

## MATH 440 Winter 2021

### Geometry & Topology

**Instructor:** Paul Goerss

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**Office hours:** TBA

**Course Time:** MWF 10AM.

**Text:** Hatcher, *Algebraic Topology*

This is the second quarter of a three-quarter course; the emphasis here will be on basic algebraic topology. The intent is to go from the definition of singular homology to Poincaré Duality.

1. Singular homology; homotopy invariance
2. Basic homological algebra
3. Local-to-global computations; Mayer-Vietoris
4. CW complexes: CW-homology, simplicial homology
5. More advanced homological algebra: Universal Coefficient Theorems, Eilenberg-Zilber.
6. Cohomology: cohomology rings, the cohomology of projective space
7. Orientations
8. Poincaré Duality

**Homework:** TBA. Depends on whether there is a grader.

**The Evaluation Component – Grades:** There will be no in-class tests, but there will be guided projects in addition to the homework.

**Read this:** As of December 1, 2020, this class is scheduled to be taught in a hybrid format, meaning there will be some in-person class meetings. Math 483 Algebraic Geometry met in the Fall quarter on Fridays, and was on-line the rest of the time. This may be a model for Math 440. Learning and teaching are highly interactive and if we can hold meetings it will add considerably to the experience. However, the final format of the class is not yet set; the final determination will depend on how enrollments proceed, the policies and procedures set by the University, and the course of COVID in the community.

1. **Remote learning is possible, and even on-campus students should not attend a class if they are not well or not comfortable.**
2. In the first week of the quarter all classes are only on-line. We will decide on format for later classes at that time.
3. All classes will be synchronously on-line, will be recorded, and will be available for later review.

**Canvas:** All class materials, including the syllabus, more detailed descriptions of class topics, all assignments including homework and the projects, further policies and procedures, all grades, and the class Zoom link will all be available through Canvas.

**Zoom:** All classes will be accessible virtually, over Zoom, and recorded. (See below on the University's policy on recording.) Attendance is restricted to registered students, and the link will be available only through Canvas.

**If, at any time, the internet connection fails and there is still substantial class time remaining, the instructor will try to reestablish connection for up to ten (10) minutes. If there is still no connection after that time, class will be deemed cancelled and the material will be rescheduled.**

## University Statements and Policies

### Recording

This class or portions of this class will be recorded by the instructor for educational purposes. These recordings will be shared only with students enrolled in the course and will be deleted at the end of the Winter Quarter 2021. Your instructor will communicate how you can access the recordings.

Unauthorized student recording of classroom or other academic activities (including advising sessions or office hours) is prohibited. Unauthorized recording is unethical and may also be a violation of University policy and state law. Students requesting the use of assistive technology as an accommodation should contact AccessibleNU. Unauthorized use of classroom recordings – including distributing or posting them – is also prohibited. Under the University's Copyright Policy, faculty own the copyright to instructional materials – including those resources created specifically for the purposes of instruction, such as syllabi, lectures and lecture notes, and presentations. Students cannot copy, reproduce, display, or distribute these materials. Students who engage in unauthorized recording, unauthorized use of a recording, or unauthorized distribution of instructional materials will be referred to the appropriate University office for follow-up.

### Accessibility

Any student requesting accommodations related to a disability or other condition must register with AccessibleNU and provide the instructor with an accommodation notification from AccessibleNU, preferably within the first two weeks of class. All information will remain confidential. For more information, visit AccessibleNU, or call (847) 467-5530.

### Discrimination and Sexual Harassment

Northwestern University's Policies on Discrimination, Harassment, and Sexual Harassment apply to all members of the University community, including students, staff, and faculty. Any student, staff, or faculty member who believes that he or she has been discriminated against or harassed on the basis of his or her race, color, religion, national origin, sex, sexual

orientation, gender identity, gender expression, parental status, marital status, age, disability, citizenship, veteran status, genetic information or any other classification protected by law, should contact the Office of Equal Opportunity and Access at (847) 491-7458 or the Sexual Harassment Prevention Office at (847) 467-6571. Additional information about the University's discrimination and harassment policies, including the campus resources available to assist individuals with discrimination or harassment concerns, is available online on the Human Resources Equal Opportunity and Access website.

### **Sexual Misconduct and Reporting**

Northwestern University is committed to fostering an environment where students are safe and free from sexual misconduct. Confidential resources are available to those who have experienced sexual misconduct. Faculty and instructors are not confidential resources and are required to report incidents of sexual misconduct, whether discussed in your assignments or in person, to the Title IX Coordinator, who can provide information about resources and options. Students who have experienced sexual misconduct are strongly encouraged to talk with someone to get support. For more information, including how to request interim protective measures and academic accommodations or file a complaint, see the Get Help page.

### **Academic Integrity**

**Academic integrity is taken very seriously at Northwestern.** Students are responsible for reading and understanding Northwestern's academic integrity policies. **All suspected violations of academic integrity will be reported to The Graduate School.** These include: cheating, plagiarism, fabrication, unfair advantage, unauthorized collaboration, and aiding and abetting of academic dishonesty. Students found in violation of academic integrity may receive a zero on the assignment or a failing grade for the course, **and** may be suspended or permanently expelled from the University. See the WCAS website on academic integrity and Academic Integrity: A Basic Guide for more information.

**That all said, I hope to structure the class so that cheating and plagiarism are impossible. Collaboration is not only allowed, but encouraged. The only rule is that you hand in your own work.–PG**

### **Resources**

Students can find useful resources for safety and security, academic support, and mental and physical health and well-being at the NUhelp website and app.