

Math 8230 Syllabus Fall 2026

1. COURSE INFORMATION

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Office hours: Wednesday 3-5pm

Please use the email address above to contact me. It often takes me a couple of days (or longer) to respond to email, and if I'm going to see you in class first, I'll try to follow up with you in person. Email is generally a bad way to try to answer math questions, so I'm much happier to stay for a few minutes after class or talk during office hours than to try to write math notation into UGAmail. The class generally doesn't use eLC.

Books

- (mostly) *Discrete Differential Geometry: An Applied Introduction*, Keenan Crane.
<https://www.cs.cmu.edu/~kmc Crane/Projects/DDG/paper.pdf>
- *Boundary-first flattening*, Crane and Sawhney.
<https://www.cs.cmu.edu/~kmc Crane/Projects/BoundaryFirstFlattening/paper.pdf>
- *You can find geodesics in triangle meshes by flipping edges*, Crane and Sharp.
https://nmwsharp.com/media/papers/flip-geodesics/flip_geodesics.pdf
- *Geodesics in Heat: A new approach to computing distance based on heat flow*. Crane and Sharp.
<https://www.cs.cmu.edu/~kmc Crane/Projects/HeatMethod/paperTOG.pdf>

2. COURSE SCHEDULE

This is a graduate course that I've never taught before, and I'd like to proceed at a pace which leaves plenty of time for questions and digressions. So it seems a little bit pointless to try to lock down a day-by-day schedule at the start of the semester. However, here's the rough plan.

Topics	Book	Chapter	Week
Simplicial Complexes	Crane	2	1
Surface Geometry	Crane	3	2-3
Differential Forms and DEC	Crane	4	4-6
Discrete and Continuous Surface Curvature	Crane	5	7-8
The intrinsic Laplacian	Crane	6	9-10
Conformal Parameterizations	Crane	7	11
Boundary-first flattening			12
Finding geodesics			13-14

Final Projects instead of Exam

3. PREREQUISITES

Students are expected to have a strong undergraduate understanding of linear algebra and multivariable calculus. Some facility with coding will be extremely useful over the course of the semester.

4. COURSE GOALS

Students will be able to accomplish practical tasks in understanding and processing the geometry of large meshes in 2d and 3d. Students will understand differential forms in the discrete and continuous settings. Students will be able to connect discrete and continuous notions of surface curvature. Students will be able to read and implement modern papers in geometry processing and discrete differential geometry.

5. DISCLAIMER

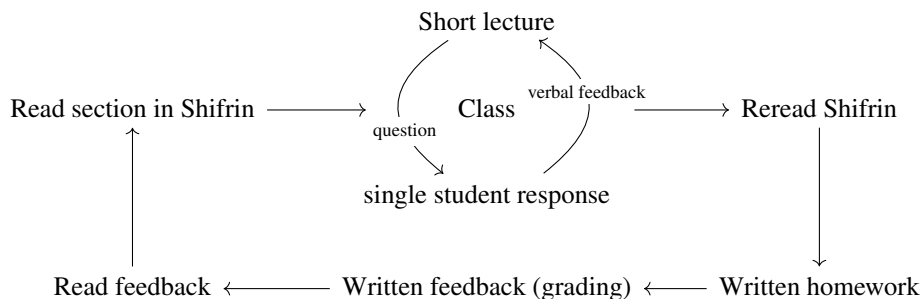
The syllabus is a general course plan, but deviations may become necessary over the course of the semester.

6. PRINCIPAL COURSE ASSIGNMENTS

The course will actually have some homework assignments, assigned using Gradescope, with course entry code given in class.

7. GRADING AND POLICIES, PEDAGOGY

The course plan is that we follow this flowchart (the “core gameplay loop” of math class):



Class will mostly consist of an interactive lecture which assumes that you’ve already read the corresponding section in the book. Everyone will be called on in class (in sequence). Our classroom norm is that *the student who is called on is the only one who speaks (no interruptions)* unless they specifically invite participation from the rest of the class.

The overall course grade is computed from homework, exam, and final exam grades by the formula:

- (1) 30% for the final (oral) exam
- (2) 35% for the homework assignments
- (3) 35% for in-class questions and answers

For the final exam, we’ll have individual 15-30 minute conversations about the class. The purpose of the conversation is to get a sense of what you’ve learned during the semester. It will generally include approaching a problem or two. The in-class questions and answers are graded on a two tier scale. “check” (you asked a reasonable question or gave a reasonable answer), “check-plus” (you asked an unusually good question or gave an unusually good answer), “check-plus-plus” (rare).

8. ATTENDANCE POLICY

Students are expected to attend class regularly; a substantial portion of the class grade is based on in-class discussion. Students who miss more than 3 classes (one full week of class) with no excuse may be withdrawn from the course by the instructor.

9. ACADEMIC HONESTY

As a University of Georgia student, you have agreed to abide by the University’s academic honesty policy, “A Culture of Honesty,” and the Student Honor Code. All academic work must meet the standards described in A Culture of Honesty found at: www.uga.edu/honesty.

It is perfectly acceptable to work on homework problems in groups in this course. However, the help you should get from your fellow students should enable you to complete the problem on your own. Please write up your solutions in your own words.

10. USE OF AI IN THIS COURSE

At this point, AI can produce correct solutions to all of the homework problems in the course without taxing its cooling infrastructure. However, copying out AI solutions to math problems in your own handwriting is a high-effort/low-reward way to get course points and somewhat defeats the purpose of the course, which is for you to learn to think differently over the course of the year. It also leaves one extremely unprepared for the final discussion.

Potential good uses of AI in the course include: “Claude, this picture is my best attempt at a handwritten proof of the following theorem: can you critique it and tell me where my argument has flaws? Do not produce your own

proof.” and “Claude, I would like to write some Mathematica code to download 15 years of weekly stock prices for Costco and Kroger and express them as vectors in $\mathbb{R}^n$. Can you help?”.

11. UGA STUDENT HONOR CODE

”I will be academically honest in all of my academic work and will not tolerate academic dishonesty of others.” A Culture of Honesty, the University’s policy and procedures for handling cases of suspected dishonesty, can be found at www.uga.edu/ovpi.

12. MAKE-UP EXAMINATIONS AND LATE WORK

Each homework assignment (in Gradescope) has a “due date” and a “late due date” a few hours later (in case you have trouble uploading your work). The late due date is a “pencils down” time intended to prevent you from getting locked onto a problem and going without sleep– the homework is a relatively small part of your numerical grade, and I don’t expect you to finish every problem on every homework assigned; just upload whatever you did get done by the late time and move on to your other assignments. In order to keep grading reasonably prompt, this represents the last possible time that I can accept the work for grading.

13. GENERAL DISCLAIMER

The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.

14. ACCOMMODATIONS FOR DISABILITIES

If you plan to request accommodations for a disability, please register with the Disability Resource Center. They can be reached by visiting Clark Howell Hall, calling 706-542-8719 (voice) or 706-542-8778 (TTY), or by visiting <http://drc.uga.edu>.

15. FERPA NOTICE

The Federal Family Educational Rights and Privacy Act (FERPA) grants students certain information privacy rights. See the registrar’s explanation at [reg.uga.edu/ general-information/ferpa/](http://reg.uga.edu/general-information/ferpa/). FERPA allows disclosure of directory information (name, address, telephone, email, major, activities, degrees, awards, prior schools), unless requested in a written letter to the registrar.

16. MENTAL HEALTH AND WELLNESS RESOURCES

UGA Well-being Resources promote student success by cultivating a culture that supports a more active, healthy, and engaged student community. Anyone needing assistance is encouraged to contact Student Care & Outreach (SCO) in the Division of Student Affairs at 706-542-8479 or visit sco.uga.edu. Student Care & Outreach helps students navigate difficult circumstances by connecting them with the most appropriate resources or services. They also administer the Embark@UGA program which supports students experiencing, or who have experienced, homelessness, foster care, or housing insecurity.

UGA provides both clinical and non-clinical options to support student well-being and mental health, any time, any place. Whether on campus, or studying from home or abroad, UGA well-being Resources are here to help.

- Well-being Resources: well-being.uga.edu
- Student Care and Outreach: sco.uga.edu
- University Health Center: healthcenter.uga.edu
- Counseling and Psychiatric Services: caps.uga.edu or CAPS 24/7 crisis support at 706- 542-2273
- Health Promotion/ Fontaine Center: healthpromotion.uga.edu
- Disability Resource Center and Testing Services: drc.uga.edu Additional information, including free digital well-being resources, can be accessed through the UGA app or by visiting <https://well-being.uga.edu>.