《Algebraic Topology Spring 2026》 Syllabus

1. Basic course information

course name	Algebraic Topology	course code	MATH2101.01
Course Level	Undergraduate	Credit/Contact Hour:	4/64
Major:	undergraduates and gradautes	Teaching Language	English
Prerequisite	Abstract Algebra (MATH1224) ; Linear Algebra (MATH1112) Introduction to Topology (MATH1233)	Prerequisite suggestion	One of the following: Differential Topology (MATH1224) Homological Algebra (1326)
School/Institute	Institute of Mathematical Sciences	Instructor	Daniel Skodlerack

2.Course Introduction

Algebraic topology has its initial importance in answering topological questions in terms of algebraic objects, for example in using group theory, divided into homology and homotopy. It is used in all areas in pure mathematics, and many of its constructions have counterparts in algebraic geometry as for example the étale fundamental group. As another example in number theory the universal cover is related to the maximal separable extension of a field. So to get used to concepts in algebraic topology even helps later on to understand phenomena which are not directly coming from topology.

3.Learning Goal

Getting profound in using homology groups, cohomology groups and homotopy groups of topological spaces. A knowledge on fibrations (if there is enough time) and CW complexes.

4.Instructional Pedagogy

Lecture and self-reading and homework. The complete material will be published on the website www.skodleracks.co.uk

5. Course Content and Schedule

Chapter	Teaching Contents	Week	Contact Hours	Teaching Modes
[Hatcher, Ch 1.1]	Fundamental group	1	4	Lecture
[Lang, Ch. 1.11]	Category Theory	2	4	Lecture
[Massey, Ch. III]	Free groups	3	4	Lecture
[Hatcher, Ch 1.2]	Seifert-Van Kampen Theorem	4-5	8	Lecture
[Hatcher, Ch. 1.3]	Covering Spaces	6-7	8	Lecture
[Hatcher, Ch. 2]	Homology groups	8-9	8	Lecture
[Massey, Ch IX]	CW complex	10-11	8	Lecture
[Hatcher,Ch. VIII.5]	Mayer-Vietoris sequence	12-13	8	Lecture
[Hatcher, Ch. 3A]	Universal Coefficient Theorem	14-15	8	Lecture
[Hatcher, Ch.3]	Cohomology Theory	16	4	Lecture

6. Grading Policy

Homework: 40%; ; Final: 60%.

7. Textbook & Recommended Reading

(1) Textbook

book name	author	press	publication time	ISBN	edition
Algebraic Topology	Allen Hatcher	Cambridge University Press	2002		
A basic course in Algebraic Topology	William S. Massey	Springer	1991	978-4939-9063-4	1
Algebra	Serge Lang	Springer	2002	978-1-4612-6551-1	3

8.Academic Integrity

This course highly values academic integrity. Behaviours such as plagiarism and cheating are strictly prohibited.

9.Other Information (Optional)