**Code and Name:**

**MAT5030 General Mathematical Analysis**

**Unit:**

Institute of Science, Department of Mathematics

**Details:**

* **Term:** 2023-2024 Spring
* **Status:** Mandatory
* **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:**

This course aims to provide students with the general analysis topics they will need in master's and doctoral studies.

**Materials:**

1. Arif Sabuncuoğlu, *Linear Algebra*, Nobel Publishing, 2017.
2. Arif Sabuncuoğlu, *Differential Geometry*, Nobel Publishing, 2014.
3. Alfred Gray, *Modern Differential Geometry of Curves and Surfaces with Mathematica*, Chapman and Hall/CRC, 2006.
4. Hasan Hilmi Hacısalihoğlu, *Linear Algebra*, Dicle University Faculty of Science Publishing, 1975.
5. Andrew Pressley, *Elementary Differential Geometry*, Springer, 2010.

**Student Responsibilities:**

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

**Weekly Lesson Plan:**

| **Week** | **Topic** | **Methodology** |
| --- | --- | --- |
| 1 | **Introduction to the course**: Objectives, content, resources, outcomes, and the importance of the topics | Face-to-Face |
| 2 | **Proof Methods, Limit, Continuity**: Mathematical proof methods, single-variable functions | Face-to-Face |
| 3 | **Derivatives and Integrals**: Definitions, rules, applications | Face-to-Face |
| 4 | **Vector-Valued Functions and Sequences**: Basics and properties | Face-to-Face |
| 5 | **Series**: Convergence tests and expansions | Face-to-Face |
| 6 | **Generalized Integrals**: Definitions and convergence | Face-to-Face |
| 7 | **Multivariable Functions**: Domain, limit, continuity | Face-to-Face |
| 8 | **Multivariable Functions**: Partial derivatives, chain rule, total differential | Face-to-Face |
| 9 | **Midterm Exam** | Face-to-Face |
| 10 | **Multivariable Functions**: Maximum-minimum problems, double integrals | Face-to-Face |
| 11 | **Multivariable Functions**: Triple integrals, line integrals | Face-to-Face |
| 12 | **Real Analysis Basics**: Measurement, measure spaces | Face-to-Face |
| 13 | **Topology Basics**: Topological spaces, bases | Face-to-Face |
| 14 | **Functional Analysis Basics**: Metric, normed, inner product, Hilbert, Sobolev spaces | Face-to-Face |

**Assessment and Evaluation:**

| **Method** | **Quantity** | **Weight** |
| --- | --- | --- |
| **Midterm Exam** | 1 | 50% |
| **Quizzes** | None | - |
| **Assignments** | Before and after midterms | - |
| **Projects** | None | - |
| **Final Exam** | 1 | 50% |

**Learning Outcomes:**

1. Understand limits, continuity, derivatives, and integrals of single-variable functions.
2. Learn vector-valued functions, sequences, and series.
3. Grasp generalized integrals and multivariable functions' limits and continuity.
4. Master core concepts in multivariable functions, double/triple integrals, and line integrals.
5. Understand key concepts in functional analysis, topology, and real analysis.

**Special Notes:**

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