

# Algebraic Topology (SP23)

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## Math 74 Current Problems in Topology

**ORC Course description:** This course provides a foundation in algebraic topology, including both homotopy theory and homology theory. Topics may include: the fundamental group, covering spaces, calculation of the fundamental group, singular homology theory, Eilenberg-Steenrod axioms, Mayer-Vietoris sequence, computations, applications to fixed points and vector fields.

**Prerequisites:** Math 31/71 and Math 54 and permission of Instructor or Math 54 and Math 101.

**This course meets Monday, Wednesday, Friday 10:10-11:15 AM. We will have the occasional x-hours on Thursday 12:15-1:05 PM. The course meets in Kemeny 307.**

**Course Textbook: Allen Hatcher “Algebraic Topology” First Edition**

**Instructor:** Vladimir Chernov, **Office Hours** Monday 11:30-12:30 PM, Tuesday 11:30-12:30 PM, Wednesday 11:30-12:30 PM My office is 304 Kemeny. If you can not come to the office hours please do not hesitate to make an appointment in Zoom or in person.

**Course grade** will be based on regular homework assigned every week 20%, Take Home Midterm Exam 35% and Take Home Final Exam 45%.

**Take home Midterm exam will be Friday April 28 - Tuesday May 2 and it should be submitted on Canvas.**

**Take home Final Exam will be Thursday June 1 - Sunday June 4 and it should be submitted on Canvas.**

### ***Tentative Course Schedule:***

*Weeks 1, 2, 3 Chapter 0*

*Weeks 4, 5, 6 Chapter 1*

*Weeks 7, 8, 9 Chapter 2 and if we have time cohomology*

## **COVID-19 Information:**

### **Attendance:**

You are expected to attend class in person unless you have made alternative arrangements due to illness, medical reasons, or the need to isolate due to COVID-19. For the health and safety of our class community, please: **do not attend class when you are sick**, nor when you have been instructed by Student Health Services to stay home. (If you are unable to attend class, please contact your instructor for further instructions.)

### Safety:

In accordance with [current College policy \(https://covid.dartmouth.edu/face-mask-policy\)](https://covid.dartmouth.edu/face-mask-policy), all members of the Dartmouth community under the conditions described in the [face-mask policy \(https://covid.dartmouth.edu/face-mask-policy\)](https://covid.dartmouth.edu/face-mask-policy) are required to wear a suitable face covering when indoors, regardless of vaccination status. This includes our classroom and other course-related locations, such as labs, studios, and office hours. Masks are welcome at Dartmouth. If you feel more comfortable wearing a mask around others, you are encouraged to do so. (The only exception to the mask requirement is for students with an approved disability-related accommodation; see [Student Accessibility Needs \(https://canvas.dartmouth.edu/courses/54948/pages/student-accessibility-needs\)](https://canvas.dartmouth.edu/courses/54948/pages/student-accessibility-needs).) If you do not have an accommodation and refuse to comply with masking or other safety protocols, your instructor is obligated to assure that the COVID health and safety standards are followed, and you will be asked to leave the classroom. You remain subject to course attendance policies, and dismissal from class will result in an unexcused absence. If you refuse to comply with masking or other safety protocols, and to ensure the health and safety of our community, your instructor is obligated to report you to the Dean's office for disciplinary action under Dartmouth's [Standards of Conduct \(https://student-affairs.dartmouth.edu/policy/standards-conduct\)](https://student-affairs.dartmouth.edu/policy/standards-conduct). Additional COVID-19 protocols may emerge. Pay attention to emails from the senior administrators at the College.

## Consent to Record

*(1) Consent to recording of course and group office hours*

*By enrolling in this course,*

*a) I affirm my understanding that the instructor may record this course and any associated group meetings involving students and the instructor, including but not limited to scheduled and ad hoc office hours and other consultations, within any digital platform used to offer remote instruction for this course;*

*b) I further affirm that the instructor owns the copyright to their instructional materials, of which these recordings constitute a part, and my distribution of any of these recordings in whole or in part without prior written consent of the instructor may be subject to discipline by Dartmouth up to and including expulsion;*

*(2) Requirement of consent to one-on-one recordings*

*By enrolling in this course, I hereby affirm that I will not under any circumstance make a recording in any medium of any one-on-one meeting with the instructor without obtaining the prior written consent of all*

*those participating, and I understand that if I violate this prohibition, I will be subject to discipline by Dartmouth up to and including expulsion, as well as any other civil or criminal penalties under applicable law.*

## Academic Honors Principle

Cooperation on daily and weekly homework is permitted (and encouraged), but you should write up the solution on your own. In other words, you might share your thoughts on a sheet of paper or blackboard to get started together, but then work on your own submission afterwards using only your understanding. For weekly homework, please acknowledge any cooperative work by listing your collaborators at the end of each assignment.

Plagiarism, collusion, or other violations of the [Academic Honor Principle](#) (<https://students.dartmouth.edu/community-standards/policy/academic-honor-principle>) will be referred to the The Committee on Standards. If you have any questions as to whether some action would be acceptable under the Academic Honor Principle, please speak to your instructor beforehand. For more information about standards of conduct, please see [these resources](#) (<https://students.dartmouth.edu/community-standards/>).

## Mental Health

The academic environment at Dartmouth is challenging, our terms are intensive, and classes are not the only demanding part of your life. There are a number of resources available to you on campus to support your wellness, including your:

- Undergraduate Dean (<http://www.dartmouth.edu/~upperde/> (<http://www.dartmouth.edu/~upperde/>));
- Counseling and Human Development (<http://www.dartmouth.edu/~chd/> (<http://www.dartmouth.edu/~chd/>)); and the
- Student Wellness Center (<http://www.dartmouth.edu/~healthed/> (<http://www.dartmouth.edu/~healthed/>)).

I encourage you to use these resources to take care of yourself throughout the term, and to come speak to me if you experience any difficulties.

## Title IX

At Dartmouth, we value integrity, responsibility, and respect for the rights and interests of others, all central to our Principles of Community. We are dedicated to establishing and maintaining a safe and inclusive campus where all have equal access to the educational and employment opportunities Dartmouth offers. We strive to promote an environment of sexual respect, safety, and well-being. In its policies and standards, Dartmouth demonstrates unequivocally that sexual assault, gender-based harassment, domestic violence, dating violence, and stalking are not tolerated in our community.

The Sexual Respect Website (<https://sexual-respect.dartmouth.edu> (<https://sexual-respect.dartmouth.edu/>)) at Dartmouth provides a wealth of information on your rights with regard to sexual respect and resources that are available to all in our community.

Please note that, as a faculty member, I am obligated to share disclosures regarding conduct under Title IX with Dartmouth's Title IX Coordinator. Confidential resources are also available, and include licensed medical or counseling professionals (e.g., a licensed psychologist), staff members of organizations recognized as rape crisis centers under state law (such as WISE), and ordained clergy (see [https://dartgo.org/titleix\\_resources](https://dartgo.org/titleix_resources) ([https://dartgo.org/titleix\\_resources](https://dartgo.org/titleix_resources))).

Should you have any questions, please feel free to contact Dartmouth's Title IX Coordinator or the Deputy Title IX Coordinator for the Guarini School. Their contact information can be found on the sexual respect website at: <https://sexual-respect.dartmouth.edu> (<https://sexual-respect.dartmouth.edu/>).











## Religious Observances

Some students may wish to take part in religious observances that occur during this academic term. If you have a religious observance that conflicts with your participation in the course, please meet with me as soon as possible, or before the end of the second week of the term—at the latest, to discuss appropriate adjustments. Dartmouth has a deep commitment to support students' religious observances and diverse faith practices.

## Student Accessibility Needs

Students requesting disability-related accommodations and services for this course are required to register with Student Accessibility Services (SAS; [Apply for Services webpage](https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fstudents.dartmouth.edu%2Fstudent-accessibility%2Fstudents%2Fwhere-start%2Fapply-services&data=05%7C01%7Cvladimir.chernov%40dartmouth.edu%7C88c28a661714471142ef08da91afaa8b%7C) (<https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fstudents.dartmouth.edu%2Fstudent-accessibility%2Fstudents%2Fwhere-start%2Fapply-services&data=05%7C01%7Cvladimir.chernov%40dartmouth.edu%7C88c28a661714471142ef08da91afaa8b%7C>); [student.accessibility.services@dartmouth.edu](mailto:student.accessibility.services@dartmouth.edu) (<mailto:student.accessibility.services@dartmouth.edu>); 1-603-646-9900) and to request that an accommodation email be sent to me in advance of the need for an accommodation. Then, students should schedule a follow-up meeting with me to determine relevant details such as what role SAS or its [Testing Center](https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fstudents.dartmouth.edu%2Fstudent-accessibility%2Fservices%2Ftesting-center&data=05%7C01%7Cvladimir.chernov%40dartmouth.edu%7C88c28a661714471142ef08da91afaa8b%7C) (<https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fstudents.dartmouth.edu%2Fstudent-accessibility%2Fservices%2Ftesting-center&data=05%7C01%7Cvladimir.chernov%40dartmouth.edu%7C88c28a661714471142ef08da91afaa8b%7C>) may play in accommodation implementation. This process works best for everyone when completed as early in the quarter as possible. If students have questions about whether they are eligible for accommodations or have concerns about the implementation of their accommodations, they should contact the SAS office. All inquiries and discussions will remain confidential.

# Course Summary:

Date	Details	Due
Tue Apr 4, 2023	 <a href="#">Homework Assignment 1</a> ( <a href="https://canvas.dartmouth.edu/courses/58352/assignments/401424">https://canvas.dartmouth.edu/courses/58352/assignments/401424</a> )	due by 5pm
Tue Apr 11, 2023	 <a href="#">Homework 2</a> ( <a href="https://canvas.dartmouth.edu/courses/58352/assignments/405177">https://canvas.dartmouth.edu/courses/58352/assignments/405177</a> )	due by 5pm
Tue Apr 18, 2023	 <a href="#">Homework Assignment 3</a> ( <a href="https://canvas.dartmouth.edu/courses/58352/assignments/405878">https://canvas.dartmouth.edu/courses/58352/assignments/405878</a> )	due by 5pm
Tue Apr 25, 2023	 <a href="#">Homework 4</a> ( <a href="https://canvas.dartmouth.edu/courses/58352/assignments/406470">https://canvas.dartmouth.edu/courses/58352/assignments/406470</a> )	due by 5pm
Tue May 2, 2023	 <a href="#">Midterm</a> ( <a href="https://canvas.dartmouth.edu/courses/58352/assignments/406978">https://canvas.dartmouth.edu/courses/58352/assignments/406978</a> )	due by 5pm
Tue May 9, 2023	 <a href="#">Homework 5</a> ( <a href="https://canvas.dartmouth.edu/courses/58352/assignments/407672">https://canvas.dartmouth.edu/courses/58352/assignments/407672</a> )	due by 5pm
Tue May 16, 2023	 <a href="#">Homework 6</a> ( <a href="https://canvas.dartmouth.edu/courses/58352/assignments/408232">https://canvas.dartmouth.edu/courses/58352/assignments/408232</a> )	due by 5pm
Tue May 23, 2023	 <a href="#">Homework 7</a> ( <a href="https://canvas.dartmouth.edu/courses/58352/assignments/408934">https://canvas.dartmouth.edu/courses/58352/assignments/408934</a> )	due by 5pm
Tue May 30, 2023	 <a href="#">Homework 8</a> ( <a href="https://canvas.dartmouth.edu/courses/58352/assignments/408935">https://canvas.dartmouth.edu/courses/58352/assignments/408935</a> )	due by 5pm
Sun Jun 4, 2023	 <a href="#">Takehome Final Exam</a> ( <a href="https://canvas.dartmouth.edu/courses/58352/assignments/410045">https://canvas.dartmouth.edu/courses/58352/assignments/410045</a> )	due by 12:01pm