students the opportunity to ask in-depth questions and to explore points of confusion or interest that cannot be fully addressed in class.

F. Exams & Grading System

The semi-official dates of the exams for this course are:

- **Midterm :** 8th or 9th week.
- **Quizzes & Homeworks:** During the semester.
- **Final Exam:** 16th week.

Your course grade will be based on your semester work as follows:

Midterm : 30 %	Final Exam: 40 %
Quizzes, Homework, Attendance & Participation: 30 %	

The grading distribution:

A ⁺	A	B ⁺	B	C ⁺	C	F
[95, 100]	[90, 95)	[85, 90)	[80, 85)	[75, 80)	[70, 75)	[0, 70)



G. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. (“Immediate family” is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

[Executive Rules for Study Regulations and Examsgoo.gl/ykm7t3](https://Examsgoo.gl/ykm7t3)

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