

COMPUTATIONAL GEOMETRY

St. Olaf College • Math 282
Dr. Matthew Wright • Spring 2021

Class Meetings

Tuesdays 8:00 – 9:25am and Thursdays 8:00 – 9:20am

Class will meet online during the COVID-19 quarantine period. We plan to meet in-person in RNS 290 starting on February 23.

Contact the Professor

If you have any question or concern about the course, email Prof. Wright at **wright5@stolaf.edu** or join online office hours. Prof. Wright tries to respond quickly to email from students during the week, but responses may take a bit longer on the weekends. Online office hours are scheduled daily:

Mon. 9–10am, Tues. 10–11am, Wed. 10:30–11:30am, Thurs. 1–2pm, Fri. 9–10am

Please check your email or the course Moodle page for the Zoom link for office hours. If the hours above don't work for you, just send Prof. Wright an email to arrange a meeting at another time!

Web Site

The course web site is:

<https://math282.mlwright.org>

The professor maintains a course schedule and assignment calendar on this site. We will use Moodle for assignment submissions, grades, and items that require password protection.

Text

Devadoss and O'Rourke, *Discrete and Computational Geometry*

Course Objectives

1. Understand key theorems and proofs in discrete and computational geometry.
2. Understand and implement algorithms for manipulating discrete geometric objects, and assess the computational complexity of such algorithms.
3. Develop/improve ability to work computationally in programming environments such as Mathematica.
4. Solve data-driven problems with geometric input and output, motivated by real-world applications.

Software

The primary computational software for this course will be *Mathematica* (available for St. Olaf students). No prior programming experience is assumed, though a desire to learn through experimentation will be essential.

Grading

Your final grade will be a weighted average of the following:

Reading Questions:	10%
Homework:	55%
Quizzes:	20%
Final Project:	15%

See the following sections for details about each of these grade items.

Reading Questions

Thorough, active reading of the text will help you keep up with the material and get the most out of this course. The professor will assign readings from the text, along with comprehension questions on Moodle. Answers to these questions will be due at the beginning of class. Reading question will *not* be accepted late, but your lowest reading question grade will be dropped.

Homework

This course will involve weekly problem sets, which will be posted on the course web site. These problem sets will involve both mathematical problems and implementation of algorithms. Students wishing to count this course as a CS elective will be required to do more coding than students taking the course simply for a math elective.

Students are encouraged to work together on homework, though each student must hand in their own work. The lowest homework score for each student will be dropped.

Quizzes

Rather than in-class exams, this course will involve 4 or 5 take-home quizzes throughout the semester. These quizzes will assess your grasp of the mathematical content, problem-solving strategies, algorithms, and applications in this course. Quizzes will be given electronically, on Moodle. Quizzes will typically be timed and allow the use of the text and online resources. Quizzes will be conducted under the St. Olaf Honor Code (see below). Specifically, you must not discuss each quiz with anyone except the professor until all students have completed the quiz.

Final Project

The final project will be an opportunity to investigate a topic in computational geometry beyond what we study as a class. This could be a more in-depth study of a topic in the text, an application of some of the tools we discuss, or an advanced topic that we didn't get to in

the semester. Final projects may be completed individually or with a partner. Each project will result in a written report and a brief presentation, to be delivered during the final exam period.

Strategies for Success

- Attend class faithfully and participate in class activities.
- Work with other students, in class and on the homework. You will find that you will both learn from and teach your classmates.
- Keep up with the assignments. Start early — don't wait until the last minute!
- Don't give up when your code doesn't work. Writing good code often requires many revisions. Understand that mistakes are opportunities for learning.
- Ask questions! Experiment!
- When you encounter trouble, seek help!

Getting Help

Prof. Wright is your primary resource for help in this course and is happy to talk with you. When you need help, or if you have any concerns about the course, please email Prof. Wright or visit his office hours.

Your classmates are a valuable resource. The professor encourages you to course topics and homework problems with your classmates, as long as you turn in your own work. Mathematics is a collaborative activity!

Furthermore, the Center for Advising and Academic Support (CAAS) offers tutoring, academic coaching, and other services – talk with Prof. Wright or email the CAAS for more information. If you have any concern at all related to this course, please email Prof. Wright.

Community Standards

We all share the responsibility of acting to keep our St. Olaf community safe, especially in this time of the COVID-19 pandemic. Each student, faculty, and staff member has agreed to follow the Community Standards (wp.stolaf.edu/covid-19/community-standards) throughout the semester. The following items are especially important for our class:

- Do not come to class if you are sick. Stay in your residence and contact the professor for alternate arrangements regarding class work.
- Face masks are required during in-person class sessions. Masks must be properly worn, covering both the nose and mouth. A student who attends class without a mask will be asked to leave. If a student refuses to either wear a mask or leave, then class will be dismissed and the Dean of Students Office will be notified of this violation of community standards.
- Please sanitize your hands as you enter and as you leave the classroom.
- We will practice social distancing during in-person class sessions.

If you have any questions or concerns about the community standards in this class, don't hesitate to talk with Prof. Wright.

Academic Integrity

Claiming someone else's work as your own will earn you a failing grade on the work in question. Don't do it. For more information, see the *Academic Integrity* section of *The Book* (wp.stolaf.edu/thebook/academic/integrity).

The Honor Pledge applies to quizzes in this course. The Honor Pledge reads:

"I pledge my honor that on this examination I have neither given nor received assistance not explicitly approved by the professor and that I have seen no dishonest work."

The Honor Pledge is violated when information could result in an unfair advantage for one or more students is given or received before, during, or after a test. On each quiz, students will be asked to either affirm the Honor Pledge or indicate awareness of violations by intentionally not signing the pledge.

Inclusivity and Access

Prof. Wright is committed facilitating a safe, caring, and inclusive learning community, respecting those of differing backgrounds and beliefs. As part of St. Olaf College, we aim to be respectful to everyone in this class, regardless of race, ethnicity, religion, gender, or sexual orientation. All students are capable of success in mathematics, and Prof. Wright aims to create an environment in which all can succeed. If you have any questions or concerns, don't hesitate to talk with Prof. Wright.

If you have any concerns about access to course materials, or if English is not your first language and this causes you concern, please talk with Prof. Wright.

Health and Accommodations

Prof. Wright is committed to supporting all students. He recognizes that emotional, physical, or psychological experiences, both in and out of the classroom, have the potential to distract students from learning. If you have any concerns, please do not hesitate to contact the professor—he is available to listen and to discuss what resources may be available to you.

If you have an accommodation letter from the Disability and Access (DAC) office, please meet with the professor early in the course to discuss, plan, and implement your accommodations in the course. Otherwise, if you have or think you have a disability please contact the Disability and Access office at 507-786-3288 or wp.stolaf.edu/academic-support/dac/.