Philadelphia University
Department of Basic Sciences and Mathematics

First Semester | Course Syllabus | 2014/2015

Course Title	Topology (1)
Course Code	0250461
Lecturer	Ahmad Hamdan
Office Room	1019 S (Ext. 2466)
Office Hours	Sun. Tue. Thu. 9:00-10:00, Mon. Wed. 10:00-11:00
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Course Description

This is an introductory course in Topology. This course will provide a firm foundation in topology to enable the student to continue more advanced study in this area. As several important areas of mathematics, in particular modern analysis, depend upon or are clarified by certain topics in topology, this course will present and emphasize those topics in order to aid the student in his future mathematical studies. Finally, this course hopes to expose the students to both mathematical rigor and abstraction, giving there an opportunity further to develop his mathematical maturity.
Topics will include Topological Spaces: Open sets, closed sets, closure, interior and boundary of a set, cluster points and the derived set, isolated points. Relative topology and subspaces. Bases. Finite product of topological spaces. Continuous functions, open functions, closed functions, homeomorphism, T_0, T_1 and T_2 spaces, connected and compact spaces.

Topics by the Week

Week	Topics
(1)	**Topological Spaces:** Defining a topology, some examples.
(2)	Closed sets. A closer look at the standard topology on $\mathbb{R}$.
(3)	The Interior, Exterior and Boundary of a set.
(4)	Cluster points.
(5)	Topologies induced by functions.
(6)	Examples of topological spaces.
(7)	**Relative topology and subspaces.**
(8)	**Bases, Subbases and Products:** Bases.
(9)	Finite products of topological spaces. Subbases.
(10)	**Continuous functions:** Defining a Continuous Function. Open functions, closed functions.
(11)	Homeomorphisms.

(12)	**Separation and Countability Axioms:** Separation axioms.
(13)	Hausdorff Spaces.
(14)	The Second axiom of Countability and Separable Spaces.
(15)	**Compact Spaces:** Compact Spaces and their properties.
(16)	Review & Final Exam.

Course Objectives

Upon completion of the course, the student will be able to

- understand the concepts of topological spaces and apply them to different mathematical advanced areas,
- learn and apply the concepts of topology on advanced courses,
- analyze and synthesize proofs to build proofs in a deductive reasoning,
- understanding the concepts of compactness especially for the real numbers and applying the idea to different topological spaces,
- practicing proofs for many theorems on different ideas in topology to emphasis the right away in building proofs,
- improving the student's ability to think and write in a mature mathematical fashion and to a solid understanding of the material most useful for advanced courses.

Learning Outcomes

- Knowledge and understanding:
  - Understanding the basic topics of Topology, such as: the concepts; topology, topological spaces, open sets, closed sets, closure, cluster points and compact.
  - Understanding the concepts of continuous functions and homoeomorphism.
  - Defining some examples of topological spaces, such as: discrete, indiscrete, usual, co-finite and co-countable topologies.
- Cognitive skills (thinking and analysis):
  - Analyze and synthesize proofs to build proofs of topological theorems in a deductive reasoning.
- Communication skills (personal and academic).
  - Thinking and talking logically through the principle of proving a big amount of theorems.
- Practical and subject specific skills (Transferable Skills).

- Applying the concepts of topology to different mathematical advanced areas.
- Practice operations on topological spaces and decide whether the result forms a topology.

Assessment Distribution

Students will be assessed based on a 100 total marks, which are distributed as follows.

Exam Type	Expected Time	Points Allocated
First	19/11/2014 - 27/11/2014	20%
Second	28/12/2014 - 6/1/2015	20%
Quizzes	quizzes & homeworks	20%
Final	1/2/2015 - 9/2/2015	40%

Textbook and Supporting Materials

- Long E. Paul, **An Introduction To General Topology**, Amman: Jordan Book Center, 1986.
- Benjamin T. Sims, **Fundamentals of Topology**, 1976, Macmillan Publishing Co.
- Seymour Lipschutz Kendall e. Atkinson, **Theory and Problems of General Topology** (Schaum's Outline Series), Schaum Publishing Co., ISBN: 0-471-02985-8.
- Munkres, James R., **Topology**, 2nd Edition (2000), Upper Saddle River, New Jersey: Prentice-Hall, 2000, ISBN: 0-13-178449-8.
- Willard,Stephen, **GENERAL TOPOLOGY**, London: Adelison-Wesley, 1970.
- Armstrong, M. A, **BASIC TOPOLOGY**, New York: Springer, 2003.

Class Attendance

Attendance is expected of every student. Being absent is not an excuse for not knowing about any important information that may have been given in class. Under the University's regulations, a student whose absence record exceeds 15% of total class hours will automatically fail the course. Students who in any way disrupt the class will be expelled from the classroom and will not be allowed to return until the problem has been resolved.

Late Exams

Late (make-up) exams will be given only to students who have a valid excuse and are able to provide a written document for its verification. The level of difficulty of a late exam is about 50% higher than that of the corresponding regular exam. All late exams will be conducted during the last week of the semester. Each student is allowed only one make-up in a semester, either for the first exam or the second, but not both. There is no make-up for a late exam.

AHMAD HAMDAN
SEPTEMBER 26, 2014