**Code and Name:**

**MAT5730 Topological Groups and Their Properties**

**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 provide knowledge about topological groups, separation axioms, compact spaces and integrals, linear functionals, and complex measures.

**Materials:**

1. Elias M. Stein, *Harmonic Analysis*, 1993
2. Anton Deitmar, *A First Course in Harmonic Analysis*, 2005

**Student Responsibilities:**

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

**Weekly Lesson Plan:**

| **Week** | **Topic** | **Methodology** |
| --- | --- | --- |
| 1 | Introduction to the course and key concepts | Face-to-Face |
| 2 | **Topological Groups**: Fundamental definitions and theorems | Face-to-Face |
| 3 | Subgroups and quotient groups | Face-to-Face |
| 4 | Products of groups and projective limits | Face-to-Face |
| 5 | Properties of connected topological groups | Face-to-Face |
| 6 | **Separation Axioms**: Definitions and equivalence with semi-metrics | Face-to-Face |
| 7 | Structure of compact and locally compact abelian groups | Face-to-Face |
| 8 | Examples of locally compact abelian groups | Face-to-Face |
| 9 | **Midterm Exam** | Face-to-Face |
| 10 | Extension of linear functionals | Face-to-Face |
| 11 | Integrals in locally compact spaces | Face-to-Face |
| 12 | Measurement of linear functionals | Face-to-Face |
| 13 | Integration in product spaces | Face-to-Face |
| 14 | Complex measures and their properties | 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 the concept of topological groups and their properties.
2. Learn the separation axioms and the equivalence of semi-metrics.
3. Understand the structure of compact and semi-compact abelian groups.
4. Learn integration in locally compact spaces.
5. Understand integration in product spaces and complex measures.

**Special Notes:**

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