MTG6256/MAT4930 SYLLABUS – FALL, 2019

Lecture Times and Location: MWF period 8, Little Hall, Room 219

Instructor: Luca F. Di Cerbo
https://people.clas.ufl.edu/ldicerbo/

Instructor's Office: Little Hall 476

Office Hours: TBA. They will be posted on my departmental web department page during the 1st week of class.

Instructor's Email: ldicerbo@ufl.edu

COURSE TITLE: Differential Geometry 1.

PREREQUISITES: Calculus III, Linear Algebra, and Basic Topology.

COURSE OBJECTIVES

By the end of the semester, you will understand the basic concepts of Differential and Riemannian Geometry. You will be able to communicate such concepts in writing and through short oral presentations. This course will expose you to modern graduate level mathematics which also plays an important role in theoretical physics, such as General Relativity and String Theory.

MAIN TEXTBOOK

- Manfredo P. do Carmo, Riemannian Geometry.
  Mathematics: Theory & Applications. *Birkhäuser Boston, Inc., Boston, MA,* 1992.

Other References

- Manfredo P. do Carmo, Differential Geometry of Curves and Surfaces. *Prentice-Hall, INC., Englewood Cliffs, N. J.,* 1976.
- Peter Petersen, Riemannian Geometry. Third edition. Graduate Texts in Mathematics, 171. *Springer, Cham,* 2016.
- Isaac Chavel, Eigenvalues in Riemannian Geometry. Pure and Applied Mathematics, 115. *Academic Press, Inc., Orlando, FL,* 1984.

COURSE DESCRIPTION

Below is a list of topics we will be covering.

Regular Surfaces in $\mathbb{R}^3$, Gauss and Mean Curvatures. Basic differentiable Manifolds Theory, Tangent Space, and Tangent Bundle. Orientation, Vector Fields, Brackets and Examples. Riemannian Metrics, Levi-Civita Connection, and Parallelism. Geodesics, Exponential Maps, and the three Main Notions of Curvature: Sectional, Ricci, and Scalar. Jacobi fields, Conjugate Points, and Klingenberg Lemma. Second Fundamental Form of a Riemannian Submanifold, Hopf-Rinow Theorem, and the Theorem of Hadamard.

We will cover the material from **Chapters 0, 1, 2, 3, 4, 5, 6 and 7** of the Main Textbook (first 149 pages in Riemannian Geometry, by do Carmo).

COURSE SCHEDULE

We will follow the progression of topics listed in the "Course Description" section. This corresponds to Chapters 0 – 7 in the main reference book. Roughly, this is the weekly schedule

- Week 1 – 3: Review of Surfaces in $\mathbb{R}^3$ and Chapter 0;
- Weeks 4 – 5: Chapters 1–2;
- Weeks 5 – 7: Chapter 3;
- Weeks 8 – 9: Chapter 4;
- Weeks 9 – 10: Chapter 5;
- Weeks 11 – 12: Chapter 6;
- Weeks 13 – 14: Chapter 7;
- Weeks 15: Review.

The course schedule is subject to adjustments depending on my interaction with the audience.

ATTENDANCE POLICY, CLASS EXPECTATIONS, and MAKE-UP POLICY

I consider attendance very important. Excused absences must be consistent with university policies in the Graduate Catalog and require appropriate documentation. Additional information can be found here:
`https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx`

EVALUATION OF GRADES

- Homework, presentations, and attendance (60%).

- One mid-term exam (15%). The date and format are to be determined.
- Final exam (25%). The date and format are to be determined.

GRADING POLICY

A: 90% – 100%, A-: 85% – 89%, B+: 80% – 84%, B: 75% – 79%, B-: 70% – 74%, C+: 65% – 69%, C: 60% – 64%, D+: 57% – 59%, D: 54% – 56%, D-: 50% – 53%, E: 0% – 49%.

STUDENTS REQUIRING ACCOMMODATIONS

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, `https://www.dso.ufl.edu/drc`) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

COURSE EVALUATIONS

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at `https://gatorevals.aa.ufl.edu/students/`. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via `https://ufl.bluera.com/ufl/`. Summaries of course evaluation results are available to students at `https://gatorevals.aa.ufl.edu/public-results/`.

UNIVERSITY HONESTY POLICY

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 (`https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/`) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult

with the instructor or TAs in this class.

STUDENT PRIVACY

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see:
`http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html`

CAMPUS RESOURCES

Health and Wellness

U Matter, We Care:
If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: `http://www.counseling.ufl.edu/cwc`, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or `http://www.police.ufl.edu/`.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. `https://lss.at.ufl.edu/help.shtml`.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. `https://www.crc.ufl.edu/`.

Library Support, `http://cms.uflib.ufl.edu/ask`. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. `https://teachingcenter.ufl.edu/`.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. `https://writing.ufl.edu/writing-studio/`.

Student Complaints Campus: `https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf`.

On-Line Students Complaints:
`http://www.distance.ufl.edu/student-complaint-process`.