MATH 426: Introduction to Topology

Fall 2025

Instructor:	Kasia Jankiewicz (she/her)	**Time:**	MWF 14:00 - 14:50
Email:	through Canvas	**Place:**	MATH Room 225
Office:	MATH 212	**Canvas page:**	link
Office hours:	F 15:00 - 16:00, or by appointment.		

Contents

1   Land acknowledgement

UBC's Point Grey Campus is located on the ancestral and unceded territory of the xʷməθkʷəy̓əm (Musqueam) people. The land it is situated on has always been a place of learning for the Musqueam people, who for millennia have passed on their culture, history, and traditions from one generation to the next on this site. Learn more about Musqueam here.

2   Prerequisites

A score of 68% or higher in both MATH 321 (Real Variables II) and MATH 322 (Introduction to Group Theory).

3   Course description

This course has two main parts. The first one will cover basics of the point set topology: topological and metric spaces, continuous maps, induced topologies, connectivity, compactness, Urysohn's Lemma. In the second part we will introduce the basic homotopy theory, the fundamental group, and covering spaces. If there is time left, we will discuss additional topics.

4   References

- *Topology* by James Munkres, 2nd edition (can be found online) - we will roughly cover the topics covered by this book, but in less detail.

- *Algebraic Topology* by Allen Hatcher (freely available online) - Chapter 1 corresponds to the second part of the course.

- *Topology and Geometry* by Glen Brendon (pdf available through the UBC library) - Chapter 1 and 3 correspond to the first and second part of this course.

5   Canvas

All the course information and assignment will be posted on Canvas. Please check it for announcements.

6   Homework

Homework problem sets will be assigned weekly on Mondays. They will be due on Sundays at 11:59pm. The homework submission is through Canvas.

You are encouraged to work together on problem sets. However, your solutions must be written up independently. The use of generative AI is permitted, but needs to be acknowledged in your written solution of each problem where you used it. The homework grading will be at the grader's discretion. It might be partially graded for completion and partially for correctness of selected problems. Typesetting your solutions in LaTeX is strongly encouraged.

The late homework is accepted with a 10% penalty per each 24 hour period that it is late. To accommodate for unforeseeable circumstances, two lowest problem set scores will be automatically dropped at the end of the term.

7   Exams

There will be one in-class midterm exam on Friday, October 24. The date of the final exam will be announced by the university in October. The final exam will be cumulative.

8   Grade breakdown

Homework: 40%
Midterm: 20%
Final: 40%

9   Course Topics

Subject to change. The exact topics covered each week will be posted in Canvas.

1. Metric spaces, topological spaces, continuous maps

2. Induced topologies

3. Separation axioms, Urysohn's Lemma

4. Connectedness

5. Compactness, Tychonoff's theorem

6. Homotopy

7. Fundamental group, the van Kampen theorem

8. Covering spaces, classification of covering spaces

9. Deck transformations

10 Accessibility

Students requiring support due to physical or learning disabilities may apply for accommodations through the Centre for Accessibility (CfA). Students must register with the CfA before requesting accommodation.

11 UBC resources to support student success

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions.

Details of the policies and how to access support are available here.

12 UBC statement on respectful environment

The University expects courses to be respectful environments. This expectation extends to discussion forums associated with the course, where posts must be respectful and civil. The University's Statement on Respectful Environment highlights two central principles, *freedom of expression* and *promotion of free inquiry*, and an underlying requirement of *a vigorous commitment to recognition of and respect for the freedoms of others, and concern for the well-being of every member of the university community.*