**Code and Name:**

**MAT5490 Numerical Solutions of Partial Differential Equations**

**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 numerical solutions for the canonical forms of partial differential equations using various methods.

**Materials:**

* Mustafa Balcı, *Numerical Analysis*, Sürat Publications

**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 | **Elliptic Equations**: Finite difference equations for Laplace and Poisson equations | Face-to-Face |
| 3 | **Elliptic Equations**: Dirichlet problem | Face-to-Face |
| 4 | **Elliptic Equations**: Gauss-Seidel method | Face-to-Face |
| 5 | **Elliptic Equations**: Neumann problem | Face-to-Face |
| 6 | **Elliptic Equations**: Irregular boundary conditions | Face-to-Face |
| 7 | **Elliptic Equations**: General applications | Face-to-Face |
| 8 | **Parabolic Equations**: Finite difference equations for the heat equation | Face-to-Face |
| 9 | **Midterm Exam** | Face-to-Face |
| 10 | **Parabolic Equations**: Crank-Nicholson method | Face-to-Face |
| 11 | **Parabolic Equations**: General applications | Face-to-Face |
| 12 | **Hyperbolic Equations**: Applications and solutions | Face-to-Face |
| 13 | **Finite Element Method**: Introduction and applications | Face-to-Face |
| 14 | **Finite Element Method**: General 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. Learn finite difference equations for Laplace and Poisson equations.
2. Understand the Dirichlet problem, Gauss-Seidel method, and Neumann problem.
3. Learn finite difference equations for the heat equation under irregular boundary conditions.
4. Understand the Crank-Nicholson method and hyperbolic equations.
5. Learn the finite element method and its applications.

**Special Notes:**

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