King Saud University

College of Science

Introduction to General topology
Course Syllabus

First Semester 1436 - 1437

1. Course General Information:

Course Title: **Introduction to General Topology**	**Course Code:** **MATH 373**
Course Level: **6**	**Course Prerequisite:** **MATH 382** **Co-requisites for this course (if any): None**
Lecture Time: **10-11 am**	**Credit Hours:** **4**

2. Faculty Member Responsible for the Course:

Name	Rank	Office Number and Location	Office Hours	Email Address
Dr. Mongi Blel	Professor	0114676493 Main Campus	-	mblel@ksu.edu.sa

3. Course Description:

Students are introduced to: Topological spaces, examples, closure of a set, derived set, subspace topology, Bases, finite product topology, subbases, Metric spaces, examples, metrizability, $\mathbb{R}^n$ as a metrizabile space, Continuous functions, characterization of continuous functions on topological and metric spaces, homeomorphisms, examples, topological property, Compact spaces, compactness in $\mathbb{R}^n$ limit point and sequentially compact spaces. Finite intersection property.

4. Course Academic Calendar

Week	Basic material to be covered
(1-2)	Topological spaces: Definition and examples
(3-4)	Open and closed sets, Subspaces, Closure of a set, Interior, boundary , exterior and derived sets
(5-6)	Basis Definition and examples. Finite product topology. Subbases Problem and Examples of
(7-9)	Definition and examples of the metrics, metric spaces , Hausdorff spaces ,metrizability problems.
(10-12)	Continuous functions, and homeomorphisms, topological property.
(12-15)	Compactness, compactness in $\mathbb{R}^n$ **,** Limit point compactness, Sequentially compact spaces, Compactness in metric spaces.
(16)	Final Examination

5. Course Objectives:

The main purpose for this course is to introduce the following concepts:

- Topology, Topological spaces, Open Sets, closed sets, and Subspaces.
- Basis, Product Topology and Subbases.
- Metrics, Metric spaces, Hausdorff Space, Sequences in Topological Spaces, Metrizability Problem and Examples of Metrizabile Spaces.
- Continuity, and Homeomorphisms
- Compactness, Limit Point Compactness and Sequentially Compact Spaces and Some of their properties

6. Course References:

6.1 Textbooks:

1- General Topology. Dr. Tahsin Mustafa Ghazal; Book under Review.
2- Munkres J. R.; Topology, Second Edition. Prentice Hall, Incorporate. New York, 2000.

3- Crumps W. Baker; Introduction to topology ;Wm. C. Brown Publisher. Dubuque. IA
4- Long, P.: Introduction to general topology: Charles E. Merrill Publishing Company, A Bell & Howell Company, Columbus, Ohio, 1971.

6.2 Essential References Materials (Journals, Reports, etc.)

1- James Dugundji; *Topology*. Allan and Bacon Inc. Boston
2- R. Engelking; *General Topology*. Heldermann.

6.3 Recommended Textbooks and Reference Material (Journals, Reports, etc)

1- Jacques Dixmier; *General Topology*. Springer – Verlag, Under graduate texts in mathematics. New York.
2- John L. Kelley; *General Topology*. Graduate texts in mathematics, Springer – Verlag, New York.

6.4 Websites:

1- http://faculty.ksu.edu.sa/tmghazal/default.aspx
2- Internet sites relevant to the course

6.5 Other learning material such as computer-based programs/CD, professional standards or regulations and software.

- Some computer programs exist relevant to course materials'

7. Teaching Methods:

- At the beginning of studying each topic some examples will be laid out and discussed with the students encouraging them to discover the relevant concepts.
- At the beginning of each lecture, a discussion is conducted with the students about what has been done in the previous lecture in order to establish a link with the current lecture.
- Discussions in the class
- Homework assignments
- Independent study
- Student's' Representation.

8. Learning Outcomes:

8.1 Knowledge and Understanding:

After studying this course, the student will acquire the following knowledge and be able to:

- Write the definition of topology, define open, closed, closure, limit point, interior, exterior, and boundary of a set, and Describe the relations between these sets.
- Define basis for a topology, List conditions under which one can generate a topology from a certain collection of subsets, Outline the definition of product topology for a finite number of topological spaces, and Describe how to generate a topology from any collection of subsets without any condition.
- , Describe the metrizability problem, and how its related to Hausdorff space, outline the proof that $\mathbb{R}^n$ is metrizable.
- State the definition of a metric on a none empty set, Outline the buildup of the metric topology
- State the definition of continuity of a function between topological spaces, List the equivalence definitions of continuous functions. Recall the definition of homeomorphic spaces.
- Describe the homeomorphism between well-known spaces both geometrically and analytically.
- Write the definition of an open cover and compact spaces and their properties.
- Recognize the different types of compactness and discus their relation in general topological spaces and metric spaces in particular.

8.2 Cognitive Skills (Thinking and Analysis):

After studying this course, the student will able to:

- Define: topology on a non-empty set, open, closed, closure, limit point, interior, exterior, and boundary of a set, and explain the relations between these sets.
- Explain how to generate a topology from a collection of subsets under certain conditions, and without any conditions.
- Differentiate between functions that define a metric on a set and those that do not.
- Explain how a metric generate a topology, and the metrizability problem.
- Write the equivalent definitions of continuous functions, and homeomorphic spaces.
- Reconstruct homeomorphism functions between topological space
- Write the definitions of open covering, compactness for a topological space and give examples of compact and non-compact spaces.
- Write the definitions of limit point compactness and sequentially compact spaces, and give examples of for both spaces, and Explain the relation between the three types of compactness in general topological spaces and in metric spaces.

8.3 Interpersonal Skills and Responsibility:

After studying this course, the student is expected to:

- To participate in the discussion
- Study, learn and work independently.
- Work effectively in teams.
- Meet deadlines and manage time properly.
- Exhibit ethical behaviour and respect different points of view.

8.4 Communication, Information Technology and Numerical Skills

After studying this course, the student is expected to be able to:

- Present mathematics to others, both in oral and written form clearly and in a well-organized manner.
- Use IT facilities as an aid to mathematical processes and for acquiring available information.
- Use library to locate mathematical information.

9. Methods of Assessment:

Course Assessment	Mark
Class activates (in class quizzes, and homework)	10
Presentation	10
Midterm exams I	20
Midterm exams II	20
Final Examination	40
Total	**100**

10. Course Policies:

- All exams are closed book.
- The final exam will be comprehensive.

11. Attendance Policy:

Absence from lectures and/or tutorials shall not exceed 25%. Students who exceed the 25% limit without an accepted medical or emergency excuse shall not be allowed to take the final examination and shall receive a grade of "DN" for the course.