

# Computer Graphics

CS 420  
Fall 2024

**Instructor** Tom Kelliher, Ph.D., Associate Professor of Mathematics and Computer Science  
Pronouns: he/him/his  
Office: Julia Rogers 133  
Office hours: MW 11:00 am–12:00 pm, TuTh 1:00 pm–2:00 pm, drop-in when my office door is open, or email to request an appointment.  
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## Course Textbook and Other Resources:

1. S. Guha, *Computer Graphics through OpenGL, From Theory to Experiments*, 3rd edition. Taylor & Francis, 2019. Required.
2. See the course web site for additional resources:  
<http://phoenix.goucher.edu/~kelliher/f2024/cs420/>

**Meetings** Julia Rogers 121, MW 2:40 pm–4:30 pm

**Description** An application-oriented introduction to computer graphics. Graphics devices and their programming interfaces. Fundamentals of two-dimensional graphics: rendering, object and view transformations, and interactive animation. Introduction to three-dimensional graphics: clipping, lighting, and hidden-surface removal. Large programming projects in a modern graphics API are an integral part of the course.

**Prerequisite** CS 205.

## Learning Objectives:

At the end of this course students will be able to:

1. Explain and use the mathematical foundations of transformations.
2. Describe the function of the graphics pipeline, the camera model, and viewing.
3. Describe and use the various tools available for coloring pixels in 3D graphics.
4. Apply the model-render paradigm to the design of graphics programs.
5. Design and implement significant 2D and 3D graphics programs using the C++ programming language and the shader-based OpenGL API.

**Expectations** You are expected to give CS 420 the attention it deserves as a college-level computer science course. In particular, you are expected to:

- Spend an average eight hours per week outside of class working on the course. This includes the entire range of activities from preparing for class, to completing assignments and projects, to attending office hours.
- Attend class each time it meets, with all assigned preparation activities completed. During each class meeting, you are expected to pay attention respectfully, work productively, and not interrupt the learning of your classmates.
- Take initiative to seek out help in a combination of forms and channels when needed, and to be honest about when help is needed.

Registering for a four-credit class is a 12-hour-per-week commitment, four hours of which take place during our class meetings. The other eight hours are to be spent in productive, engaged work in individual and group study and in attending office hours.

## **Grading:**

### **Grade Distribution**

At the conclusion of the semester, your grades will be weighted as detailed below, rounded up, and converted to a letter grade as follows: A = [92–100], A- = [90–92), B+ = [88–90), B = [82–88), B- = [80–82), etc.

### **Graded Work**

As necessary, grades will be scaled to a [0–100] scale. Work is to be completed individually.

1. Experiments — For the most part, class time will be spent learning about computer graphics concepts and topics through in-class programming and “written” experiments. These will be ungraded.
2. Assignments — There will be two written/programming assignments.
3. Projects — There will be three projects. The last project will be presented during the Final Experience.

Work submitted after the due date shown in Canvas is subject to a 10% late penalty. A few days after each due date, I will close each assignment to further submissions. Once an assignment is closed, no further submissions will be accepted.

## **Academic Integrity**

Academic dishonesty is detrimental to the integrity of our learning community and will not be tolerated. All of us, including me, are bound by the Academic Honor Code. The College’s Academic Honor Code is available at [www.goucher.edu/documents/General/AcademicHonorCode.pdf](http://www.goucher.edu/documents/General/AcademicHonorCode.pdf). I expect you to be familiar with its obligations and requirements. I have also written a statement that applies the Honor Code to this course. This statement is available on the course web site (see *Integrity in My Computer Science Courses*).

## **Disabilities**

If you have a documented disability you should contact the Academic Center for Excellence (ACE) to arrange for academic accommodations for the course. Carefully follow all of ACE’s policies and procedures. Once you have coordinated with ACE, email me to make me aware of your accommodation. I will

receive official correspondence from ACE; however, I would also like to receive an email from all students requiring accommodations for the semester. If your accommodation involves taking exams at ACE, it is your responsibility to schedule your exams with ACE. When scheduling exams with ACE, be sure to carbon copy me on any emails with ACE so that I have confirmation that everything is in order. This process is to be repeated for all exams throughout the semester.

### **Achieving Academic Success**

If you are struggling in this or other courses, I strongly encourage you to reach out for help sooner rather than later. Proactive strategies could include contacting me directly, attending office hours, and/or taking advantage of the multitude of academic services that the Academic Center for Excellence offers. The responsibility is upon you to recognize when you need help and to take the steps necessary to succeed. Goucher College has a variety of resources available to help you succeed in your classes; use them!

Office hours are perhaps the most effective and immediate way to get help. My goal in office hours is to answer your questions in such a way that you will not only get your question answered, but also strengthen your ability to answer your own questions.

If you don't need an immediate answer to a question, you may submit it by email. I check email several times during the day, and usually during the evening. Please note, however, that I am not available on a 24x7 basis, and don't check email very frequently the weekends.

The first 10 minutes of each class may be reserved for addressing the most common issues I see occurring from all of our interactions.

### **Student-Athletes**

According to the Goucher College policy on Student-Athlete Responsibilities, if you are a student-athletes, you are expected to contact me at the beginning of the semester to request approval for absences associated with athletic events (or scheduled departure times for such events) that conflict with the regularly scheduled class meeting time. The approved absences will then be listed on a contract signed by both me and you. Additionally, it is the responsibility of the student-athlete to complete all assignments covered in class during the approved absences and to obtain all handouts, assignments, and notes from the missed class(es). Student-athletes who fail to coordinate with me prior to any class absences will not be permitted to make-up missed assignments.

### **Student Responsibilities in Academic Conflicts (Field trips, Performances, etc.)**

According to the Goucher College policy on Academic Conflicts, if you are in a situation in which you are confronted with obligations or responsibilities (ranging from participation in field trips in the visual arts or the sciences or rehearsals or performances in the performing arts to extra-curricula activities at which students are representing the College such as model senate events or varsity athletic contests) that conflict with regularly scheduled academic classes, you are expected to contact me at the beginning of the semester, or as soon as the conflict is known, to request approval for absences that conflict with the regularly scheduled class time. The approved absences will then be listed on a

contract signed by both me and you. Additionally, it is your responsibility to complete all assignments covered in class during the approved absences and to obtain all handouts, assignments, and notes from the missed class(es). Students who fail to coordinate with me prior to any class absences will not be permitted to make-up missed assignments.