

## Course Syllabus

**Course:** Mathematics 9071.001.

**Course Title:** Differential Topology (Topology of fiber bundles).

**Credits:** 3 credits.

**How this course will be taught:** Classroom, in-person.

**Time:** TR 12:30-1:50.

**Place:** Wachman 527.

**Instructor:** Gerardo A. Mendoza.

**Instructor Office:** Wachman 618.

**Instructor Email:** gerardo.mendoza@temple.edu

**Instructor Phone:** 1-5053.

**Course Web Page:** <http://math.temple.edu/~gmendoza>, to some extent also Canvas.

**Office Hours:** Tuesday and Thursday, 11:00-12:00. Office hours by appointment are also possible, arranged one day in advance. Or just come to my office: if I have time, I'll see you.

**Prerequisites:** MATH 8061-8062. Differential Geometry and Topology I, II, or permission from instructor.

**Course Materials:** Notes by instructor (no cost).

**Course Goals:** 1. General aspects of fiber bundles, 2. Topological aspects of vector bundles, 3. differential-geometric structures on manifolds.

**Topics Covered:** The course will begin with introductory lectures on general facts about fiber bundles, but will focus primarily on topological aspects of vector bundles. Topics include Chern classes (and obstructions to triviality), connections, an introduction to Lie groups as needed for the study of principal  $G$ -bundles, groups of bundle isomorphism of a given vector bundle, special structures of the tangent bundle (involutive structures such as complex and CR structures). Time permitting, there will be an introduction to K-theory and the Atiyah-Singer index theorem.

**Course Grading:** This is an advanced graduate course. Attendance and in-class participation will be the primary assessment methods.

**Exam Dates:** This is an advanced graduate course.

**Attendance Policy:** Attendance is required.

**Attendance and Your Health:** To achieve course learning goals, students must attend and participate in classes, according to your instructors' requirements. However, if you feel unwell or if you are under quarantine or in isolation because you have been exposed to the virus or tested positive for it, you should not come to campus or attend in-person classes or activities. It is the student's responsibility to contact their instructors to create a plan for participation and engagement in the course as soon as they are able to do so, and to make a plan to complete all assignments in a timely fashion, when illness delays their completion.

**Disability Statement:** Any student who has a need for accommodations based on the impact of a documented disability or medical condition should contact Disability Resources

and Services (DRS) in Howard Gittis Student Center South, Rm 420 (drs@temple.edu; 215-204-1280) to request accommodations and learn more about the resources available to you. If you have a DRS accommodation letter to share with me, or you would like to discuss your accommodations, please contact me as soon as practical. I will work with you and with DRS to coordinate reasonable accommodations for all students with documented disabilities. All discussions related to your accommodations will be confidential.

**Academic Freedom:** Freedom to teach and freedom to learn are inseparable facets of academic freedom. The University has adopted a policy on Student and Faculty Academic Rights and Responsibilities (Policy # 03.70.02) which can be accessed here.

**Add/Drop Policy:** Students will be charged for a course unless dropped by the Drop/Add deadline date. Check the University calendar for exact dates.

During the Drop/Add period, students may drop a course with no record of the class appearing on their transcript. Students are not financially responsible for any courses dropped during this period. In the following weeks prior to or on the withdrawal date students may withdraw from a course with the grade of “W” appearing on their transcript. After the withdrawal date students may not withdraw from courses. Check the University Calendar for exact dates. See the full policy by clicking here.

**Incomplete Policy:** The grade “I” (an “incomplete”) is only given if students cannot complete the course work due to circumstances beyond their control. It is necessary for the student to have completed the majority of the course work with a passing average and to sign an incomplete contract which clearly states what is left for the student to do and the deadline by which the work must be completed. The incomplete contract must also include a default grade that will be used in case the “I” grade is not resolved by the agreed deadline. See the full policy by clicking here.

**Expectations for Class Conduct:** The best way to maintain a safe and focused learning environment is for everyone to get vaccinated. Masks must be worn by vaccinated and unvaccinated people in all indoor or in enclosed spaces (including classrooms, the Library, the TECH Center, the Student Center, shuttles/buses, administrative spaces, common areas in residence halls, etc.). For your general health and well-being, hand washing and monitoring your health is still highly recommended.

**Student Support Services:** The following academic support services are available to students:

- The Math Consulting Center
- Student Success Center
- University Libraries
- Undergraduate Research Support
- Career Center
- Tuttleman Counseling Services
- Disability Resources and Services

If you are experiencing food insecurity or financial struggles, Temple provides resources and support. Notably, the Temple University Cherry Pantry and the Temple University Emergency Student Aid Program are in operation as well as a variety of resources from the Division of Student Affairs.

## FOR COURSES IN REMOTE MODE:

**Technology specifications for this course:** A working computer with a reliable internet connection, a Webcam, and audio capability. Recommended Internet Speed: 8mbps download & 5mbps upload. You can test your connection at <https://www.speedtest.net>. Please note: Hard-wired connections are more consistent than Wi-Fi for Zoom sessions. A scanning app such as AdobeScan or CamScanner is required as is access to Zoom and Canvas (the Canvas app is also recommended). Limited resources are available for students who do not have the technology they need for class. Students with educational technology needs, including no computer or camera or insufficient Wifi-access, should submit a request outlining their needs using the Student Emergency Aid Fund form. The University will endeavor to meet needs, such as with a long-term loan of a laptop or Mifi device, a refurbished computer, or subsidized internet access.

**Remote proctoring statement:** Zoom, Proctorio or a similar proctoring tool may be used to proctor exams and quizzes in this course. These tools verify your identity and record online actions and surroundings. It is your responsibility to have the necessary government or school issued ID, a laptop or desktop computer with a reliable internet connection, the Google Chrome and Proctorio extension, a webcam/built-in camera and microphone, and system requirements for using Proctorio, Zoom, or a similar proctoring tool. Before the exam begins, the proctor may require a scan of the room in which you are taking the exam.

**Online Classroom Etiquette:** It is expected that each student attends every class on time for the full duration of each class and behaves, in the same professional manner, as if you are in a regular classroom. This refers in particular to your location and attire. It is not appropriate to eat a large meal, drink alcohol, smoke, or get up often during an online class.

**Statement on recording and distribution of recordings of class sessions:** Any recordings permitted in this class can only be used for the student's personal educational use. Students are not permitted to copy, publish, or redistribute audio or video recordings of any portion of the class session to individuals who are not students in the course or academic program without the express permission of the faculty member and of any students who are recorded. Distribution without permission may be a violation of educational privacy law known as FERPA as well as certain copyright laws. Any recordings made by the instructor or university of this course are the property of Temple University.