MATH 3370, DIFFERENTIAL GEOMETRY

General information

- Instructor: Ovidiu Munteanu
- Email: ovidiu.munteanu@uconn.edu
- Lecture: MONT 420, TuTh 9:30AM - 10:45AM.
- Office Hours: TuTh 11:00 -12:00 pm in MONT 434.
- Recommended textbook: Elementary Differential Geometry, by Andrew Pressley, Second Edition, Springer-Verlag London, 2010.

The learning objectives for this course are:

- To understand and be able to compute basic invariants of curves, like length, curvature, and torsion.
- To understand and be able to compute basic invariants of surfaces, like first and second fundamental forms, area, mean curvature, and Gauss curvature.
- To distinguish between extrinsic and intrinsic invariants of curves and surfaces.
- To understand how curvature, a local object, affects the global geometry and topology of the surface.

Grading

Homework. There will be 6 homework assignments, due on Thursday of Weeks 3, 5, 7, 9, 11, 13 by 3 pm.

It is permitted to discuss homework with other students and/or use AI, but you must write it and understand it on your own. Late homework is not allowed.

Homework will be posted on HuskyCT in advance and be collected in class during lecture. If you can't attend the lecture, you may post your homework on HuskyCT as a single pdf file by the due date.

We mainly use techniques from multivariable calculus, linear algebra, and differential equations. However, there are also some proof problems, so it may happen that you occasionally can't solve some question.

Exams. We will have two exams, Exam 1 in Week 8 and Exam 2 in Week 14.

Exam 1 on 10/16 is based on material covered in Week1 – Week 6, that was tested in Hwk1 – Hwk3.

Exam 2 on 12/04 is based on material covered in Week7–Week14, that was tested in Hwk4 – Hwk6.

Date: Fall 2025.

Academic Integrity. It is in your best interest to maintain your academic integrity. Any form of academic dishonesty undermines the goals of this course and devalues the learning process. Academic dishonesty is a serious offense at UConn and can result in a zero grade on an assessment and/or failure in the course.

Final grades. Will be computed via the following grading breakdown:

Homework: 40%

Exam 1, October 16th : 30%

Exam 2, December 4th: 30%

Grading Scale
The *total scores* will be curved at the end of the semester according to the following (tentative) rule out of 100 maximum points:

Grade	**Letter grade**
87-100	A
83-86	A-
78-82	B+
73-77	B
68-72	B-
63-67	C+
58-62	C
53-57	C-
50-52	D
0-49	F

Tentative Schedule

Week 1. Curves, Arclength. Read Ch. 1.1, 1.2.

Week 2. Parametrizing curves, closed curves, Curvature. Read Ch. 1.3, 1.4, 2.1.

Week 3. Plane curves, simple closed curves, the isoperimetric inequality. Read Ch. 2.2, 3.1, 3.2, 3.3. *Collect Hwk 1.*

Week 4. Space curves. Read Ch. 2.3.

Week 5. Surfaces, maps between surfaces. Read Ch. 4.1, 4.2, 4.3. *Collect Hwk 2.*

Week 6. Tangent plane, normal plane, examples. Read Ch 4.4, 4.5, 5.1.

Week 7. Examples, curves on surfaces. Read Ch. 5.2, 5.3, 6.1. *Collect Hwk 3* .

Week 8. Isometries of surfaces, the second fundamental form. *Exam 1 on Thursday.* Read Ch. 6.2, 7.1.

Week 9. The Gauss map, normal and geodesic curvatures. Read Ch. 7.2, 7.3. *Collect Hwk 4.*

Week 10. Gauss and mean curvatures, principal curvatures. Read Ch. 8.1, 8.2.

Week 11. Surfaces of constant curvature. Read Ch. 8.3, 8.4 . *Collect Hwk 5.*

Week 12. Gauss curvature in the compact case, the Gauss equations and Theorema Egregium. Read Ch. 8.6, 10.1, 10.2.

Week 13. Geodesics. Read Ch 9.1, 9.2. *Collect Hwk 6.*

Week 14. The Gauss-Bonnet theorem. Read Ch.13.1, 13.2. 13.3, 13.4. *Exam 2 on Thursday.*