

# MATH 231A: ALGEBRAIC TOPOLOGY

Fall 2024

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**Instructor:** Fan Ye

**Email:** [fanye@math.harvard.edu](mailto:fanye@math.harvard.edu)

**Time:** MW12-1:15pm

**Place:** SC 304.

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**Course Page:** <https://scholar.harvard.edu/fanye/classes/math231a-algebraic-topology>

**Course Assistant:** Greg Wong [gregwong@college.harvard.edu](mailto:gregwong@college.harvard.edu)

**Office Hours:** Fan Ye, SC 505H, MW 1:15-2:15 pm.

Greg Wong M 8-9:30 pm Leverett Dining Hall, Th 3-4:30 pm math lounge

**Main References:** Lectures on Algebraic Topology by Haynes Miller, Chapters 1-3:

<https://math.mit.edu/hrm/papers/lectures-905-906.pdf>

Algebraic topology by Allen Hatcher, Chapters 2-3:

<https://pi.math.cornell.edu/hatcher/>

**Other suggested references:** W. Fulton: Algebraic Topology; E. Spanier: Algebraic Topology; Greenberg and Harper: Algebraic Topology: A First Course

**Prerequisites:** An undergraduate-level understanding of topology. An undergraduate may look at Basic Topology by M. A. Armstrong.

**Tentative Course Outline:** Notes will be posted on the course page after the classes.

- Weeks 1-4: Singular Homology
- Weeks 5-8: Computational methods
- Weeks 9-14: Cohomology and duality

**Grading Policy:** Homework (60% = 5 × 12%) and Final exam (40%).

**Homework:** There will be 6 assignments, posted on the course page every two weeks, which are related to the materials in the next two weeks. The first assignment will be posted on the first week. The homework should be submitted via Canvas (see Important Dates for the exact dates). Late homework is accepted only by my permission. LaTeX, scanned copies, photos of writings, and any other types of writings are accepted if they are clear and understandable. The lowest homework score will be dropped and it is allowed to only finish and submit homework for 5 times.

**Final Exam:** There will be a take-home final exam, posted on the course page on Dec. 4. It should be submitted via Canvas before Dec. 10.

**Collaboration:** Discussion and collaboration are encouraged for homework but students should write up their own solutions. It is good to write the names of collaborators on the first page of the homework. Collaboration on the final exam is prohibited.

**Important Dates:**

Sept. 4, Wed ..... Assignment 1 will be posted  
Sept. 18, Wed ..... Assignment 2 will be posted  
Oct. 2, Wed, 11:59 pm ..... Deadline of Assignment 1  
Oct. 2, Wed ..... Assignment 3 will be posted  
Oct. 16, Wed, 11:59 pm ..... Deadline of Assignment 2  
Oct. 16, Wed ..... Assignments 4 will be posted  
Oct. 30, Wed, 11:59 pm ..... Deadline of Assignment 3  
Oct. 30, Wed ..... Assignment 5 will be posted  
Nov. 13, Wed, 11:59 pm ..... Deadline of Assignments 4  
Nov. 13, Wed ..... Assignment 6 will be posted  
Nov. 27, Wed, 11:59 pm ..... Deadline of Assignment 5  
Nov. 27-29, Wed-Sun ..... Thanksgiving break  
Dec. 4, Wed, 11:59 pm ..... Deadline of Assignment 6  
Dec. 4, Wed ..... Final exam will be posted  
Dec. 10, Tue, 11:59 pm ..... Deadline of final exam