اعتماد
NCAAA

T4

2020

# Course Specifications

| Course Title: | Introduction to Topology |
|---|---|
| Course Code: | MATH 4430 |
| Program: | Bachelor of Science in Mathematics |
| Department: | Mathematics |
| College: | College of Science and Humanities Alkharj |
| Institution: | PRINCE SATTAM BIN ABDUALZIZ UNIVERSITY |

# Table of Contents

## A. Course Identification

| | |
|---|---|
| **1. Credit hours:** | **04** |

**2. Course type**

a.   University ☐   College ☐   Department ☑   Others ☐

b.   Required ☑   Elective ☐

**3. Level/year at which this course is offered:**   Level 11

**4. Pre-requisites for this course** (if any)**:**

MAT 3460

**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** | 04 | 100% |
| 2 | **Blended** | | |
| 3 | **E-learning** | | |
| 4 | **Distance learning** | | |
| 5 | **Other** | | |

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

| No | Activity | Contact Hours |
|---|---|---|
| 1 | **Lecture** | 48 |
| 2 | **Laboratory/Studio** | 0 |
| 3 | **Tutorial** | 0 |
| 4 | **Others** (specify) – (5 Office Hours in a week) | 60 |
| | **Total** | 108 |

## . Course Objectives and Learning Outcomes

### 1. Course Description

Logic and Foundations – Relations – Cardinality – Axiom of Choice – Topologies – Closed Sets – Continuous Functions – Arbitrary Products – Metric Topologies – Quotient Topology – Connected Spaces – Compact Spaces – Well– Ordered Sets – Maximum Principle – Countability and Separation Axioms – Urysohn Lemma – Metrization – Tietze Theorem – Tychonoff Theorem – Stone–Cech Compactification – Baire Spaces – Dimension – Imbedding in Euclidean Space

### 2. Course Main Objective

1- The Objective is to make the students acquire knowledge about algebraic topology and associated theorems and results.

## 3. Course Learning Outcomes

| | CLOs | Aligned PLOs |
|---|---|---|
| 1 | **Knowledge and Understanding** | |
| 1.1 | Be familiar with the concept of topology, topological spaces , relative topology open sets, closed sets, interior point and limit points of a set in a topological space | K1, |
| 1.2 | Be familiar with the concept of continuous function, open mapping, homeomorphism, topological properties in a topological space and associated theorems | K2 |
| **2** | **Skills :** | |
| 2.1 | Evaluate Closure, Interior Point, relative topology, relative topology, basis of a topolgoy | S1 |
| 2.2 | Able to classify topological spaces as T1, Hausdorff, Regular and Normal, understand the relationship between them and learn their hereditary and topological | S2 |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | Review of Logic and Foundations – Relations - Cardinality – Axioms of Choice | 4 |
| 2 | Introduction to Topology and Topological Spaces - Open and Closed Sets – Closure – Interior Point | 4 |
| 3 | Relative Topology – Sub spaces | 4 |
| 4 | Continuous Functions | 4 |
| 5 | Metric Topology – Quotient Topology | 4 |
| 6 | Connected Spaces | 4 |
| 7 | Compact Spaces | 6 |
| 8 | Well Ordered Sets – Maximum Principle | 3 |
| 9 | Countability and Separation Axioms | 3 |
| 10 | Urysohn Lemma | 3 |
| 11 | Metrization – Tietzie Theorem – Tychnoff Theorem | 3 |
| 12 | Stone-Cech compactification | 3 |
| 13 | Baire Spaces – Dimension | 3 |
| **Total** | | 48 |

## D. Teaching and Assessment

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

| Code | Course Learning Outcomes | TeachingStrategies | AssessmentMethods |
|---|---|---|---|
| **1.0** | **Knowledge and Understanding** | | |
| 1.1 | Be familiar with the concept of topology, topological spaces , relative topology open sets, closed sets, interior point and limit points of a set in a topological space | 1. Class Room Lectures 2. Interactive sessions 3. Exclusive Office Hours for clearing doubts in small groups | 1. Two Internal Exams 2. At least two Quiz 3. End Semester Exam |
| 1.2 | Be familiar with the concept of continuous function, open mapping, homeomorphism, topological properties in a topological space and associated theorems | | |
| **2.0** | **Skills** | | |
| 2.1 | Evaluate Closure, Interior Point, relative topology, relative topology, basis of a topolgoy | 1. Application oriented exercises | 1. Homework 2. Assignments 3. Quiz |

| Code | Course Learning Outcomes | TeachingStrategies | AssessmentMethods |
|---|---|---|---|
| 2.2 | Able to classify topological spaces as T1, Hausdorff, Regular and Normal, understand the relationship between them and learn their hereditary and topological | 2. Homework to improve the analytical skills | 4. Exams |

## 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| 1 | Mid Term Exam I | 6 | 20% |
| 2 | Quiz | 4 & 10 | 5% |
| 3 | Mid Term Exam II | 13 | 20% |
| 4 | Continuous Assessment – Homework, Assignment, Attendance etc. | -- | 5% |
| 5 | End Semester Exam (Practical 10%, Theory 40%) | 15 | 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 :**

1. Exclusive Office Hours – 5 Hours per week
2. Academic Advising for Students – 1 Hour per week

## F. Learning Resources and Facilities

### 1.Learning Resources

| | |
|---|---|
| **Required Textbooks** | -Munkres James, "Topology", 2nd ed. Upper Saddle River – NJ: Prentice Hall, ISBN: 0131816292<br>-Introduction to General Topology, by George L. Cain, ISBN10: 0201756110, ISBN13: 978-0201756111<br>-Topology : Introduction to Point -Set and Algebraic, by Donald W. Kahn, ISBN10: 0486686094 ISBN13: 978-0486686097 |
| **Essential References Materials** | NIL |
| **Electronic Materials** | |
| **Other Learning Materials** | Lecture Notes Prepared by the Department of Mathematics |

### 2. Facilities Required

| Item | Resources |
|---|---|
| **Accommodation**<br>(Classrooms, laboratories, demonstration rooms/labs, etc.) | Classrooms with Smart boards with seating facilities for at least 30 students |
| **Technology Resources**<br>(AV, data show, Smart Board, software, etc.) | Smartboard, Internet Connection for Blackboard |

| Item | Resources |
|---|---|
| | Computer Lab with software packages such as Excel etc. |
| **Other Resources** (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | Nil |

## G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---|---|---|
| Course Evaluation | Quality Assurance Committee of the Department | Review all the course documents and course report |
| Peer Review | Senior Faculty Members / HoD | Attend the lecture and fill in a form |
| End Semester online survey | students | online survey |

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

## H. Specification Approval Data

| Council / Committee | |
|---|---|
| Reference No. | |
| Date | |