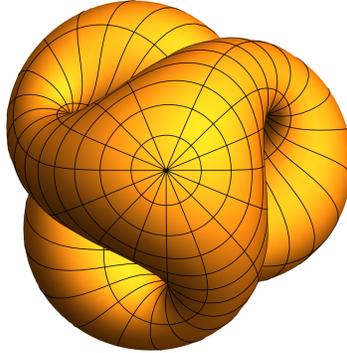


# Math 549 - Differentiable Manifolds I

David Dumas

Fall 2017



## 1. BASIC COURSE INFORMATION

**Course web page** <http://dumas.io/math549/>

**Primary textbook** J. M. Lee, *Introduction to Smooth Manifolds*, 2ed, Springer GTM, 2012.

**Meeting time** MWF 9:00-9:50am

**Location** Taft 305

**CRN** 38306

**Instructor** David Dumas ([david@dumas.io](mailto:david@dumas.io))

**Office** SEO 503

**Office Hours** Mon 2-3 in SEO 503

Wed 11-12 in MSLC (SEO 430)

or by appointment

## 2. COURSE DESCRIPTION

This is a first course on smooth manifolds. We will introduce and study manifolds, smooth maps, tangent spaces, vector fields, and differential forms. If time allows we will include some introductory material on related topics such as Riemannian metrics, foliations, de Rham cohomology, and Lie groups.

Most of the course material will come from the primary textbook (by J. M. Lee). The following secondary texts are recommended for students seeking other expositions of the course material:

- W. M. Boothby, *An Introduction to Differentiable Manifolds and Riemannian Geometry*, 2ed, Academic Press, 1986.
- F. W. Warner, *Foundations of Differentiable Manifolds and Lie Groups*, Springer GTM, 1983.

## 3. PREREQUISITES

Math 445 (topology) and Math 310 or Math 320 (linear algebra) or equivalent background in these topics are required. We will also assume some familiarity with analysis of functions of several real variables (e.g. continuity and differentiability).

#### 4. GRADING

The final grade for the course will be based on the homework assignments, a take-home midterm exam, and a cumulative final exam. These components will be weighted as follows:

- 40% Homework
- 20% Take-home midterm (due at 9:00am on Monday, October 16)
- 40% Final exam (10:30am-12:30pm on Tuesday, December 12)

#### 5. HOMEWORK POLICIES

Problems sets will be posted on the course web page, with each problem set indicating the date when it is due. Some problems will be taken from the textbook. The usual schedule will be one problem set per week, due on Monday.

On the day when an assignment is due, it must be submitted directly to the grader's mailbox on the third floor mailroom in SEO. Detailed submission instructions will be given on the course web page.

Typesetting solutions to problem sets is encouraged, but is not required.

Students in the course may work on the problem sets in groups. However, each student must:

- (1) Write, understand, and submit their own solutions
- (2) Acknowledge collaborators by name on the assignment (e.g. write "in collaboration with Jane Doe" at the top of the page)

A homework grade will be determined by dropping the two lowest problem set scores and then averaging the remaining scores.

Submission of homework on paper (either typeset and printed or legibly hand-written) is required. Please staple multi-page submissions.

#### 6. MIDTERM EXAM

There will be a take-home midterm exam posted on or before Monday October 9 and due **in class** at 9:00am on Monday October 16.

The midterm will be similar to a weekly problem set. However, in addition to material from the previous week, the midterm exam will also include problems on material from earlier in the course. The midterm exam will be graded by the instructor.

Unlike the other weekly problem sets, **no collaboration is permitted on the take-home midterm exam**. Course notes and the three official textbooks are the only references that students are allowed to consult when solving these problems.

#### 7. FINAL EXAM

The final exam will be held at the time set by the registrar, which is 10:30am-12:30pm on Tuesday, December 12. It is important that students avoid making plans (e.g. travel) that conflict with the exam.

The final exam location will be announced at a later date.

#### 8. COMMUNICATION PREFERENCES

Email is the preferred and most reliable method of communication with the instructor outside of lecture and office hours.

## 9. PARTICIPATION

Students are encouraged to ask questions in lecture about the material currently under discussion, and to answer questions asked by the instructor.

Questions specific to a single student (such as requests to clarify comments on returned problem sets) are better left to office hours.

## 10. ATTENDANCE

Students are responsible for all of the material covered in the lectures, including any lectures they miss. Any student who misses a lecture is advised to ask classmates for notes and information about any assignments or course announcements. Lecture notes are not provided by the instructor.

## 11. POLICY ON MISSED OR LATE WORK

In most cases:

- Late homework is not accepted
- Late mid-term exams are not accepted
- Missing the final exam results in a score of zero

Exceptions are made with instructor approval and only under extraordinary circumstances, such as a severe illness or injury. Documentation may be required. Students should contact the instructor as soon as possible regarding any missed or late work if they believe this policy applies.

## 12. CLASSROOM BEHAVIOR

In order to provide a classroom environment most conducive to learning, and to minimize distractions, students are asked to follow these guidelines:

- Use of electronic devices during class should be limited to purposes directly related to the course, such as note-taking<sup>1</sup>.
- Electronic devices should be silenced during class.
- Making or receiving phone calls in the classroom is prohibited.
- Please do not to eat in class. (If this policy creates a hardship, for example due to a medical condition, contact the instructor.)

## 13. UNIVERSITY POLICIES

UIC requires that every syllabus mention the following university policies.

13.1. **Academic deadlines.** The UIC academic calendar can be found at:

<http://catalog.uic.edu/ucat/academic-calendar/>

In particular this calendar includes the deadlines for adding and dropping courses.

13.2. **Academic honesty.** All UIC students are required to maintain the standards of academic integrity described in the *Guidelines Regarding Academic Integrity*:

<http://dos.uic.edu/docs/Guidelines%20for%20Academic%20Integrity.pdf>

In particular, this policy prohibits plagiarism. Any violation of these standards will be handled in accordance with the [Student Disciplinary Policy](#).

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<sup>1</sup>Taking notes by typing on a computer keyboard is *not* recommended, though it is permitted.

13.3. **Disability accommodation.** The University of Illinois at Chicago is committed to maintaining a barrier-free environment so that students with disabilities can fully access university programs, courses, services, and activities. Students with disabilities who require accommodations for access or participation in this course are welcome, but must be registered with the Disability Resource Center (DRC). Students may contact the DRC at 312-413-2183 (voice) or 312-413-0123 (TTY). Further information is available from the DRC web page (<http://drc.uic.edu/>).

13.4. **Religious holidays.** The UIC Senate Policy on religious holidays (approved May 25, 1988) is as follows:

“The faculty of the University of Illinois at Chicago shall make every effort to avoid scheduling examinations or requiring that student projects be turned in or completed on religious holidays. Students who wish to observe their religious holidays shall notify the faculty member by the tenth day of the semester of the date when they will be absent unless the religious holiday is observed on or before the tenth day of the semester. In such cases, the students shall notify the faculty member at least five days in advance of the date when he/she will be absent. The faculty member shall make every reasonable effort to honor the request, not penalize the student for missing the class, and if an examination or project is due during the absence, give the student an exam or assignment equivalent to the one completed by those students in attendance. If the student feels aggrieved, he/she may request remedy through the campus grievance procedure.”

The University Holidays and Religious Observances calendar can be found at:

<http://oae.uic.edu/religious-calendar/>

#### 14. REVISION HISTORY OF THIS DOCUMENT

- 2017-08-25 Initial public posting.