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Syllabus and course information: Differential Geometry 1 — MAT 4930 — Fall 2014

Section 7554, Spring 2015
 MWF 8th period, LIT 223

[Link to class home page](#)

Instructor: Dr. David Groisser

Office: Little 308 (southeastern quadrant of building)

Phone: (352) 294-2307

Email: groisser@ufl.edu

Please note:

- I won't answer math questions by email.
- I will **never provide any grade information by email.**
- I won't answer anonymous email, or email that lacks an *informative subject line* and your full name.

Office Hours:

Tentatively Monday 5th period (11:45-12:35) and Wednesday & Friday 9th period (4:05-4:55). 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. Students who can't make scheduled office hours may see me by appointment on most weekdays (but **never on a Thursday**).

Textbook: none. However, here is a list and description of some references on differential geometry and differential topology.

Syllabus (course content): continuation of Groisser section of Differential Geometry 1. The first part of the semester will be devoted to some basics that we didn't cover, or covered incompletely, including flows, Lie derivatives, and some basic Riemannian geometry. The topics for the rest of the semester will be selected based on input from students. Some of the possible topics, several of which are interdependent, are listed below.

- Lie groups (and, possibly, homogeneous spaces)
- Further topics in Riemannian geometry. Among these are: geodesics, Jacobi fields, Hopf-Rinow Theorem, and curvature-comparison theorems.
- Surfaces in \mathbb{R}^3 and the Gauss-Bonnet Theorem.
- General vector bundles and covariant derivatives. Subtopics include curvature, parallel transport, and holonomy.
- Principal fiber bundles. Subtopics include:
 - reduction and enlargement of structure group
 - associated vector bundles
 - connections on principal bundles, with sub-subtopics
 - curvature, parallel transport, and holonomy, and the induced structures on associated vector bundles
 - holonomy groups
- Symplectic geometry and its relation to classical mechanics
- Selected topics in differential topology, such as the Poincaré-Hopf Theorem, degree theory, Sard's theorem and some applications (such as embedding theorems), and the Lefschetz Fixed-Point Theorem.

Exams, Homework, and Grading: There will be no exams. Your final grade will be determined by homework and attendance. I expect to collect four to eight problem-sets over the course of the semester. I will assign more homework exercises than I collect.

Attendance: I work hard to prepare my lectures, and I expect all enrolled students to attend all of them, with the usual allowances for illness, emergency, etc. When you must miss a class, please obtain notes from a classmate.

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."*

The Honor Code (here) specifies a number of behaviors that are in violation of this code, and the possible sanctions. Furthermore, students are obligated to report to appropriate personnel any condition that facilitates academic misconduct. If you have any questions or concerns about student conduct, please consult me.

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. See <http://www.dso.ufl.edu/drc>.

Letter grades and their grade-point equivalents at UF: see <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

