**Code and Name:**

**MAT5610 Mathematical Statistics**

**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 develop an understanding of the fundamental theory of statistics, including sampling, hypothesis testing, variance analysis, and regression analysis, with derivations based on mathematical and statistical knowledge.

**Materials:**

* A. Bener, *Mathematical Statistics I and II*, First Edition, Yıldız Technical University Foundation, 2002

**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 concepts | Face-to-Face |
| 2 | **Sampling Theory**: Random sampling, distributions, sample mean, and variance | Face-to-Face |
| 3 | **Sample Mean**: Distributions of sample mean and variance, ratios, and differences | Face-to-Face |
| 4 | **Order Statistics**: Distributions of order statistics and random numbers | Face-to-Face |
| 5 | **Estimation Theory**: Maximum likelihood and method of moments | Face-to-Face |
| 6 | **Mean Square Error**: Unbiased, consistent, and sufficient estimators | Face-to-Face |
| 7 | **Confidence Interval**: Mean and variance of populations | Face-to-Face |
| 8 | Confidence intervals for means, ratios, and variances | Face-to-Face |
| 9 | **Midterm Exam** | Face-to-Face |
| 10 | **Test Theory**: Simple and composite hypothesis tests | Face-to-Face |
| 11 | **Error Tests and Power Function**: Type I and II errors, likelihood ratio test, Chi-square test | Face-to-Face |
| 12 | **Variance Analysis**: Properties and applications | Face-to-Face |
| 13 | **Regression Analysis**: Simple and multiple regression analysis | Face-to-Face |
| 14 | **Nonparametric Methods**: Definitions and properties | 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. Learn sampling theory and order statistics.
2. Understand estimation theory, maximum likelihood, and method of moments.
3. Learn mean square error, confidence intervals, and means.
4. Understand error tests, power functions, and variance analysis.
5. Learn regression analysis and nonparametric methods.

**Special Notes:**

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