

SYLLABUS Fall 2017

The University of Iowa
The College of Liberal Arts and Sciences
Department of Mathematics
MATH 4500.0001 Introduction to Differential Geometry I
10:30A - 11:20A MWF 210 MLH

Some of the policies relating to this course (such as the drop deadline) are governed by its administrative home, the College of Liberal Arts and Sciences, 120 Schaeffer Hall.

Instructor: Oguz Durumeric

Office location: B20F MLH

Office hours: M W Th 9:00-10:20 and by appointment

Phone: 335-0774

E-mail: oguz-durumeric@uiowa.edu

Website address: <http://www.math.uiowa.edu/~odurumer/> and then go to MATH 4500

TA: None

DEO Contact Information: Professor Maggy Tomova, 14 MLH, maggy-tomova@uiowa.edu

Prerequisites: (MATH:3550 or MATH:2850) and (MATH:2700 or MATH:2550)

Description of Course: Space curves, Frenet frames, intrinsic and extrinsic geometry of surfaces, first and second fundamental forms, isometries, Gauss map, Gaussian curvature, Theorema Egregium, geodesics, covariant differentiation; may include global theory of curves and Gauss-bonnet theorem.

Objectives and Goals of the Course: We will study curves and surfaces in Euclidean spaces and introduce the notion of differentiable surfaces. The extrinsic properties of curves and surfaces in Euclidean Spaces will be studied and used to understand their intrinsic geometry. This will lay foundations to introduce the notion of abstract surfaces. We will study various "curvature" functions, and "extremal" objects, such as distance and energy minimizing curves on surfaces, and area minimizing surfaces. If the time permits, we will cover Gauss-Bonnet Theorem. This course has heavy calculational content involving multivariable differential and integral calculus and linear algebra. The theory and geometric intuition will be introduced via derivations and calculations. The continuation of this course is MATH 4510, in which we cover the remainder of the textbook and further topics. These ideas have applications in Physics, Chemistry, Engineering and other disciplines.

Texts: Differential Geometry and its Applications by John Oprea, 2nd edition, ISBN: 9780883857489 (MAA version) Available in the University Bookstore and Iowa Book and Supply, Amazon and many other possibilities for online purchases

Grades: Plus/minus grading will be used.
 30% Midterm (Take-home, tentatively due on **October 9, Monday**)
 30% Final Exam (Take-home, tentatively due on **December 13, Wednesday**)
 20% Homework (about 9-11, drop the lowest two)
 20% Attendance and class participation
ALL EXAMS ARE COMPREHENSIVE, unless specified otherwise

A Word about the Date and Time of the Final Exam: Your midterm and the final exam are take-home. Please remember that final exams may only be given during finals week according to CLAS policy. Likewise, no major exams may be given the week before finals week.

Criterion-Referenced Grading: Described by CLAS as “With criterion-reference grading, students receive grades based on the quality of their work in relation to the criteria defined by the instructor and by the rubrics or models specifying the qualities of each grade. Students’ achievements are measured by this mastery of concepts and skills.” Our starting scale is as follows. If a need arises, this scale can be revised only to improve your letter grades, (that is, the cut scores will never go up).

A, A- > 90 B+, B, B- > 80 C+, C, C- > 65 D+, D, D- > 50

Tentative Syllabus: We will cover chapters 1-3, 5 and 6 (omitting some sections)

<u>Weeks</u>	<u>Chapters</u>	<u>Subject</u>
1-4	1	Curves
5-9	2	Surfaces
10-12	3	Curvatures
13-14	5.1, 5.2	Geodesics and isometries
15	6.5, 6.6	Preview Holonomy and Gauss-Bonnet (if time permits)

Course Structure and Expectations: You are expected to attend almost all (>90%) of the lectures. More than 10% absences will reduce your grade. You are responsible for everything covered in the lectures, textbook and the prerequisites. Lectures will cover material beyond the textbook when a need arises.

Homework will be assigned by Fridays (every week or two weeks) and it is due the following Friday. No late homework without a good excuse, and no make-ups for homework. If a HW is late for 1-6 days, the score will be reduced by 10%. Any HW that is late 7 or more days will not be accepted, unless that is due to an illness that can be documented. We will drop the lowest two homework grades.

Midterm and Final Exam are take-home, and you will have one week to complete each of them. If you have a conflict or a medical problem, discuss your situation with your lecturer as soon as possible.

During the semester, we may use computer programs (Mathematica) in several occasions as a visual tool to understand the geometry intuitively. No previous knowledge of Mathematica is needed, but familiarity with computers will be useful. No computer assignment will be a part of your grade.

Rules on Collaboration: The Final and Midterm take-home exams for this course are not collaborative projects and must be completed by the student without help from others (no internet as well). Exams showing strong similarities and/or duplication will be considered the result of academic dishonesty and will be failed and the students involved reported to the College. Do not share your final exam with others in the class. If you have questions about this policy, it is your responsibility to ask your instructor.

In this class, students are allowed to talk with others about homework. However, do not share your written work with others or ask others to see their completed assignments since both are considered academic misconduct. In other words, you can discuss a problem with other students, but you write your solution alone. If you worked/discussed a problem with others, you must state their names on your homework before the beginning of that problem, even if you wrote the solution yourself. HWs showing duplication will be considered the result of academic dishonesty. If you need help, please stop by during my office hours. Students are responsible for understanding this policy; if you have questions, ask for clarification.

Resources: There is no TA, so you are strongly encouraged to go to your lecturer's office hours, or make an appointment if you have a conflict with the office hours.

Other Expectations of Student Performance: Please put away your cell phones during the lectures, and turn the volume off. If you need to make an urgent call or text, please go outside the classroom to do it.

Notes to the Students: All students in the College have specific rights and responsibilities. You have the right to adjudication of any complaints you have about classroom activities or instructor actions. Information on these procedures and your responsibilities is available in the Schedule of Courses and on-line in the College's Student Academic Handbook, see the next page. In summary, first see the person you wish to complain about, and then see his/her immediate supervisor. The chain is: graduate or undergraduate assistants, then Prof. Durumeric, then the Chairman of the Department of Mathematics, Prof. Tomova, and then an appropriate Dean. The Department of Mathematics has offices in 14 MLH (MacLean Hall). To make an appointment to talk to the chairman of the department call 335-0714 or contact the departmental secretary in 14 MLH.

We would like to hear from anyone who has a disability which may require some modification of seating, testing, or other class requirements so that appropriate arrangements may be made. Please contact your lecturer during his office hours, in the beginning of the semester and far in advance of the exams. You should notify the Office of Student Disability services and obtain the forms. The necessary modifications will be made available to you.

We are planning to use ICON for posting grades and other course material. Also, some announcements may be e-mailed through ICON to your UI e-mail. Check ICON and your UI e-mail regularly, and make sure that UI has your correct e-mail address.

This course plan may be modified during the semester. All changes will be announced in class in advance. It is solely the student's responsibility to be informed of such announced changes.

Teaching Policies & Resources — Syllabus Insert

Administrative Home

The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook at <https://clas.uiowa.edu/students/handbook>.

Electronic Communication

University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences ([Operations Manual, III.15.2](#), k.11).

Accommodations for Disabilities

The University of Iowa is committed to providing an educational experience that is accessible to all students. A student may request academic accommodations for a disability (which includes but is not limited to mental health, attention, learning, vision, and physical or health-related conditions). A student seeking academic accommodations should first register with Student Disability Services and then meet with the course instructor privately in the instructor's office to make particular arrangements. Reasonable accommodations are established through an interactive process between the student, instructor, and SDS. See <https://sds.studentlife.uiowa.edu/> for information.

Nondiscrimination in the Classroom

The University of Iowa is committed to making the classroom a respectful and inclusive space for all people irrespective of their gender, sexual, racial, religious or other identities. Toward this goal, students are invited to optionally share their preferred names and pronouns with their instructors and classmates. The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national origin, and other identity categories set forth in the University's Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity, diversity@uiowa.edu, or visit diversity.uiowa.edu.

Academic Honesty

All CLAS students or students taking classes offered by CLAS have, in essence, agreed to the College's [Code of Academic Honesty](#): "I pledge to do my own academic work and to excel to the best of my abilities, upholding the [IOWA Challenge](#). I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled ([CLAS Academic Policies Handbook](#)).

CLAS Final Examination Policies

The final examination schedule for each class is announced by the Registrar generally by the fifth week of classes. Final exams are offered only during the official final examination period. No exams of any kind are allowed during the last week of classes. All students should plan on being at the UI through the final examination period. Once the Registrar has announced the date, time, and location of each final exam, the complete schedule will be published on the Registrar's web site and will be shared with instructors and students. It is the student's responsibility to know the date, time, and place of a final exam.

Making a Suggestion or a Complaint

Students with a suggestion or complaint should first visit with the instructor (and the course supervisor), and then with the departmental DEO. Complaints must be made within six months of the incident ([CLAS Academic Policies Handbook](#)).

Understanding Sexual Harassment

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI [Office of the Sexual Misconduct Response Coordinator](#) for assistance, definitions, and the full University policy.

Reacting Safely to Severe Weather In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the [Department of Public Safety website](#).