Course Change Request

New Course Proposal

Date Submitted: 01/26/26 10:40 am

Viewing: **MATH 531 : Topology**

Last edit: 02/04/26 2:34 pm

Changes proposed by: esander

Programs referencing this course

SC-MS-MATH: Mathematics, MS

In Workflow

1. **MATH Chair**
2. **SC Curriculum Committee**
3. SC Assistant Dean
4. Assoc Provost-Graduate
5. Registrar-Courses
6. Banner

Approval Path

1. 01/28/26 10:55 pm Maria Emelianenko (memelian): Approved for MATH Chair

Are you completing this form on someone else's behalf?

No

Effective Term: Fall 2026

Subject Code: MATH - Mathematics

Course Number: 531

Bundled Courses:

Is this course replacing another course? No

Equivalent Courses:

Catalog Title: Topology

Banner Title: Topology

Will section titles vary by semester? No

Credits: 3

Schedule Type: Lecture

Hours of Lecture or Seminar per week: 3

Repeatable:

May only be taken once for credit (NR)

GRADUATE ONLY

Default Grade Mode: Graduate Regular

Recommended Prerequisite(s):

MATH 315 (or equivalent)

Recommended Corequisite(s):

Required Prerequisite(s) / Corequisite(s) (Updates only):

Graduate-student level

Registrar's Office Use Only - Required Prerequisite(s)/Corequisite(s):

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?

Registration Restrictions (Updates only):

Registrar's Office Use Only - Registration Restrictions:

Field(s) of Study:

Class(es):

Level(s):

Degree(s):

School(s):

Catalog Description:

This course provides a basic introduction to topology, the branch of mathematics concerned with the properties of a geometric object that are preserved under continuous deformations, such as stretching, twisting, crumpling, and bending. Topics studied include: fundamental topics such as metric spaces, topological spaces, compactness, connectedness, the fundamental group, and covering spaces.

Justification:

What: Creating a new course.

Why: This course is cross listed with Math 431. The goal is to have an opportunity for graduate students to learn the material at a higher level than they would learn when taking it as an undergraduate student. This course provides a basic introduction to topology. We will cover fundamental topics such as metric spaces, topological spaces, compactness, connectedness, the fundamental group, and covering spaces.

Does this course cover material which crosses into another department? No

Learning Outcomes:

Will this course be scheduled as a cross-level cross listed section? Yes

Please use the Additional Attachments button to attach two syllabi for review, one undergraduate and one graduate, preferably as separate documents. These should be provided in order to demonstrate the difference in expectations and assessments for undergraduates and graduates taking the course.

Attach Syllabus

Math531Syllabus.pdf

Additional Attachments

math431syllabus.pdf

Staffing:

Thomas Wanner, Ben Schweinhart, James Lawrence, Rebecca Goldin, Dave Carchedi, Sean Lawton

Relationship to Existing Programs:

This course is cross listed with Math 431. The goal is to have an opportunity for graduate students to learn the material at a higher level than they would learn when taking it as an undergraduate student. This course is part of a proposed change to our MS program.

Relationship to Existing Courses:

This course is cross listed with Math 431. The goal is to have an opportunity for graduate students to learn the material at a higher level than they would learn when taking it as an undergraduate student.

Have you reached out to the Libraries to determine whether there are adequate resources to support your course? If not, please email Meg Meiman, Associate University Librarian for Learning, Research, and Engagement at mmeiman2@gmu.edu.

No

Additional Comments:

This course is part of a proposed change to our MS program.

Reviewer Comments

Key: 19209

Math 531: Topology, Advanced knowledge level

Course Modality: In person
Course Website: Canvas
Credits: 3
Prerequisite: Grade of C or better in MATH 315 (or equivalent)
Restrictions on registration: Undergraduates cannot enroll in this class

Course Description

Metric spaces, topological spaces, compactness, and connectedness.

Learning Outcomes

This course provides a basic introduction to topology. We will cover fundamental topics such as metric spaces, topological spaces, compactness, connectedness, the fundamental group, and covering spaces.

Course Topics

The course will cover the following topics

Week		Sections in the Book
1	**I. Topological Spaces**	
	1. What is Topology?	
	2. Topological Spaces	12
2	3. Basis for a Topology	13
	4. Topology via Order and Products	14, 15
3	5. The Subspace Topology	16
	6. Closed Sets and Limit Points	17
	7. Limits of Sequences and Separation Axioms	17
4	8. The Metric Topology	20
	II. Continuity of Functions	
	1. Continuous Functions	18
5	2. Topology of Infinite Products	19
	3. Continuity in Metric Spaces	20, 21

6	4. The Quotient Topology	22
	III. Connectedness and Compactness	
	1. Connected Spaces	23
7	2. Connected Subspaces of the Real Line	24
	3. Components and Local Connectedness	25
8	4. Compact Spaces	26, 27
	5. Products of Compact Spaces	26, 37
9	6. Compactness in the Reals and Metric Spaces	27, 28
	7. Local Compactness	29
	IV. Countability and Separation Axioms	
10	1. The Countability Axioms	30
	2. More Separation Axioms	31, 32
	3. The Urysohn Lemma	33
11	4. The Urysohn Metrization Theorem	34
	5. The Tietze Extension Theorem	35
	V. Fundamental Group and Covering Spaces	
12	1. Homotopy of Paths	51
	2. Some Terminology from Group Theory	52
	3. The Fundamental Group	52, 59, 60
13	4. Covering Spaces and Liftings	53, 54
	5. A Sampling of Fundamental Groups	54, 59, 60
14	6. Higher Homotopy Groups and Then?	
	Final Projects!	

Course Textbook

Text: *Topology* by James Munkres, 2nd edition, Pearson Modern Classics, 2017.

Course Policies

Grading: Grading is based on the following:
Homework 60%
Final Project 30%
Attendance and Participation: 10%

Homework: Homework problems will be assigned once a week and posted on Gradescope. These assignments will be graded and count towards your homework score.

AI Tools: The use of Artificial Intelligence tools for the solution of the computer projects is not allowed. All submitted solutions should be solely the work of the student.

Grades in the course will be based on your INDIVIDUAL effort on the quizzes, exams and projects. Discussion of course topics with others is helpful and encouraged; however, all work toward the solution of quizzes, exams, and Python projects submitted for credit, including computer code and written summaries, must be done SOLELY by you. Do not attempt to use ChatGPT or its cousins; it is instantly recognizable to your instructor.

Grading scale:
A, A- : 90 - 100
B-, B, B+ : 80 - 89
C-, C, C+ : 70 - 79
D : 60 – 69

Advanced knowledge level: This course is at a more advanced level than the undergraduate version of the material. This means that more will be expected of you as follows:

1. Problem sets will have some different problems that are at a more advanced level and with higher degree of mathematical sophistication than the ones assigned to undergraduates.
2. The exams will be different, covering more advanced material and/or to have an advanced knowledge level component.

Late Assignments: In case of illness, please contact the instructor to set up a plan for make-up work. Late assignments will not be accepted unless due to emergency, illness, quarantine, work-related, or other documented reasons.

Course Logistics

Content distribution: The course uses Canvas for distributing lecture materials and links to the homework assignments. The latter will be submitted and graded via Gradescope. Canvas can be accessed by visiting https://canvas.gmu.edu/ and logging in with your Mason ID and password, and there is a link to Gradescope from within the course site.

Communication: This course uses Canvas for announcements to distribute class updates, and Mason e-mail to communicate with students. If you wish, please share your name and gender pronouns with me and how best to address you in class and via email. My pronouns are given in Canvas, and you may address me by my title in email

and verbally. Communication over email is largely preferred, and I will respond to student emails promptly within 24 hours.

Course Technology Requirements

Technical Help: If you have difficulty with accessing Canvas, please contact the ITS Support Center at (703) 993–8870 or support@gmu.edu. If you have trouble with using the features in Canvas, email courses@gmu.edu.

Other Details

Disability Statement
If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Resources at 703.993.2474. All academic accommodations must be arranged through that office.

Honor Code
The University Honor Code is to be followed at all times. Sharing information of any kind about exams or quizzes is prohibited. Any violations will be sent to the Honor Committee and will result in a grade of zero. See the University Honor Code.
It is not an Honor Code violation a priori to use GPT or other AI, and you may find it useful to chat with a computer about many aspects of the course. You are strongly discouraged from asking an AI to answer the questions on the problem set. You will fail the exams and quizzes if you don't come up with your own solutions and exercise the part of your creative mind that figures things out. You need to "own" what you know.

AI Honor Code Violations: Do not use AIs such as ChatGPT, Gemini, Claude, Grok, etc. It is an honor code violation to have an AI do any part of your homework, quizzes, or other graded work, even if you ask it to "explain" what it does before you copy in the answer.

AI Use Policy
Using AI to "help" with homework, quizzes, or other graded work is a violation of the Honor Code.

Getting Help
Come to Office Hours!

Student Responsibilities

1. Students must use their Mason email account to receive important University information, including communications related to this class. Per University policy, I will not respond to messages sent from or send messages to a non-Mason email address.
2. It is expected that each student will conduct himself or herself within the guidelines of the Honor Code. All academic work should be done with the level of honesty and integrity that this University demands.
3. You are responsible for the accuracy of your own schedule. Check Patriot Web regularly to verify that you are registered for the classes that you think you are. A student who is not registered may not continue to attend class. Faculty are not permitted to grade work of students who do not appear on the official class roster. You are responsible for knowing the last days to drop and add this class.
4. Once the add and drop deadlines have passed, instructors do not have the authority to approve any requests from students to add or drop/withdraw late. It is NOT permissible to drop the class and leave it at that. It needs approval. Late adds (up until the last day of classes) must be reviewed and approved by the department chair of the course being offered. They will be approved only in the case of a documented university error (such as a problem with Financial Aid being processed). All student requests for withdrawals and retroactive adds (after the last day of classes) must be reviewed by the student's academic dean.
5. Once final grades have been recorded, instructors cannot accept any work to change that course grade. Grade changes can only be approved when they are due to a calculation or recording error on the part of the instructor.
6. An IN (incomplete) grade is a very special grade that can only be applied for in writing. It can only be given in cases in which a student is passing a course and has a very limited amount of work left to complete the course.
7. Federal law (a law known as FERPA) requires the protection of privacy of student information. Therefore, no instructor on campus can speak about a student's record with anyone other than the student. The record includes how a student is doing in a course, whether a student has attended class, information about grades, whether a paper has been turned in. Anything. This prohibition includes parents, siblings, and spouses, anyone. This course adheres to the common course policies set by George Mason University, which includes polices about Academic Standards, Accommodations for Students with Disabilities, FERPA, and Title IX. These policies are described in more detail at the following link: https://stearnscenter.gmu.edu/home/gmu-common-course-policies/ .