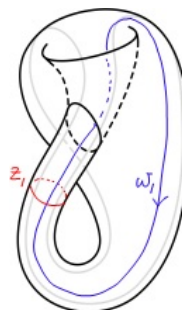


Math 524: Algebraic Topology (Fall 2025)

Credits	3
Time	Tue+Thu 2:55–4:10 pm
Locations	WLSH 4 (P), VECS 125 (V), Zoom (ID: 964 4371 6703, Pwd: 10923)
Instructor	Bala Krishnamoorthy
Instructor location	VLIB 210P (Vancouver), Zoom (ID: 360 546 9167, Pwd: Bala)
Check-in Hours	Tue, Wed 10:30–11:30 AM , or by appt
Email	kbala@wsu.edu
Web page	http://bala-krishnamoorthy.github.io/Math524.html
Text	James R. Munkres: <i>Elements of Algebraic Topology</i> Westview Press, ISBN: 0201-62728-0.



Description of the Course

Algebraic topology uses techniques from abstract algebra to study how (topological) spaces are *connected*. Most often, the algebraic structures used are groups, but more elaborate structures such as rings or modules also arise. A typical approach projects continuous maps between topological spaces onto homomorphisms between the corresponding groups. This course will introduce basic concepts of algebraic topology at the first-year graduate level.

We will follow mostly the book *Elements of Algebraic Topology* by James R. Munkres, and cover in a fair bit of detail the topics on homology of simplicial complexes, relative homology, cohomology, and, if time permits, the basics of duality in manifolds (selected Sections from Chapters 1–5 and 8). Another popular book is *Algebraic Topology* by Allen Hatcher, which could be used as a reference. We will not have the time to cover topics related to the fundamental group. We will stress geometric motivations as well as applications (where relevant) throughout the course.

Prerequisites: Some background in general topology as well as abstract algebra, both at the undergraduate level, will be assumed. In particular, familiarity with the concepts of continuous functions, connectedness, and compactness, as well as with the concepts of groups, homomorphisms, fields, and vector spaces will be helpful to follow the course. But no particularly deep theorems from these topics will be needed. Some flexibility could be afforded as far as this background is concerned—please contact the instructor if you are interested in the class, but have doubts about the background required.

Organization and Grading

The course will have around **seven** homework assignments, which include mostly theoretical, i.e., “pen-and-paper” problems. Each student will also be required to make a short lecture video (at most 10 minutes long). This video could be made on a topic chosen from the textbook (but not covered in class), from another book, or from 1–2 research papers. The suggested format is that of an AATRN Tutorial video. The overall grade will be assigned using the following weights: **homework–75%**, **lecture video–25%**. There will be no exams.

I encourage discussion of homework problems with others. But each student should submit their own (hand or type) written solutions. You might search the internet for finding materials to enhance your understanding. If you use such material to assist in your homework submission, you **should** cite the relevant sources. Plagiarism or cheating will **not** be tolerated. In particular, do not copy blindly from internet sources! Such behavior is easy to detect, and will result in a zero grade for the item in question and possibly a failing grade for the entire course.

AI Use Permitted with Acknowledgment: You are welcome to try AI tools based on generative models such as CoPilot, Chat-GPT, Gemini, and others. Any such use in your homework assignments or projects should be properly acknowledged in your submission. One way to list such an acknowledgment is as follows:

“This response is based on the solution provided by CoPilot when queried with the exact text of the problem statement on Sep 12, 2025.” (change the entries in red appropriately).

At the same time, be warned that most of these tools are not (yet!) guaranteed to give you the correct response every time!

For information on the following WSU policies, please see the University Syllabus. Students are responsible for reading and understanding all university-wide policies and resources pertaining to all courses provided on this web page.

- Reasonable Accommodations
- Arrangements for Religious Reasons
- Emergencies on Campus (including active shooter and severe weather)
- Student Support Resources (including Student Care Network and Campus Resources and Support)