**Code and Name:**

**MAT5900 Finsler 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 explain the fundamental concepts of Finsler Geometry and examine geometric invariants and fundamental equations on projective sphere bundles.

**Materials:**

1. X. Mo, *An Introduction to Finsler Geometry*, World Scientific Publishing, 2006
2. D. Bao, S.-S. Chern, Z. Shen, *An Introduction to Riemann-Finsler Geometry*, Springer, 2000

**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**: Introduction and fundamental examples | Face-to-Face |
| 3 | Invariants and reversible Finsler structures | Face-to-Face |
| 4 | **Geometric Quantities on Minkowski Space**: Cartan tensor, Cartan form, Diecke theorem | Face-to-Face |
| 5 | Finsler submanifolds and immersion problems | Face-to-Face |
| 6 | **Chern Connection**: Structure of a Finsler bundle and construction of Chern connection | Face-to-Face |
| 7 | Properties of the Chern connection | Face-to-Face |
| 8 | **Covariant Differentiation**: Horizontal and vertical covariant derivatives | Face-to-Face |
| 9 | **Midterm Exam** | Face-to-Face |
| 10 | Geometric invariants: Covariant derivatives along geodesics, Landsberg and S-curvatures | Face-to-Face |
| 11 | **Riemann Invariants**: Curvature of the Chern connection | Face-to-Face |
| 12 | Flag curvature | Face-to-Face |
| 13 | Variations of arc length: First arc length variation | Face-to-Face |
| 14 | Continued discussions on arc length variations | 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. Gain foundational knowledge in Finsler Geometry.
2. Learn about the Chern connection and its curvatures.
3. Understand projective sphere bundles.
4. Study the curvatures of Finsler manifolds.
5. Acquire basic knowledge on harmonic transformations on Finsler manifolds.

**Special Notes:**

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