

# Syllabus and course information

## Differential Geometry II, Spring 2018 MTG 6257—Section 249G

MWF 8th period, LIT 201

[Link to class home page](#)

**Instructor** : [Dr. David Groisser](#)

**Office Hours**: Tentatively Tuesday 6th period (12:50-1:40), Wednesday 9th period (4:05-4:55), and Friday 9th period (4:05-4:55). *I will need to reschedule several January (and possibly February) office hours in order to attend talks by applicants for faculty positions in the math department. I will announce the rescheduled hours by email.* My office is Little Hall 308. Please come early in the period or let me know to expect you later; otherwise I may not stay in my office for the whole period. See [my schedule](#) for updates other than the rescheduled hours mentioned above. Students who can't make scheduled office hours may see me by appointment on most weekdays (but **never on a Thursday**).

**Textbook**: None.

**Prerequisite**: MTG 6256.

**Syllabus (course content)**: Integration on oriented manifolds; Stokes's Theorem; de Rham cohomology; Riemannian metrics; introduction to Riemannian geometry (including geodesics and Riemannian curvature); vector bundles and tensor bundles; connections and curvature in greater generality. Depending on students' interests and how much time remains, we may cover additional topics, for which some possibilities are:

Surfaces in  $\mathbb{R}^3$  and the Gauss-Bonnet theorem

Principal bundles; connections on principal bundles and associated vector bundles

Further study in Riemannian geometry (conjugate points on geodesics, Hopf-Rinow Theorem, curvature-comparison theorems, Morse index, ...)

Lie groups and Lie algebras

Elliptic PDE on manifolds and Hodge Theory

Curvature and characteristic classes

Symplectic geometry and the geometry of classical mechanics

Complex and Kaehler manifolds

Selected topics in differential topology (transversality, Poincare-Hopf Theorem, degree theory, embedding theorems, ...)

**Course-grade components**: There will be no exams. Your final grade will be determined entirely by homework, assuming your attendance is good. If your attendance is poor, a grade penalty may be imposed.

**Homework**: I expect to assign and collect from five to eight problem-sets over the course of the semester. The problem-sets will include some problems that are mandatory and some that are optional. I will grade some subset of the mandatory problems. How large that subset is will depend on how many students handed in the assignment, how successful they were solving the problems, and how well-written their solutions are.

Doing well on the mandatory problems will be sufficient for you to get an A in the class. I do not think that you will find the mandatory homework excessive. However, to get the *most* out of the course, you should do as many of the optional problems as you can. The more time you put in, the more you will learn. My intent is to give students who want to learn a great deal the *opportunity* to do so, without *requiring* you to do a lot more work than you would have to do in other 6000-level courses in this department.

**More about homework**: Even when homework is well-written, reading and grading it is very time-consuming and physically difficult for your instructor. Please do not make this process more burdensome than it intrinsically needs to be. So:

- **The homework you hand in must be neat, and must either be typed** (in which case TeX or LaTeX is preferred) **or written in pen (not pencil!)**. Please do not turn in homework that is messy or that has anything that's been erased and written over (or written over without erasing), making it harder to read. Anything that is difficult for

me to read will be returned to you ungraded.

- **Leave enough space for me to write comments.**
- **Staple** the sheets together in the upper left-hand corner. Any other means of attachment makes more work for me. The staple should be close enough to the corner that when I turn pages, nothing that you've written is obscured. Also, don't use paper that's been ripped out of a spiral-bound notebook; it will make a mess on my floor.
- **Write in complete, unambiguous, grammatically correct, and correctly punctuated sentences**, just as you would find in (most) math journals and textbooks.
- **Partial proofs.** If a problem is of the form "Prove this" and you've been unable to produce a complete proof, but want to show me how far you got, **tell me at the very start of the problem that your proof is not complete (before you start writing any part of your attempted proof)**. Do not just start writing a proof, and at some point say "This is as far as I got." Otherwise, when I start reading I will assume that you think you've written a complete and correct proof, and spend too long thinking about, and writing comments on, false statements and approaches or steps that were doomed to go nowhere.

Also, I think the following points should be self-evident, and I apologize to anyone who agrees that they're self-evident and is offended by my saying them. But past experience has taught me that I need to say them explicitly, even in 6000-level classes:

- I assign homework problems because I want you to *figure them out*, not to send you on a treasure-hunt through the literature (offline or online). If I limit myself to assigning problems that I think are unlikely to have solutions or hints somewhere in some book or online resource, you will not be getting the best education I can give you. When I know that something is a worthwhile problem for you to work on, and even struggle with, I don't want to have to worry about whether a solution (in part or in whole) exists in some textbook or online resource.

That does not mean you are forbidden ever to look at textbooks or online resources. But solutions to hand-in homework problems should be your own. If you find yourself looking at a textbook or online resource while you are writing up a solution, that solution is not your own.

- You should first try all the problems yourself (alone). *After* attempting the problems, you may brainstorm with other students in the class for general ideas, but you may not completely work out hand-in problems together. You are also not permitted to split the workload with other students, with each student in a group writing up some solutions that all group-members hand in, or that all group-members work from in writing up what they're going to hand in.

**Student Honor Code.** UF students are bound by The Honor Pledge, which states:

We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment."*

**Religious Holidays.** The following is part of the [University of Florida Policy on Religious Holidays](#). "Students, **upon prior notification of their instructors**, shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith."

**Accommodations for students with disabilities.** Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation.

**Teaching-evaluations.** Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results>.

**U Matter, We Care initiative:** Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 911.

**Contact information for the Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc/Default.aspx>, 392-1575. For emergencies, call the University Police Department (392-1111) or 911.

**Goals of course:** For the student to master the course-content.