MATH 251 • Topology II

Course Syllabus

I will maintain a copy of this syllabus on the course webpage, updating it as needed.

Course Description

Fundamental groups and covering spaces, separation theorems in the plane, winding numbers, simplicial complexes, surfaces, simplicial and singular homology.

Course Objectives

Students will learn further applications of fundamental groups, especially to surfaces, and begin to learn about homological invariants, like Euler characteristic.

Prerequisites

MATH 250 (Topology I), including: topologies and their bases, metrics, continuous maps, subspaces, product spaces, quotient spaces, connectedness, compactness, the Hausdorff axiom, homotopies, homotopy equivalences.

Course Materials

We will use Munkres, *Topology*, 2nd Edition, and Crossley, *Essential Topology*. If you cannot find these books online, please let me know.

Grading and Evaluation

There will be a participation grade (16%), three in-class exams (each 18%), and a final exam (30%). The exam dates can be found in the course schedule on page 3. Each exam will be preceded by ample practice problems and a study guide. The participation grade will be based on class discussions and on the explicit effort you make to prepare for the exams.

Your raw numerical grade will be the weighted average of the component grades described above. Your final grade in the course will be a letter grade. I expect a raw percentage of 85% or higher to be an A grade, 75–85% to be a B grade, 65–75% to be a C grade, 60–65% to be a D grade, and below 60% to be an F grade. To receive credit for the course, you must earn a C or higher. Graduate students must maintain a B average overall to remain in good academic standing.

If you need to reschedule any exam, then you must email me and receive confirmation well in advance of the original exam date. Please note that I may not be able to grant last-minute requests.

Please keep in mind all other academic regulations of the Graduate School, especially **the zero-tolerance policy for cheating and plagiarism**. In particular, the policy states that the use of AI tools to do work that should be original "…will be considered as cheating and plagiarism. Such infractions will be reviewed and considered for disciplinary actions where applied."

Attendance and Participation Policy

Please attend class on time.

If you get sick, please let me know (with documentation as appropriate), stay at home, and take care of yourself—it will be ok.

Course Schedule

Week	Dates	Lesson Objectives	Text	Notes
1	1/12–1/14	Syllabus, homotopies, homotopy equivalences	Munkres §51, 58	
2	1/21	Path homotopies, fundamental groups	51–52	*MLK Day* (1/19)
3	1/26–1/28	More on fundamental groups	54, 58–59, 70–71	
4	2/2–2/4	Covering spaces	53–54	**Exam 1 (2/2)**
5	2/9–2/11	More on covering spaces	79, 80–82	
6	2/18	The Jordan separation theorem	61	*Presidents' Day* (2/16)
7	2/23–2/25	The Jordan curve theorem, planar graphs	63–64	
8	3/2–3/4	Winding numbers, the fundamental theorem of algebra	65, 56	**Exam 2 (3/2)**
9	3/9–3/11			*Spring Recess*
10	3/16–3/18	Simplicial complexes	Crossley §7.1	
11	3/23–3/25	Euler characteristic, surfaces	7.2–7.3	
12	3/30–4/1	More on surfaces	Munkres §74–77	
13	4/6–4/8	Simplicial homology	Crossley §9.1–9.3	
14	4/13–4/15	Singular homology	10.1–10.3	**Exam 3 (4/13)**
15	4/20–4/22	More on singular homology	10.6–10.7	
16	4/27–4/28			*Reading Period*
17	5/3–5/7			**Final (TBA)**

University Services

Academic and Student Support Services

For tutoring services, visit the Tutoring & Learning Support Services Office.
For writing assistance, visit the Writing Center.
For library services, visit the Howard University Libraries.
For academic advising, visit the Academic Advising Services.
For general student academic support, visit the Center for Academic Excellence.
For general student support, visit the Division of Student Affairs.

Technology Support

Enterprise Technology Services (ETS) and LMS support:
- Canvas has 24/7 support via chat or call 1-877-686-8251. To access Canvas Chat, click the Help icon in the bottom left corner of your Canvas Dashboard.
- For questions about the LMS or third-party tools, visit My Helpdesk and select LMS Support.
- For general tech-support questions, visit My Helpdesk and select Technical Support.
- To contact ETS:
  Phone: 202-806-2020
  Email: huhelpdesk@howard.edu

Proctorio support:
- Visit here for frequently asked questions.
- To contact Proctorio:
  Phone: 480-428-4089 or toll-free at 866-948-9248
  Email: support@proctorio.com

University Statements and Compliance

The Americans with Disabilities Act (ADA)

Howard University is committed to creating an accessible, inclusive, and safe learning environment for all students and providing equal access to students with documented disabilities. Students seeking reasonable accommodations must first register with the Office of Student Services (OSS). There you can engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom and clinical settings, which the Office of Student Services (OSS) determines. Accommodations must be requested each semester. Accommodations are not provided retroactively. If you want to request accommodations, please contact OSS via email at oss.disabilityservices@howard.edu or visit https://howard.edu/disability-services.

COVID-19 Statement

The indoor mask mandate has been lifted on campus for all faculty, staff, students, and visitors, with a notable exception like patient settings. Faculty may continue to

require masks for individual classes. In those classes where a face mask is required, students will be directed to leave the classroom if a face mask is not worn properly to cover the nose and mouth. Any student who refuses or fails to comply with a specific classroom requirement to wear a face mask, and any other measures the University advances for the safety and protection of the Howard Community, will constitute a violation of the University's Student Code of Conduct and could result in sanctions up to and including expulsion from the University.

LGBTQ+

Howard University is committed to providing an educational, living, and working environment that is welcoming, respectful, and inclusive of all members of the University community, including all sexes, sexual orientations, gender expressions, and gender identities. For more information please contact the Division of Student Affairs.

Educational Benefits and Opportunities

No member of the University Community shall deny a student fair access to all educational opportunities and benefits available at the University. To find more information on this policy, please refer to the Code of Ethical Conduct. To report a concern, visit the Office of Student Affairs

The Family Educational Rights and Privacy Act (FERPA)

It is the policy of Howard University (the "University) to ensure that information contained within the education records of all students is protected to the fullest extent of the law. To find more information about this policy visit the FERPA Policy page.

Title IX Statement

Howard University's *Policy Prohibiting Sex and Gender-Based Discrimination, Sexual Misconduct and Retaliation* (aka, the Title IX Policy) prohibits discrimination, harassment, and violence based on sex, gender, gender expression, gender identity, sexual orientation, pregnancy, or marital status. With the exception of certain employees designated as confidential, note that all Howard University employees – *including all faculty members* – are required to report any information they receive regarding known or suspected prohibited conduct under the Title IX Policy to the Title IX Office (TitleIX@howard.edu or 202-806-2550), regardless of how they learn of it. For *confidential* support and assistance, you may contact the Interpersonal Violence Prevention Program (202-836-1401) or the University Counseling Service (202-806-7540). To learn more about your rights, resources, and options for reporting and/or seeking confidential support services (including additional confidential resources, both on and off campus), visit https://howard.edu/title-ix.

Academic Code of Conduct

Howard University is a community of scholars composed of faculty and students both of whom must hold the pursuit of learning and search for truth in the highest regard. Such regard requires adherence to the goal of unquestionable integrity and honesty in the discharge of teaching and learning responsibilities. The prescribed policies and

procedures that pertain to violation of the academic integrity policy are contained in the Student Handbook. Please note include the appropriate student handbook from your perspective college or school (e.g. Howard university school of law student handbook, etc.)

Expected Computer and Digital Literacy Skills

The following computer skills and digital information literacy skills expected for this course include:
- Using the learning management system (Canvas)
- Using email
- Uploading and downloading documents, files, etc.
- Using web conferencing tools and software
- Using remote/virtual libraries and databases
- Properly citing information sources

Communication Policy

Use Standard English in all areas of communication. Although many Internet users are accustomed to lower-case writing and abbreviations, our written exchange should reflect the educational setting in which we are operating. Therefore, out of respect for our institution, as well as to model good practices for our distance learners, please use only polished, thoughtful written expression.

Do not hesitate to ask questions, give suggestions, or raise an issue during the course. If you feel lost or frustrated, please contact one of the facilitators as soon as possible, and let others help you.

Component	What you may expect from instructors	What is expected of you
Email	An instructor will respond to your emails within 48 hours. We often check our email and typically respond promptly. However, please allow an entire business day before emailing again on the same question or issue. Emails sent on Saturday or Sunday will receive a reply by Monday or Tuesday. Please do not expect to receive email from your instructor on Saturdays or Sundays.	If you have a personal question, please send an email. Please sign all your emails with your full name.
Phone	You are welcome to call your instructor, although our preferred communication is through email. If it is a matter of solving a technology question, please email the helpdesk at	If you do not receive a response follow up. Be sure to check your emails to ensure you are responsive, should

	helpdesk@howard.edu. Please be aware that your instructor will not be available to return or receive your calls on Saturdays or Sundays.	the helpdesk have questions. Include your full name, the name of the course, the name of the instructor, and a clear description of your issue. Provide a contact number, should they need to call back.
Announcements	Your instructor will post announcements about any updates to the course.	Read the announcements from the instructor.
Office Hours	We will be available to make an appointment with you should you require additional assistance outside of our established lab sessions. Please be aware that it will be imperative to email us to set up an appointment time and we will be available virtually.	Contact the instructor to set up additional time to meet. Be prepared to use Canvas Collaborate or the designated web conferencing medium in order to access us virtually during your appointed time.

Privacy Polices

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Canvas
Echo 360
Flickr
McGraw Hill Campus & Higher Education
Microsoft
Pearson My Lab & Mastering
Poll Everywhere
Proctorio
SlideShare
Wiley Course Resources & Wiley Plus
YouTube