**Code and Name:**

**MAT5190 Measure and Integration**

**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 introduce students to the fundamental concepts and properties of real analysis.

**Materials:**

1. Mustafa Balcı, *Real Analysis*
2. Anthony W. Knapp, *Advanced Real Analysis*
3. Gerald B. Folland, *A Guide to Advanced Real Analysis*

**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 topics | Face-to-Face |
| 2 | Introduction to real analysis: Algebra, measure, outer measure, Lebesgue outer measure and measure | Face-to-Face |
| 3 | Integral of simple and positive functions | Face-to-Face |
| 4 | Monotone convergence theorem; integrable functions | Face-to-Face |
| 5 | Functions integrable to the ppp-th power | Face-to-Face |
| 6 | Young's inequality | Face-to-Face |
| 7 | Hölder's inequality | Face-to-Face |
| 8 | Riesz-Fischer theorem; essentially bounded functions | Face-to-Face |
| 9 | **Midterm Exam** | Face-to-Face |
| 10 | Uniform and pointwise convergence | Face-to-Face |
| 11 | LpL^pLp-convergence, measure-theoretic convergence | Face-to-Face |
| 12 | Functions of bounded oscillation; derivative of indefinite integral | Face-to-Face |
| 13 | Fubini's differentiation theorem; absolute continuity | Face-to-Face |
| 14 | Various applications | 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 algebra, measure, outer measure, and Lebesgue measure.
2. Learn the integration of simple and positive functions.
3. Grasp the monotone convergence theorem and Riesz-Fischer theorem.
4. Understand uniform, pointwise, and LpL^pLp-convergence.
5. Learn Fubini's differentiation theorem.

**Special Notes:**

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