هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

# Course Specifications

| | |
|---|---|
| **Course Title:** | **TOPOLOGY** |
| **Course Code:** | **442 Math** |
| **Program:** | **B. Sc. in Mathematics** |
| **Department:** | **Mathematics** |
| **College:** | **Science** |
| **Institution:** | **Jazan University** |

## Table of Contents

## A. Course Identification

| |
|---|
| **1. Credit hours:** |
| **2. Course type**<br>**a.** University ☐ College ☐ Department ☑ Others ☐<br>**b.** Required ☑ Elective ☐ |
| **3. Level/year at which this course is offered: Level 7/Year 4** |
| **4. Pre-requisites for this course** (if any)**: 315 Math** |
| **5. Co-requisites for this course** (if any)**: none** |

**6. Mode of Instruction** (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | **Traditional classroom** | 45 | 100% |
| 2 | **Blended** | | |
| 3 | **E-learning** | | |
| 4 | **Distance learning** | | |
| 5 | **Other** | | |

**7. Contact Hours** (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | **Lecture** | **42** |
| 2 | **Laboratory/Studio** | |
| 3 | **Tutorial** | **3** |
| 4 | **Others** (specify) | |
| | **Total** | **45** |

## B. Course Objectives and Learning Outcomes

### 1. Course Description

This course is designed to provide students with topological space - Accumulation points(Limit points)and the derived set- Closed sets and Closure of set - Interior, Exterior and Boundary set – Neighborhoods and Neighborhoods systems - Subspace Topology and relative Topology - Bases and subbases - Continuity and Topological Equivalent - Open and Closed functions - Homeomorphism and Topological properties - Connected and Compact space.

### 2. Course Main Objective

After finishing the course, the student is expected to be familiar with the following:

- Know the definitions of topology and some concepts of topology
- Recognize between the closure, interior and derived sets
- Write a topology generating by base and subbase
- Prove the equivalent properties of continuity and open, closed functions
- Learn the concepts of neighborhood, compactness and connectedness

### 3. Course Learning Outcomes

| CLOs | | Aligned PLOs |
|---|---|---|
| 1 | **Knowledge and Understanding** | |
| 1.1 | Distinguish mathematical concepts relevant to Topological spaces, Neighbourhood systems, Base and subbase, continuous functions, compactness and connectedness. | K1 |
| 1.2 | Identify structures and features of Mathematics problems in Topological spaces, Neighbourhood systems, Base and subbase , continuous functions , compactness and connectedness. | K2 |
| 1.3 | Explain required notations and concepts in Topological spaces, Neighbourhood systems, Base and subbase, continuous functions, compactness and connectedness | K3 |
| **2** | **Skills :** | |
| 2.1 | Apply aspects relevant to Topological spaces, Neighbourhood systems, Base and subbase, continuous functions, compactness and connectedness | S1 |
| 2.2 | Compute rates/quantities and Approximate Solutions in Topological spaces, Neighbourhood systems, Base and subbase, continuous functions, compactness and connectedness. | S2 |
| 2.3 | Apply various math rules, techniques and theorems in Topological spaces, Neighbourhood systems, Base and subbase, continuous functions, compactness and connectedness. | S3 |
| 2.4 | Solve mathematical problems using critical thinking and problem solving in Topological spaces, Neighbourhood systems, Base and subbase, continuous functions, compactness and connectedness. | S4 |
| **3** | **Values:** | |
| 3.1 | Cultivate a mathematical attitude and nurture the interest. | V1 |
| 3.2 | Realize the importance of responsibilities through different modes of practice, competition and related activities. | V2 |
| 3.3 | Inculcating values and ethics in thought, expression and deed. | V3 |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | Topological space | 6 |
| 2 | Accumulation points(Limit points)and the derived set, Closed sets and Closure of set. | 6 |
| 3 | Interior, Exterior and Boundary set. | 6 |
| 4 | Neighbourhoods and Neighbourhood systems | 6 |
| 5 | Subspace Topology and relative Topology | 5 |
| 6 | Bases and subbases | 5 |
| 7 | Continuity and Topological Equivalent, Open and Closed functions. | 6 |
| 8 | Homeomorphism and Topological properties, Connected and Compact space | 5 |
| **Total** | | 45 |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge and Understanding** | | |
| 1.1 | Distinguish mathematical concepts relevant to topological spaces, Neighbourhood systems, Base and subbase, continuous functions, compactness and connectedness. | Lectures, Web based work, Classroom discussions. | Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments |
| 1.2 | Identify structures and features of Mathematics problems in Topological spaces, Neighbourhood systems, Base and subbase, continuous functions , compactness and connectedness. | Lectures, Web based work, Classroom discussions. | Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments |
| 1.3 | Explain required notations and concepts in Topological spaces, Neighbourhood systems, Base and subbase, continuous functions, compactness and connectedness | Lectures, Web based work, Classroom discussions. | Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments |
| **2.0** | **Skills** | | |
| 2.1 | Apply aspects relevant to Topological spaces, Neighbourhood systems, Base and subbase, continuous functions, compactness and connectedness | Lectures, problem solving, web based work, Classroom discussions. | Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments |
| 2.2 | Compute rates/quantities and Approximate Solutions in Topological spaces, Neighbourhood systems, Base and subbase, continuous functions, compactness and connectedness. | Lectures, problem solving, web based work, Classroom discussions. | Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments |
| 2.3 | Apply various math rules, techniques and theorems in Topological spaces, Neighbourhood systems, Base and subbase, continuous functions, compactness and connectedness. | Lectures, problem solving, web based work, Classroom discussions. | Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments |
| 2.4 | Solve mathematical problems using critical thinking and problem solving in Topological spaces, Neighbourhood systems, Base and subbase, continuous functions, compactness and connectedness. | Lectures, problem solving, web based work, Classroom discussions. | Written exam (Problem solve, MCQ, true/false, Proof, Short answer), Quizzes, Assignments |
| **3.0** | **Values** | | |
| 3.1 | Cultivate a mathematical attitude and nurture the interest. | Group work, problem solving, web based work | Assignments |
| 3.2 | Realize the importance of responsibilities through different modes of practice, competition and related activities. | Group work, problem solving, web based work | Assignments |
| 3.3 | Inculcating values and ethics in thought, expression and | Group work, | Assignments |

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| | deed. | problem solving, web based work | |

### 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| 1 | Homework | 3 | 5% |
| 2 | First exam. | 6 | 20% |
| 3 | Second exam. | 12 | 20% |
| 4 | Homework | 14 | 5% |
| 5 | Final exam. | 16 | 50% |

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**
Each group of students assigned to a member of staff who will be available for help and academic guidance office hours at specific hours on daily basis. At least be available 8 hours per week.

## F. Learning Resources and Facilities

### 1.Learning Resources

| | |
|---|---|
| **Required Textbooks** | S. Lipschutz(1965), General Topology, Schaum's Outline Series |
| **Essential References Materials** | - B. Mendelson(1990), A Introduction to Topology, Dover Publications, Inc., New York.<br>- Paul E.long (1971), A Introduction to General Topology, Charles E Menil Publishing Company.<br>- J. R. Munkres(1977), Topology: A first Course, Prentice- Hall.<br>- C. W. Patty(1993), Foundation of Topology , PWS-Kent Publishing |
| **Electronic Materials** | Web sites dedicated to Topology available on the internet |
| **Other Learning Materials** | |

### 2. Facilities Required

| Item | Resources |
|---|---|
| **Accommodation**<br>(Classrooms, laboratories, demonstration rooms/labs, etc.) | Classroom, Computer lab. |
| **Technology Resources**<br>(AV, data show, Smart Board, software, etc.) | Data show; Smart Board, Mathematics software. |
| **Other Resources**<br>(Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | |

## G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---|---|---|
| Effectiveness of teaching | Students, Peer and program leader | Indirect (Course Evaluation Survey)- Indirect peer evaluation |
| Assessment | Students, Program assessment committee | Direct/ Indirect |
| Extent of achievement of course learning outcomes | Instructor | Direct/Indirect |
| Quality of learning resources | Students, Faculty members | Indirect |

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

| | |
|---|---|
| **Council / Committee** | **Board Of Mathematics Department** |
| **Reference No.** | **12th Meeting Of The Board Of Mathematics Department 1441-1442** |
| **Date** | **14/6/1442 A. H.; 27/1/2021 A. D.** |