**Code and Name:**

**MAT5160 Fourier Analysis**

**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 students with fundamental knowledge about the definition, properties, and convergence of Fourier series.

**Materials:**

1. G.P. Tolstov, *Fourier Series*
2. Elias M. Stein, Rami Shakarchi, *Fourier Analysis: An Introduction*

**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 basic concepts | Face-to-Face |
| 2 | **Trigonometric Fourier Series**: Periodic functions, orthogonality of sine and cosine functions | Face-to-Face |
| 3 | **Fourier Series**: Functions with 2π2\pi2π-periodicity, smooth and piecewise smooth functions | Face-to-Face |
| 4 | **Convergence of Fourier Series**: Even and odd functions, cosine and sine series | Face-to-Face |
| 5 | Complex form of Fourier series, orthogonal systems | Face-to-Face |
| 6 | **Orthogonal Systems**: Square-integrable functions, Schwarz inequality | Face-to-Face |
| 7 | Mean square error, Bessel inequality, completeness conditions | Face-to-Face |
| 8 | **Orthogonal Systems**: Conditions for completeness | Face-to-Face |
| 9 | **Midterm Exam** | Face-to-Face |
| 10 | Convergence of trigonometric integrals | Face-to-Face |
| 11 | Conditions for convergence at continuous and discontinuous points | Face-to-Face |
| 12 | Operations on Fourier series: Completeness of trigonometric systems | Face-to-Face |
| 13 | Parseval's theorem, sum and difference of Fourier series | Face-to-Face |
| 14 | Differentiation of Fourier series | 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 periodic and harmonic functions, and learn the concept and properties of Fourier series.
2. Analyze the convergence of Fourier series and understand their complex form.
3. Learn the Fourier series of orthogonal systems.
4. Comprehend the convergence of trigonometric Fourier series.
5. Learn the integration and differentiation of Fourier series.

**Special Notes:**

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