**Code and Name:**

**MAT5390 Integration and 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 explain the concept of integration, partitioning of a unit, and the most general form of Fubini's theorem as presented at the undergraduate level. To provide the fundamental geometric concepts of differentials and integrals and prepare students for research in differential geometry.

**Materials:**

1. H. H. Hacısalihoğlu, *Differential Geometry*, Vol. III, 4th Edition, Nobel Publishing, 2003
2. S. Kobayashi, K. Nomuzi, *Foundations of Differential Geometry*, Vol. I, John Wiley Sons
3. L. Auslander, *Differential Geometry*, Harper International Edition, 1963
4. B. O’Neill, *Elementary Differential Geometry*, Academic Press, 1966
5. N. J. Hicks, *Notes on Differential Geometry*, Van Nostrand Reinhold Company, 1974

**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 | **Integration**: Fubini’s Theorems (First and Second) | Face-to-Face |
| 3 | **Integration on Vectors**: Ordinary integrals, line integrals, surface integrals, volume integrals | Face-to-Face |
| 4 | **Basic Concepts for Integration Theory**: n-Prism and its partitioning | Face-to-Face |
| 5 | **Basic Concepts for Integration Theory**: Integrability | Face-to-Face |
| 6 | **Basic Concepts for Integration Theory**: Zero measure and zero coverage | Face-to-Face |
| 7 | **Basic Concepts for Integration Theory**: Integrable functions | Face-to-Face |
| 8 | **Basic Concepts for Integration Theory**: Jordan measurable sentences and integrability | Face-to-Face |
| 9 | **Midterm Exam** | Face-to-Face |
| 10 | **Integration on Manifolds**: Concept of manifolds | Face-to-Face |
| 11 | **Integration on Manifolds**: Forms on manifolds | Face-to-Face |
| 12 | **Integration on Manifolds**: Orientation | Face-to-Face |
| 13 | **Stokes’ Theorem on Manifolds** | Face-to-Face |
| 14 | **Orientation and Volume Element**: Volume element on manifolds | 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. Utilize materials related to differential geometry and integration.
2. Evaluate geometric concepts and theories using scientific methods.
3. Express basic concepts for integration theory.
4. Learn Fubini’s theorem.
5. Understand fundamental concepts related to differentials.

**Special Notes:**

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