**Code and Name:**

**MAT5770 Advanced 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 a solid foundation for graduate-level education in mathematical analysis.

**Materials:**

1. R. Beals, *Advanced Mathematical Analysis*, Springer, 1973
2. J.A. Fridy, *Introductory Analysis: The Theory of Calculus*, Academic Press, 1987
3. B. Yurtsever, *Mathematical Analysis Lectures*, Vol. I, Ekonomist Publications, 1981
4. M. Balcı, *Mathematical Analysis*, Vol. I, Ertem Press, 2000

**Student Responsibilities:**

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

**Weekly Lesson Plan:**

| **Week** | **Topic** | **Methodology** |
| --- | --- | --- |
| 1 | Real and complex numbers, sequences, series, and convergence tests | Face-to-Face |
| 2 | Metric space concepts, compact sets, and vector spaces | Face-to-Face |
| 3 | Continuity, examples of continuous functions, uniform continuity, and compactness | Face-to-Face |
| 4 | Derivatives of complex-valued functions, related theorems | Face-to-Face |
| 5 | Integration of complex-valued functions and related theorems | Face-to-Face |
| 6 | Function sequences and series, trigonometric and logarithmic functions | Face-to-Face |
| 7 | Functions of two variables, infinitely differentiable functions | Face-to-Face |
| 8 | Periodic functions: Continuous and uniformly periodic functions | Face-to-Face |
| 9 | **Midterm Exam** | Face-to-Face |
| 10 | Convolution and approximation, Weierstrass approximation theorems | Face-to-Face |
| 11 | Periodic distributions and their determination | Face-to-Face |
| 12 | Convolution of distributions | Face-to-Face |
| 13 | Hilbert spaces, L2L^2L2-spaces, orthonormal bases, and expansions | Face-to-Face |
| 14 | Fourier series and related theorems | 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 real and complex numbers, sequences, series, and convergence tests.
2. Learn metric spaces, compact sets, vector spaces, and continuity.
3. Understand the integration and differentiation of complex-valued functions.
4. Learn periodic functions, continuous and uniformly periodic functions.
5. Understand convolution of distributions, Hilbert spaces, L2L^2L2-spaces, orthonormal bases, and Fourier series.

**Special Notes:**

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