**Code and Name:**

**MAT5050 Fundamentals of Applied Mathematics**

**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:**

To provide graduate students with a detailed understanding of fundamental topics in applied mathematics.

**Materials:**

1. M. Çağlıyan, N. Çelik, S. Doğan, *Ordinary Differential Equations*, Dora Publishing, 2010.
2. K. Koca, *Partial Differential Equations*, Gündüz Education Publishing, 2001.
3. M. Çağlıyan, O. Çelebi, *Partial Differential Equations*, Dora Publishing, 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, importance of topics | Face-to-Face |
| 2 | **Introduction to Ordinary and Partial Differential Equations**: Definitions, order, degree, linearity | Face-to-Face |
| 3 | **Boundary Value Problems**: Initial and boundary conditions, elimination of arbitrary constants | Face-to-Face |
| 4 | **First-Order ODEs**: Basic properties of first-order ordinary differential equations | Face-to-Face |
| 5 | **First-Order ODEs**: Solution methods for first-order ordinary differential equations | Face-to-Face |
| 6 | **Higher-Order ODEs**: Solution methods for higher-order ordinary differential equations | Face-to-Face |
| 7 | **Power Series Method**: Solving differential equations using the power series method | Face-to-Face |
| 8 | **Laplace Transform**: Definition and properties of Laplace transform | Face-to-Face |
| 9 | **Midterm Exam** | Face-to-Face |
| 10 | **Laplace Transform**: Solving initial value problems using Laplace transform | Face-to-Face |
| 11 | **First-Order PDEs**: Basic properties of first-order partial differential equations | Face-to-Face |
| 12 | **First-Order PDEs**: Solution methods for first-order partial differential equations | Face-to-Face |
| 13 | **Second-Order Linear and Nonlinear PDEs**: Classification and solution methods | Face-to-Face |
| 14 | **Second-Order Linear and Nonlinear PDEs**: Solution methods for second-order partial differential equations | 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 fundamental definitions and theorems of ordinary and partial differential equations.
2. Understand the properties and solution methods of first-order ordinary differential equations.
3. Learn solution methods for higher-order ordinary differential equations.
4. Master the power series and Laplace transform methods.
5. Understand and solve first- and second-order partial differential equations.

**Special Notes:**

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