

MATH 151A, TOPOLOGY I
FALL 2015

Instructor: Arunima Ray

Email: aruray@brandeis.edu

Course website: LATTE

Lecture time: MW 330-450p (Block L)

Office: Goldsmith 205

Office hours: M 5–7p, W 11a–1p, and by appointment.

Textbook: *Algebraic Topology* by Allen Hatcher

The book is available online at <http://www.math.cornell.edu/~hatcher/AT/ATpage.html>.

However, the physical copy is quite inexpensive and worth adding to the library of any mathematician.

Additional (optional) references:

Elements of Algebraic Topology by Munkres

Introduction to Topological Manifolds by Lee

Abstract Algebra by Dummit and Foote

Prerequisites:

Basics of point-set topology and algebra.

Course outline:

This is an introductory course in algebraic topology. We will talk about the fundamental group, covering spaces, homology and (time permitting, but unlikely) cohomology. This translates to Chapters 1–3.1 of Hatcher.

Learning goals:

Upon successful completion of this course, students will be able to

- (1) define the fundamental group of a space, and compute the fundamental group of a given space,
- (2) apply the Seifert–van Kampen theorem to determine the fundamental group of a space,
- (3) define and illustrate the concept of covering spaces,
- (4) explain the relationship between (classes of) covers of a space and (classes of) subgroups of its fundamental group,
- (5) apply the concept and theory of covering spaces to solve various problems, including questions about group theory,
- (6) define and distinguish between simplicial, singular, and cellular homologies,
- (7) define and use reduced and relative homologies,
- (8) state the Eilenberg–Steenrod axioms, and
- (9) apply long exact sequences to compute homology groups.

Grading:

Your grade will be determined as follows.

Problem sets: 50%

Midterm: 20%

Final: 30%

If there are any concerns about grading, please see me within one week of getting the assignment/exam back, and before the final. *You must hand in both exams and a majority of the problem sets to receive a passing grade.*

Problem sets:

Problem sets will be posted on LATTE at regular intervals. There will be six problem sets; see schedule at the end of syllabus. Assignments turned in late are subject to a late penalty, and in no case will homework be accepted more than one week after it is due.

Homework is a very important part of this course. I encourage you to work together on problem sets; however, your write-up should be your own. It is not acceptable to look up solutions to homework problems in any written form before you have submitted your work; in particular, *you are not allowed to look up solutions online.*

Exams:

There will be two exams in this course: a midterm and a final. The midterm will be take-home and the final will be comprehensive and in-class (during the registrar's scheduled final exam slot). No make-up exams will be given without prior approval and an appropriate excuse

Expectations:

I don't expect you to follow all the details of a math lecture in real time, but I do expect you to go home and fill in the gaps in your understanding between lectures. In particular, I expect you to supplement my lectures with reading the textbook, which is extremely well-written and readable.

My goal is to distill a large amount of information into a concise presentation, and you should pay attention to my advice about what's important and what isn't.

I also expect you to attend lecture and arrive on time. Regularly missing class puts you at a real disadvantage for effectively learning the material.

Success in this four-credit course is based on the expectation that students will spend a minimum of 9 hours of study time per week in preparation for class (readings, papers, discussion sections, preparation for exams, etc.).

Disability support:

If you are a student with a documented disability on record at Brandeis University and wish to have a reasonable accommodation made for you in this class, please see me immediately.

Academic Integrity:

You are expected to be familiar with, and to follow, the University's policies on academic

integrity. Please consult Brandeis University Rights and Responsibilities for all policies and procedures. All policies related to academic integrity apply to in-class and take home projects, assignments, exams, and quizzes. Students may only collaborate on assignments with permission from the instructor. Allegations of alleged academic dishonesty will be forwarded to the Director of Academic Integrity. Sanctions for academic dishonesty can include failing grades and/or suspension from the university.

Schedule:

PS #1	Sep 16
PS #2	Sep 30
PS #3	Oct 19
MT handed out	Oct 21
MT due	Oct 28
PS #4	Nov 9
PS #5	Nov 23
PS #6	Dec 9
Final Exam	TBA

Disclaimer:

I reserve the right to make changes to this syllabus and to course policies during the semester. Such changes will be announced in lecture and/or by email when they are made. An up to date copy of this syllabus will be available on my website.

Last updated: August 24, 2015