**Code and Name:**

**MAT5830 Applied Surface Theory in Differential Geometry**

**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 perform applications related to manifolds and surface geometry in differential geometry.

**Materials:**

1. V.G. Ivancevic, T.T. Ivancevic, *Applied Differential Geometry*, 2007
2. I.A. Taimanov, *Lectures on Differential Geometry*, 2008
3. G. Farin, *Curves and Surfaces for Computer-Aided Geometric Design: A Practical Guide*, Academic Press, 1990

**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 | **Finsler Manifolds and Applications**: Definitions, energy functionals | Face-to-Face |
| 3 | Finsler-Lagrangian theory | Face-to-Face |
| 4 | **Symplectic Manifolds and Applications**: Symplectic algebra and geometry | Face-to-Face |
| 5 | Fundamentals of Hamiltonian mechanics | Face-to-Face |
| 6 | Applications in Hamiltonian mechanics | Face-to-Face |
| 7 | Multisymplectic geometry | Face-to-Face |
| 8 | **Complex and Kähler Manifolds and Applications**: Complex metrics: Kähler and Hermitian | Face-to-Face |
| 9 | **Midterm Exam** | Face-to-Face |
| 10 | Calabi-Yau manifolds | Face-to-Face |
| 11 | Special Lagrangian submanifolds | Face-to-Face |
| 12 | **Conformal Killing-Riemannian Geometry**: Conformal Killing vector fields | Face-to-Face |
| 13 | Killing tensors | Face-to-Face |
| 14 | Killing tensors and Laplacian symmetry | 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 Finsler manifolds and their applications.
2. Understand symplectic manifolds and their applications.
3. Learn complex and Kähler manifolds and their applications.
4. Understand conformal Killing-Riemannian geometry.
5. Learn Killing tensors and Laplacian symmetry.

**Special Notes:**

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