Mathematics 651: Topology
Spring 2013

Instructor: John Rhodes, `j.rhodes@alaska.edu`, 301B Chapman, 474-5445

Office Hours: General office hours: T 11:00–12:00, W 2:00–3:00, F 12:00-1:00, and by appointment.

Topology homework meeting/office hour: To be determined.

Course web page: `http://www.dms.uaf.edu/~jrhodes/M651.html`

Prerequisites: Math 401 (undergraduate real analysis) or Math 404 (undergraduate topology)

Credit Hours: 4.0

Text: Topology, by James Munkres, Prentice Hall

Class Meetings: M W F 9:15-10:15, in Gruening 308

Midterm Exam: In-class part on Monday, March 4 (tentative, may change due to travel), followed by Take-home part for the rest of the week

Final Exam: In-class part 8:00–10:00, Friday, May 10; a Take-home part of the exam will given out about a week before classes end, and will be due the last day of class

Course overview and goals:

This course rigorously studies the notions of *topological spaces* and *continuous functions*. Even if you haven't been formally exposed to topology before, you have studied the idea of a continuous function $f : \mathbb{R} \to \mathbb{R}$ using the ϵ-δ definition developed in real analysis. In topology, we reformulate that definition to be based on the concept of an *open set*. This then provides a new framework where continuity and its implications can be explored in a surprisingly wide range of settings.

The first two-thirds of the course focus on *point-set topology* (also called *general topology*) progressing from basic definitions to deep theorems such as Urysohn's Metrization Theorem and the Tychanoff Theorem on compactness of products. The remaining third of the course will move into the basics of *algebraic topology*, where groups are associated to spaces as a tool for understanding their structure. Together, this should develop a solid basis of knowledge of what has become a foundational area of mathematics. Though topology arose from more concrete studies of functions of real or complex variables, its modern formulation is abstract. This course will follow the modern style, but also try to build intuition through many examples.

Mechanics of the course:

Class meetings will be run as interactive lectures. That means that while I will usually be lecturing using the blackboard, and you will be taking notes, I will also be asking for suggestions, ideas, and questions about the material as we go along. I don't expect 'correct' answers, but I do expect you to be actively following and participating — that makes the class more interesting for us all.

Class attendance is expected, although I will not formally take roll. (Regularly missing class is sure to make this course much harder for you, and likely to lead to failure.) If you have to miss a class, you should get notes from another student. Homework assignments will be given in class, but also posted on the course web page soon after class is over.

Homework will usually be assigned daily, and collected each Wednesday in class. *All homework must be typed using LaTeX; handwritten work is not acceptable.* No late homework will be accepted, unless I have agreed in advance, or there is a genuine emergency (e.g., a death in the family, medical problem with doctor's excuse).

I encourage you to work with others on the homework, but you must *write up solutions independently.* There will be a weekly 'homework' meeting/office hour (to be scheduled) to discuss any difficulties with the homework before it is due. While attendance is not required at this, it is strongly encouraged. This will be structured as an informal discussion, in which students will provide as many of the ideas as possible.

Examinations Your midterm exam will have two parts: An in-class hour exam will cover your knowledge of definitions, important theorems, examples, and simple proofs. A take-home part, which you will have several days to complete, will consist only of longer proofs and examples.

The final exam has a similar two-part format, but the take-home will be before completed before classes end, and the in-class during the exam period.

Grades: Your performance will be evaluated based on 35% homework, 10% midterm exam in-class, 20% midterm exam take-home, 15% final exam in-class, 20% final exam take-home.

Course grades will be determined according to the following cutoffs:

$$A \geq 90\%,$$
$$B \geq 80\%,$$
$$C \geq 70\%,$$
$$D \geq 60\%.$$

I reserve the right to move the cutoff points downward if particular exams turn out to be unexpectedly difficult. Note that you are not in competition with your peers – everyone in the class may get an A, or everyone may get an F.

University and Department Policies: Your work in this course is governed by the UAF Honor Code. The Department of Mathematics and Statistics has specific policies on incompletes, late withdrawals, and early final exams which can be found at

http://www.dms.uaf.edu/dms/Policies.html.

If you have any disabilities that I should know about, you should bring them to my attention soon so that we can work with the Office of Disability Services to set up any necessary accommodations.

Tentative Schedule

Week 0-1	Jan 18 – 25	Chapter 2
Week 2	Jan 28 – Feb 1	Chapter 2
Week 3	Feb 4 – 8	Chapter 2
Week 4	Feb 11 – 15	Chapter 3
Week 5	Feb 18 – 22	Chapter 3
Week 6	Feb 25 – March 1	Chapter 4
Week 7	March 4 – 8	MIDTERM EXAM, Chapter 4
	March 11– 15	BREAK
Week 8	March 18 – 22	Chapter 4
Week 9	March 25 – 29	Chapter 4
Week 10	April 1 – 5	Chapter 5
Week 11	April 8 – 12	Chapter 9
Week 12	April 15 – 19	Chapter 9
Week 13	April 22 – 24	Chapter 13, SPRINGFEST
Week 14 – 15	April 29 – May 6	Chapter 13