

# Syllabus for *Computer Graphics*

**CIS 367**

**Winter 2023**

Generated December 30, 2022

Principles of computer graphics. I/O devices. Basic graphic primitives and attributes. Transformations: translation, scaling, and rotation. World and screen coordinates, windows and viewports, clipping. Circle drawing. Graphics and text modes. Raster graphics. Filling algorithms. 3-D graphics. Hidden line/surface elimination.

## *Contact Information:*

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**Instructor:** Dr. Erik Fredericks  
**E-mail:** frederer@gvsu.edu  
**Office:** D-2-210 MAK  
**Office Hours:** MWF, 10am – 11am, (MF) In-Office, (W) Zoom (remote)  
**Course Page:** Blackboard  
**Format:** Synchronous  
**Discord:** <https://discord.gg/pNaTDKH>  
**Class room:** Mackinac Hall B2235  
**Class time:** TR, 1:00pm – 2:15pm  
**Midterm:** (Thursday) February 23rd, 1:00pm – 2:15pm  
**Final exam:** (Tuesday) April 25th, 12:00pm – 1:50pm

## *Course Objectives:*

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Computer graphics play a key role in many applications, from video games to advanced medical simulations. This course provides an introduction to the theory and application of computer graphics programming in both 2D and 3D. Students will use WebGL and Unity in several programming projects that will provide experience in graphics programming topics such as drawing, collision detection, user interaction, and texturing. An emphasis on practical experience with graphics concepts will be emphasized.

- Create images of 3D objects using a standard graphics API
- Use a standard API to apply basic transformations (scaling, rotation, translation) to 3D objects
- Develop programs that use multiple 3D coordinate frames for controlling different parts of a 3D object
- Describe the techniques used for hidden-surface removal
- Demonstrate the results of clipping algorithms between lines and polygons

### *Prerequisites:*

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- CIS263 and admitted to CIS Major

### *Course Materials:*

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**Primary:** Instructor's Lecture Notes and Handouts (via Blackboard)

### *Course Delivery - In Person:*

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This course will be delivered **in person**, following proper social distancing protocols. If it becomes necessary to change delivery formats, we will change to an *online synchronous* format.

### *Grading Proportions:*

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The last day to drop a course with a grade of “W” is **March 10, 2023**.

The CR/NC date is **January 13, 2023**.

Your grade is based on your performance in your homework assignments, term project, exams, and participation.

Graded Item	Points Available
Participation:	15%
Coursework:	30%
Term Project	25%
Midterm Exam:	15%
Final Exam:	15%
<b>Total</b>	<b>100%</b>

<b>A</b>	$\geq 93\%$	<b>B-</b>	$\geq 80\%$	<b>D+</b>	$\geq 67\%$
<b>A-</b>	$\geq 90\%$	<b>C+</b>	$\geq 77\%$	<b>D</b>	$\geq 60\%$
<b>B+</b>	$\geq 87\%$	<b>C</b>	$\geq 73\%$	<b>F</b>	$< 60\%$
<b>B</b>	$\geq 83\%$	<b>C-</b>	$\geq 70\%$		

**Late Policy:** Work submitted after the due date will incur 10% late penalty per day, with a minimum penalty of 10%. No assignment will be accepted more than 3 days late.

*If you are struggling with meeting deadlines while working remotely, please contact me as soon as possible!*

### *Coursework:*

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Coursework in this class consists of in-class assignments (participation), homework assignments, and a semester-long term project. Assignments are graded for correctness *and*

communication. Pay attention to factors including content, organization, clarity/style, and mechanics.

1. Homework assignments must be completed individually (unless otherwise noted). However, it is expected that several of the finished and graded homework assignments will be used to support the creation of the term project report.
2. The term project is a semester-long effort *centered around computer graphics*. Grades will reflect the quality of the software created. Groups of **1–3** people will be accepted, where requests for groups of a larger size will be handled on a case-by-case basis.

### *Course Policies and General Information:*

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- (1) The Fred Meijer Center for Writing, with locations at the Allendale and Pew/Downtown Grand Rapids campuses, is available to assist you with writing for any of your classes. Writing consultants, who are fellow GVSU students, are trained to help you with all stages of your writing process, from brainstorming to organizing to editing your papers. Simply bring a draft of your paper, the assignment sheet, and your questions/concerns to any of the Center's locations. Also, through your Gmail account, you have access to online consultations through GoogleDocs. The Center's services are free and you can drop in and work with a consultant or make an appointment, either through our website or by calling the Center (331-2922). For more information about our services and locations, please visit our website: <http://www.gvsu.edu/wc/>
- (2) **Cooperation and cheating:** Be aware of the SCIS policy on academic honesty. Visit the department website (<http://www.cis.gvsu.edu/academic-honesty/>) for the full statement on academic honesty. Academic dishonesty will not be tolerated. Violations will result in *at least* failure of the assignment. However, violations may also include failure of the entire course and referral to the university resulting in additional consequences, including possible expulsion. You are welcome to discuss assignments with each other or myself, however do not copy answers or plagiarize. If you are unsure of what plagiarism means, please either ask me or visit the department website mentioned above.
- (3) Participation is *not* equivalent to attendance. Please ensure you keep up with the in-class assignments to ensure that you are staying current with the class (and receive the credit for it).
- (4) Special Needs: If there is any student in this class who has special needs because of a disability, please contact Disability Support Resources at <http://www.gvsu.edu/dsr/> (DSR) at 616-331-2490.
- (5) This course is subject to the GVSU policies listed at <http://www.gvsu.edu/coursepolicies/>.
- (6) In Case of Emergency Fire: Immediately proceed to the nearest exit during a fire alarm. Do not use elevators. More information is available on the University's Emergency website located at <http://www.gvsu.edu/emergency>.
- (7) This syllabus is deprecated in favor of any syllabus uploaded to the course Blackboard page with a *more recent* "generated" date. This version of the syllabus was generated on December 30, 2022.

*Course Schedule:*

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A course schedule of topics project deadlines are included in the table below. This schedule may be adjusted throughout the semester as needed. Note, the week that topics are covered or even the order they are covered is tentative and may be adjusted throughout the semester.

<b>Tentative Order</b>	<b>Lecture/Discussion Topic</b>
<b>January 16th, 2023, Martin Luther King Jr. Day</b>	No classes!
<b>March 5th – 12th, 2023, Spring break</b>	No classes!
1.	Graphics system and graphics programming paradigm
2.	Image models and triangle
3.	Full program!
4.	Shaders
5.	Interaction and animation
6.	Geometry and transforms
7.	Model building and camera
8.	<b>Midterm exam - February 23rd</b>
9.	Blender overview
10.	Other WebGL libraries
11.	Introduction to Unity
12.	Unity Scripting
13.	Unity 2D
14.	Git + Shader graph
15.	Remaining material and term project wrapup / student presentations
<b>Final exam</b>	<b>Tuesday, April 25th, 12:00 pm - 1:50 pm</b>