**Code and Name:**

**MAT5630 Algebraic Topology**

**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 introduce the relationship between algebra and topology by covering fundamental groups and homology groups of topological spaces, providing foundational knowledge in algebraic topology.

**Materials:**

1. J.P. Munkres, *Topology: A First Course*, Prentice Hall, 1975
2. M. Aguilar, S. Gitler, C. Prieto, *Algebraic Topology from a Homotopical Viewpoint*, Springer, 2002

**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 | **Homotopy**: Definitions and properties | Face-to-Face |
| 3 | **Fundamental Groups**: Definitions and examples | Face-to-Face |
| 4 | **Covering Spaces**: Introduction and basic properties | Face-to-Face |
| 5 | Calculating the fundamental group of a circle using covering spaces | Face-to-Face |
| 6 | **Fundamental Group of a Circle**: Definitions and computations | Face-to-Face |
| 7 | **Fundamental Group of the Punctured Plane** | Face-to-Face |
| 8 | **Fundamental Group of SnS^nSn**: Calculations | Face-to-Face |
| 9 | **Midterm Exam** | Face-to-Face |
| 10 | **Fundamental Theorem of Algebra**: Proof using algebraic topology | Face-to-Face |
| 11 | **Fundamental Group Computations**: Advanced examples | Face-to-Face |
| 12 | **Geometric and Abstract Complexes**: Definitions and examples | Face-to-Face |
| 13 | **Topological and Homotopical Invariants**: Definitions and applications | Face-to-Face |
| 14 | **Homology of Surfaces and Other Spaces**: Applications and examples | 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 homotopy and fundamental groups.
2. Understand covering spaces, the fundamental group of a circle, and the punctured plane.
3. Learn the fundamental group of SnS^nSn and the fundamental theorem of algebra.
4. Perform fundamental group computations and understand geometric and abstract complexes.
5. Learn topological and homotopical invariants and the homology of surfaces and other spaces.

**Special Notes:**

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