**Code and Name:**

**MAT5130 Fuzzy Set Theory**

**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:**

This course aims to provide students with a new perspective on applied fields by bridging classical sets and numbers with fuzzy sets and numbers.

**Materials:**

1. *Introduction to Fuzzy Arithmetic*, A. Kaufman, M.M. Gupta
2. *Principles and Foundations of Fuzzy Logic*, N. Baykal, T. Beyan

**Student Responsibilities:**

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

**Weekly Lesson Plan:**

| **Week** | **Topic** | **Methodology** |
| --- | --- | --- |
| 1 | Introduction to the course, set theories, and logic | Face-to-Face |
| 2 | Classical sets and operations; Fuzzy set concepts | Face-to-Face |
| 3 | Membership functions, α-cut sets, subsets of fuzzy sets | Face-to-Face |
| 4 | Fuzzy sets: Concepts and properties | Face-to-Face |
| 5 | Fuzzy set operations: Union, intersection, complement, and distance | Face-to-Face |
| 6 | Number sets, intervals, fuzzy numbers, and arithmetic operations | Face-to-Face |
| 7 | Fuzzy relations and functions | Face-to-Face |
| 8 | Fuzzy limits, derivatives, and integrals | Face-to-Face |
| 9 | Midterm Exam | Face-to-Face |
| 10 | Sequences of fuzzy numbers, convergence, and boundedness | Face-to-Face |
| 11 | Statistical convergence of fuzzy sequences | Face-to-Face |
| 12 | Statistical boundedness of fuzzy sequences | Face-to-Face |
| 13 | Cesàro summability in fuzzy sequences | Face-to-Face |
| 14 | Differences in fuzzy sequences and their 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 set theories and logic, classical set operations, and fuzzy set concepts.
2. Learn operations in fuzzy sets, number sets, fuzzy numbers, and their types.
3. Grasp fuzzy relations and functions.
4. Understand fuzzy limits, derivatives, and integrals, as well as fuzzy sequences and their convergence.
5. Learn statistical convergence and boundedness, Cesàro summability, and differences in fuzzy sequences with applications.

**Special Notes:**

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