



Lahore University of Management Sciences

MATH 407/507

Gen./ Adv. Topology

Syllabus and Course Policy-tentative

Spring 2023 - 2024

Instructor	Haniya Azam
Room No.	9-145A
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Office Hours	TBD

Course Basics				
Credit Hours	3			
Lecture(s)	Nbr of Lec(s) Per Week	2	Duration	75 mins
Recitation/Lab (per week)	Nbr of Lec(s) Per Week		Duration	
Tutorial (per week)	Nbr of Lec(s) Per Week		Duration	

Course Distribution	
Core	Graduate students
Elective	
Open for Student Category	Graduate, Undergraduate Seniors.
Close for Student Category	None

Please read this syllabus carefully as it contains extensive information about how the class will proceed. Ignorance of the policies and timelines of this course contained in this syllabus will not be considered a valid excuse at any time.

COURSE DESCRIPTION

This course has been designed as an introduction to general topology. The student enrolled in this course should have a back-ground in Set Theory (and preferably some knowledge of Real Analysis - I). This course covers basic point set topology and will be followed by introductory Algebraic topology. We will revisit metric spaces and study basic notions for topological spaces. We will learn topological properties connectedness and compactness. Constructions such as product spaces and quotient spaces will also be discussed.

Algebraic topology associates algebraic structures to a topological space. The first algebraic invariant is that of the fundamental group. We will cover the fundamental group and there connection with covering spaces.

COURSE PREREQUISITE(S)



Consent of the instructor or Grad

COURSE RULES AND POLICIES

Communication

- **All emails** sent to the instructor or TAs must have a **subject line** of the following format (examples):
“MATH 407/507--URGENT—connectivity issues”
“MATH 407/507—NOT URGENT—question about the average score in quiz 02”
- **All emails** must be signed with name and **roll-number**.
- I will communicate with students by email
- If you email me asking me a question that is already answered in the syllabus, I will not answer your email.
- Also do not flood my inbox to ensure that I have received your submission in your LMS Dropbox. I will not respond to such emails. If it is successfully uploaded, you should be able to see in your LMS Dropbox folder.
- **You are advised not to use informal mediums such as Whatsapp to communicate with the TAs. Please use email.**

Email response policy

I will try my best to respond to emails as soon as possible. However, in some situations it might take up to 24 hours for me to respond.

I will not usually respond to emails over the weekend. I will also not send out emails to the class on Saturday or Sunday unless absolutely necessary.

Announcements

All announcements will be posted on LMS. **It is your responsibility** to regularly check the LMS site for this course.

Mode of Instruction

- **All lectures will be conducted in person** and will last one hour 15 minutes.

Please ask questions, your feedback is essential for teaching and learning in all mediums whether in-person or online.

Grading Breakup

Assignments: (4 best ones out of 6 will be considered towards your grade)

4% x 6 = 16%

Presentations:

8%

Quizzes:

8% x 2 = 16%

Midterm Examination:

30%

Final Examination:

30%

Note that this is tentative and subject to change within the first few weeks of the course.

Grading policy

- This course may be absolutely graded.
- Anyone scoring an aggregate below 40 % will fail this course.
- If you think you are having any difficulties, please reach out to me or the TA well in advance so that we can help you fare better in the course.
- I will be assigning marks for graded components at my own discretion. Please don't mail me or ask the TA's to mediate unless there is a calculation error.
- You are welcome to contest your exams at the announced time, but be mindful of the fact that this may increase or decrease your marks.
- Please don't email me at the end of the semester to ask me to adjust the cut-offs or to change your grades (without any justification) in order to get a higher grade. I will not entertain any such requests for two reasons: it will be unfair to everyone who does not send such emails, and it will undermine the integrity of the course.

Dates for graded components

The date for assignments, quizzes and exams will be strictly adhered to and late submissions will not be entertained, unless faced with some unforeseen circumstances. These are mentioned in the description of assessments.

If you have accessibility issues or any other emergency, please email the instructor regarding graded instruments ASAP.

Harassment Policy

Harassment of any kind is unacceptable, whether it be sexual harassment, online harassment, bullying, coercion, stalking, verbal or physical abuse of any kind. Harassment is a very broad term; it includes both direct and indirect behaviour, it may be physical or psychological in nature, it may be perpetrated online or offline, on campus and off campus. It may be one offense, or it may comprise of several incidents which together amount to sexual harassment. It may include overt requests for sexual favours but can also constitute verbal or written communication of a loaded nature. Further details of what may constitute harassment may be found in the LUMS Sexual Harassment Policy, which is available as part of the university code of conduct.

LUMS has a Sexual Harassment Policy and a Sexual Harassment Inquiry Committee (SHIC). Any member of the LUMS community can file a formal or informal complaint with the SHIC. If you are unsure about the process of filing a complaint, wish to discuss your options or have any questions, concerns, or complaints, please write to the Office of Accessibility and Inclusion (OAI, oai@lums.edu.pk) and SHIC (shic@lums.edu.pk) —both of them exist to help and support you and they will do their best to assist you in whatever way they can.

To file a complaint, please write to harassment@lums.edu.pk.

Help related to equity and Belonging at SSE

SSE's Council on Equity and Belonging is committed to devising ways to provide a safe, inclusive, and respectful learning, living, and working environment for its students, faculty, and staff.

For help related to any such issue, please feel free to write to any member of the school council for help or feedback.

You are also welcome to write to me directly as I am also a member of the council.

Mental Health Support at LUMS

For matters relating to counselling, kindly email student.counselling@lums.edu.pk, or visit <https://osa.lums.edu.pk/content/student-counselling-office> for more information.

You are welcome to write to me or speak to me if you find that your mental health is impacting your ability to participate in the course. However, should you choose not to do so, please contact the Counselling Unit and speak to a counsellor or speak to the OSA team and ask them to write to me so that any necessary accommodations can be made.

COURSE OVERVIEW			
Modules		Readings	Application
1	Topological Spaces and Continuous Functions <ul style="list-style-type: none"> • Topological Spaces • Basis for a Topology • The Order Topology • The Product Topology on $X \times Y$ • The Subspace Topology • Closed Sets and Limit Points • Continuous Functions • The Product Topology • The Metric Topology • The Quotient Topology 	Chapter 2 [M]	
2	Connectedness and Compactness <ul style="list-style-type: none"> • Connected Spaces • Connected Subspaces of the Real Line • Components and Local Connectedness • Compact Spaces • Compact Subspaces of the Real Line • Limit Point Compactness • Local Compactness 	Chapter 3 [M]	
3	Countability and Separation Axioms <ul style="list-style-type: none"> • The Countability Axioms • The Separation Axioms • Normal Spaces • The Urysohn Lemma • The Urysohn Metrization Theorem • The Tietze Extension Theorem • Imbedding's of Manifolds 	Chapter 4 [M]	
4	The Fundamental Group <ul style="list-style-type: none"> • Homotopy of Paths • The Fundamental Group • Classification of covering spaces 	Chapter 9 [M]	

Textbook(s)/Supplementary Readings
[M] Topology, 2nd Edition, James R. Munkres

Assessments

All the assessments are described in the following table including mode of submission (in case of online instruction), dates and expectations from learners.

Note that these are subject to change at the discretion of the instructor.

		Weight (%)
Type 1	<p>Assignments will be 6 in number subject to N-2 policy, each assignment considered will be carrying a weight of 6%, doled out roughly every other week throughout the semester. Meant for informal feedback on presentation of arguments and assessment of applications of concepts learnt until that point in the course.</p> <p>Mode of assessment: Take home.</p> <p>Mode of submission: written submission through LMS dropbox. Please name the file (example) “Assignment_2_YourRollNumber” and submit within the time provided for submission.</p> <p>Submit your work as a single PDF file and not as a collection of individual images or photographs of your answer sheets.</p> <p>Make sure you turn them in as a single PDF file. Please arrange for the possibility to make one PDF from photos of answer sheets, on your device beforehand.</p> <p>Individual images of answer sheets will not be acceptable.</p>	16%
Type 2	<p>Presentations will be conducted in class and the discussant will present a topic prepared beforehand. Meant to address application oriented aspects of the subject or advanced topics.</p>	8%
Type 3	<p>Quizzes meant to assess retention of key concepts in announced quiz syllabus and their application to one or more problems. This includes proof-based questions.</p> <p>Dates: TBA</p> <p>Duration: 20-30 minutes</p> <p>Mode of assessment: In class and in person</p>	16%

Type 4	<p>Midterm exam will assess understanding of concepts, ability to reproduce/ improvise on small-medium length proofs of statements explained in class, as well as applications of concepts to some problems.</p> <p>Date: TBA</p> <p>Duration: 90 minutes</p> <p>Mode of assessment: In class and in person</p>	30%
Type 5	<p>Final exam will be comprehensive and will assess understanding of concepts, ability to reproduce/ improvise small-medium length proofs of statements learnt in class, as well as applications of concepts to some problems. The portion of midterm syllabus tested will be very small compared to post-mid syllabus.</p> <p>Date: TBA</p> <p>Duration: 120 minutes</p> <p>Mode of assessment: In class and in person</p>	30%

If you have any issue or you are uncomfortable with the assessments framework or polices laid out in this syllabus/ outline please write to me as soon as possible, before you are in the thick of things and it is too late.