18.901, FALL 2024 — SYLLABUS

Instructor (and author of this). Arpon Raksit (email: arpon@mit.edu; office: 2-238a).

Course description. This is a first course in topology, a subject concerning continuity and shape. The first half of the course will be an introduction to point-set topology, and the second half of the course will be an introduction to algebraic topology. See the schedule below for a (tenative) list of topics to be covered.

Lectures. TR 2:30–4:00pm, in 4-163.

Office hours. TW 1:30–2:30pm, or by appointment, in 2-238.

Internet presence. The course webpage is:

www.mit.edu/~arpon/work/courses/f24-18.901/

Lecture notes, assignments, and announcements will be posted there. The announcements will also be emailed to the class via Canvas. Assignment solutions will be submitted and grades will be reported via Canvas.

Prerequisites. This course is based in the language of set theory and will involve reading, writing, and thinking about proofs in this context. Some knowledge of real analysis will be assumed (having taken one of the 18.100 classes is certainly sufficient, but not mandatory).

References. The course textbook is *Topology* by James Munkres. It covers the main material of the course. However, the lectures will not strictly follow the book, and the homework will not strictly consist of exercises from it. Lecture notes will be posted.

Assignments. This course will have 10 homework assignments, 1 take-home midterm exam, and 1 take-home final exam.

Grading. Regarding the final grade of the course: homework counts for 70%, with your lowest homework score being dropped; the midterm exam will count for 10%; and the final exam will count for 20%.

Assignment logistics. See the schedule below for the release and due dates of assignments; they will be released after lecture on the indicated day, and they are due before lecture on the indicated day.

Late submissions will not be accepted. To be granted an exception to this policy, in case of illness or other extenuating circumstances, please write to S^3 and have them contact me (I should hear from them before the assignment is due).

Collaboration and resources. For homework, you are encouraged to collaborate with your classmates (psetpartners.mit.edu may help with this). However, the solutions you submit must be of your own writing and understanding, and they should acknlowedge any resources outside the lecture notes and textbook that you consulted, including classmates with whom you discussed the problems.

For exams, you must work alone. Here too, what you submit must be of your own writing and understanding. The only resources you may consult are the lecture notes and textbook.

Writing. In your submitted work, please do your best to write clearly. Learning to think and write clearly is satisfying and good, and your grades will necessarily be based partly on your writing.

Attitude. In the context of this course, please do your best to be honest and considerate, with yourself and with others. This includes honesty in your work. Of equal importance, it will be best if everybody feels open to and relaxed when asking questions during lecture, as well as discussing class material outside of lecture; allowing this to happen is up to all of us.

Tenative schedule.

Week	*Date*	*Lecture topic*	*Assignments*
1	Sep 5	Introduction	HW0 release
2	Sep 10	Metric spaces	
	Sep 12	The p-adic metric	HW0 due/HW1 release
3	Sep 17	Topological spaces	
	Sep 19	Constructions I	HW1 due/HW2 release
4	Sep 24	Constructions II	
	Sep 26	Manifolds	HW2 due/HW3 release
5	Oct 1	Compactness I	
	Oct 3	Compactness II	HW3 due/HW4 release
6	Oct 8	Function spaces	
	Oct 10	Connectedness	HW4 due/HW5 release
7	Oct 15	**No lecture or office hour**	
	Oct 17	The Zariski topology	HW5 due
8	Oct 22	Review	
	Oct 24	Review	Midterm release
9	Oct 29	Homotopy	Midterm due
	Oct 31	Fundamental group I	HW6 release
10	Nov 5	Fundamental group II	
	Nov 7	Covering spaces	HW6 due/HW7 release
11	Nov 12	Fundamental group of circle	
	Nov 14	Fundamental group applications	HW7 due/HW8 release
12	Nov 19	Universal covering space	
	Nov 21	Classification of covering spaces	HW8 due/HW9 release
13	Nov 26	Free groups and graphs	
	Nov 28	**No lecture**	
14	Dec 3	Review	HW9 due
	Dec 5	Review	Final release
15	Dec 10	Conclusion	Final due