**Code and Name:**

**MAT5690 Metric Topology**

**Unit:**

Institute of Science, Department of Mathematics

**Details:**

* **Term:** 2023-2024 Spring
* **Status:** Elective
* **Class Level:** 1
* **Credit Hours:** 3-0-0-3
* **ECTS:** 6
* **Language:** Turkish

**Course Instructors:**

* **Course Coordinator:** ...
* **Assistant Instructor:** ...
  + **Phone:** ...
  + **Email:** ...@firat.edu.tr
  + **Social Accounts:** ...

**Weekly Schedule**

| **Monday** | **Tuesday** | **Wednesday** | **Thursday** | **Friday** | **Saturday** |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |

**Teaching Method:**  
Each weekly hour will include at least 45 minutes of face-to-face teaching.

**Location:**

* **In-person (YY):** Classroom (To be announced)
* **Remote (UE):** -

**Objective:**

To present significant theorems in metric spaces and explore their properties and applications.

**Materials:**

1. Y. Soykan, *Metric Spaces and Their Topology*, Nobel Publications, Ankara, 2012
2. P.K. Jain, K. Ahmad, *Metric Spaces*, Narosa Publishing House, 1993

**Student Responsibilities:**

Students are required to attend at least 70% of the classes.

**Weekly Lesson Plan:**

| **Week** | **Topic** | **Methodology** |
| --- | --- | --- |
| 1 | Metric definition and metric value calculations | Face-to-Face |
| 2 | **Metric Spaces**: Open and closed balls, properties | Face-to-Face |
| 3 | **Bounded and Unbounded Sets**: Open sets, interiors, accumulation points, closures | Face-to-Face |
| 4 | **Normed Spaces**: Definitions, properties, norm calculations | Face-to-Face |
| 5 | **Normed Spaces**: Open and closed balls, bounded and unbounded sets | Face-to-Face |
| 6 | **Fixed Point Theorem**: Fixed points in metric and normed spaces, continuity, homeomorphisms | Face-to-Face |
| 7 | **Extension Theorems**: Tietze extension theorem, uniform continuity, connectedness, local connectedness, path connectedness | Face-to-Face |
| 8 | **Compactness**: Total boundedness, sequential compactness, countable compactness, local compactness | Face-to-Face |
| 9 | **Midterm Exam** | Face-to-Face |
| 10 | **Separability and Metric Topology**: Definitions and properties | Face-to-Face |
| 11 | Countability axioms | Face-to-Face |
| 12 | **Baire Category Theorem**: Applications and properties | Face-to-Face |
| 13 | **Dini Theorem and Applications**: Arzelà-Ascoli theorem and applications | Face-to-Face |
| 14 | **Finite and Infinite Products of Sets**: Finite and infinite metric products | Face-to-Face |

**Assessment and Evaluation:**

| **Method** | **Quantity** | **Weight** |
| --- | --- | --- |
| **Midterm Exam** | 1 | 50% |
| **Quizzes** | None | - |
| **Assignments** | Pre- and post-midterm activities | - |
| **Projects** | None | - |
| **Final Exam** | 1 | 50% |

**Learning Outcomes:**

1. Understand metric and normed spaces.
2. Learn concepts of continuity and homeomorphism.
3. Understand uniform continuity, connectedness, and compactness.
4. Learn the Dini theorem.
5. Understand the Arzelà-Ascoli theorem.

**Special Notes:**

* **UE:** Remote Education
* **YY:** Face-to-Face Education