

«Differential Topology» Syllabus

1. Basic course information

course name	Differential Topology	course code	MATH1324
Course Level	Undergraduate	Credit/Contact Hour:	3/48
Major:	undergraduates and gradates	Teaching Language	English
Prerequisite	Topology(MATH1313) ; Introduction to Topology(MATH1233)	Prerequisite suggestion	Linear Algebra II (MATH1122), Real Analysis (MATH1223), Abstract Algebra (MATH1224), Differential Geometry (MATH1316)
School/Institute	Institute of Mathematical Sciences	Instructor	Daniel Skodlerack

2.Course Introduction

MATH 1324 is an introductory course to differential manifolds and differential topology. The main topics include: differentiable manifolds,

differential maps, submanifolds, tangent spaces, vector bundles, differential forms and integration, Stokes theorem,

and basics of de Rham theory (de Rham cohomology, Mayer-Vietoris sequence, and homotopy invariance theorem).

Further we will introduce vector bundles and characteristic classes.

3.Learning Goal

To understand the basics about manifolds, the de Rham complex and de Rham cohomology, vector bundles and characteristic classes.

4.Instructional Pedagogy

Lecture and self-reading and homework

5. Course Content and Schedule

Chapter	Teaching	Week	Contact Hours	Teaching Modes
[BT, S1] [T, S5 S7]	De Rham complex for the n-space	1	2	Lecture/ self-reading
[H, Ch1 (S1, S2)]	Smooth manifolds, submanifolds and smooth maps, tangent bundle	1 to 3	6	Lecture
[H, Ch1, (S3)]	Embeddings	3	2	Lecture/Self-reading
[H, Ch1 (S4)]	Manifolds with boundary	4	2	Lecture
[BT, S2] [T, Ch5]	De Rham complex and de Rham cohomology, Mayer-Vietoris sequence	5 to 7	8	Lecture
[T, Ch. 6] [BT, S3]	Orientations, integration on manifolds and Stokes theorem	7 to 9	6	Lecture
[BT, S4]	Compact De Rham cohomology and Poincare	9 to 11	8	Lecture
[BT S6] [H, Ch4]	Vector bundles and the Thom class and the Euler	12 to 14	8	Lecture
[BT Ch 4]	Characteristic classes	15 to 16	6	Lecture/ self-reading

6. Grading Policy

Homework: 40%; ; Final: 60%.

7. Textbook & Recommended Reading

(1) Textbook

book name	author	translator	press	publication	ISBN	edition
An Introduction	Loring W.Tu		Springer	2010-10	978-1-4419-7399-3	Second Edition
Differential Topology	Morris W. Hirsch		Springer	1976	978-1-4684-9451-8	
Differential forms in Algebraic	Raoul Bott and Loring W. Tu		Springer	1982	978-1-4419-2815-3	

(2) Recommended Reading For complete understanding one should read Whitney embedding and approximation, [Hirsch, Ch2, see for example Thm 2.14] **after** the course. It is not entire important during the course. Also read about de Rham's theorem after the course.

8. Academic Integrity

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

9. Other Information (Optional)