

INTRO TO COMPUTER GRAPHICS

Fall 2025

Instructor:	Dr. Deng, Qixin	Time:	Tues/Thur 1:10 PM - 2:25 PM
Email:	dengq@wabash.edu	Place:	Goodrich Hall, 101
Office:	Goodrich Hall 108	Office Hour:	Mon/Wed 10:00 am to 5:00 pm

Office Hours: Find me any time from 10:00 am to 5:00 pm on Monday/Wednesday. I will not be available on Tuesday and Thursday. A pre-schedule/appointment is required after 5:00 pm.

Course Description: Introduction to Computer Graphics is a hands-on course that provides students with a solid foundation in modern OpenGL (3.3 and above) and the core concepts of real-time rendering. Students will learn how to set up a graphics environment, create and manipulate 3D objects, and understand the graphics pipeline through topics such as shaders, buffers, and coordinate systems. The course emphasizes practical skills, including applying textures, implementing geometric transformations, and building a functional camera system to simulate 3D perspective. By the end of the course, students will not only be able to write and debug OpenGL programs but also gain the conceptual understanding needed to pursue advanced graphics topics such as lighting, shading, and interactive visualization.

Reference Note:

1. learnopengl: <https://learnopengl.com/Introduction>
2. C++ reference: <https://cppreference.com/>

Course Goal: By the end of this course, students will be able to:

- **Implement and explain the graphics pipeline:** Understand how OpenGL manages vertices, buffers, and shaders to render primitives and images to the screen.
- **Apply transformations and coordinate systems:** Use matrices and coordinate space conversions (model, world, view, projection) to position objects and simulate 3D perspective.
- **Utilize textures and camera systems:** Map textures to geometry, create interactive views with camera control, and manage input for dynamic scene navigation.
- **Develop real-time graphics applications:** Combine rendering, transformations, and user interaction into small but complete OpenGL projects that lay the groundwork for more advanced computer graphics study.

Academic Credit Statement:

We will use C++/GLSL along with GLFW/GLAD library which are two new programming languages for our students. Unlike CSC-111 where students learn Python programming, in this course, students will use C++/GLSL to explore computer graphics. To support students' learning beyond the classroom, I will provide structured virtual lab sessions where students can practice graphics programming step by step under guided instruction.

- Students will participate in 7 virtual lab sessions focused on C++/GLSL reading and programming. Each session is designed to take roughly 2 hours and together will account for **14 additional 4th hour sessions** for the semester.

In total, the course includes 14 hours of additional structured virtual lab activities outside of regular class meetings (equivalent to 1 hour per week for 14 weeks.)

Grading:

- 40% Assignments
- 30% Exams
- 30% Project
- I will apply the letter grade criteria as below:

Letter	A	A-	B+	B	B-	C+	C	C-	D+	D	D-
Total	≥ 93	≥ 90	≥ 87	≥ 83	≥ 80	≥ 77	≥ 73	≥ 70	≥ 67	≥ 63	≥ 60

Class rules: The student who shows discrimination, disrespect, bullying, and other bad behaviors during the lecture will immediately fail the course. And I will report to both the department and the college.

Assignments: There will be 10 assignments across the semester. Each assignment will have several programming questions. I do not accept late submissions. Please submit the assignment on time.

Exam:

Midterm ExamOct. 14th, Tuesday, in class time
 Final ExamDec. 15th, Monday, 1:30 pm - 3:30 pm.

Guidelines for Ethical Computing and Working with Others

For the purposes of this course, adhering to the Gentleman's Rule means also adhering to the ACM Code of Ethics and Professional Conduct. The Code lays out the fundamental ethical principles that should guide all students and professionals in their study and work when computing and technology are involved. One major part of ethical computing is respecting the ideas and works of others, and only using them in an ethically appropriate and responsible manner. Computing, like almost all human endeavors, is a collaborative enterprise. We learn from each other and from the work of those who came before us, just as our descendants will learn from us. To not respect the works of others damages one's own learning, and ultimately damages human society as a whole.

For the purpose of this course, I will add the following guidelines. In general, unless specifically authorized for a particular assignment, you should refrain from providing program code or solutions to another student, or receiving program code or solutions from another student. More concretely: providing code or solutions to another student or receiving code or solutions from another student, unless specifically authorized, constitutes academic dishonesty and a violation of the Gentleman's rule. This applies also to both past and future students in this course.

For the purpose of this course, I am happy for students to work in collaborative partnerships. You can discuss it together, but you have to finish your exercises by yourself! Collaborative means learn from each other, do not copy-paste! You should not turn in anything unless you fully and completely understand it and can fully and completely explain it.

In order to foster your ability to communicate about technical matters, any assignment may include an interview with me, during which I will ask you to explain your code or solution and the process by which you came to it. While I acknowledge that technical communication is a skill that must be practiced to be improved, exceptionally poor performance during an interview will raise my suspicions that you may be in violation of the Gentleman's Rule and the ACM Code.

Academic Credit Policy

This course complies with the [Wabash College Academic Credit Policy](#) stated in the Academic Bulletin. In addition to regular class meetings, direct instruction takes place in this course through: faculty office hours, advising for group and individual projects, technical interviews, through Canvas, online videos, and public facing activities.

The Syllabus as a Living Document

A syllabus is a living document and can be amended. I will communicate any syllabus changes; it is your responsibility to be aware of course policies at all times.

Quantitative Skills Center (QSC)

Is biology shredding your brain into fine particulate matter? Does chemistry have your anxiety level reacting negatively? Do you have bugs in your computer science code that you just can't squash? Are the demands of your economics homework far outpacing your supply? Is math leaving you feeling irrational or derivative? Has your last physics exam, not gravity, been pulling you down? If you have questions about biology, chemistry, computer science, economics, mathematics, or physics, visit the Quantitative Skills Center (QSC)! Our department-selected tutors will work with you to answer your questions and deepen your understanding of each subject. The QSC operates Sundays, Tuesdays, and Thursdays from 7- 11pm on the second floor of the Library. Please check out the QSC webpage <https://www.wabash.edu/ace/qsc> for specific tutor availability. If you have any questions, please email Vic Lindsay at lindsayv@wabash.edu.

Writing Center

Do you have questions about how to start a paper? Are you struggling to get all of your ideas to fit? Do you have a draft but want someone to review it? Are you unsure of how to incorporate comments from your professor? Head to the Writing Center! No matter what your writing questions or needs, the Wabash Writing Center. Consultants are eager and able to help you! Please visit the webpage, <https://www.wabash.edu/ace/writing> to schedule an appointment. If you have any questions, please email the director, Dr. Koppelman, at koppelmz@wabash.edu.

The Office of Student Enrichment

Succeeding at Wabash College takes a great deal of effort and planning. Life is complex, assignments are time consuming, and staying involved keeps you running. When you have questions about how to make everything fit into your schedule, how to study more efficiently, how to take better notes, or any other question about developing your college skills, visit the Office of Student Enrichment (OSE). Go to <https://www.wabash.edu/ace/office> and follow the "Make an Appointment" link to arrange a one-on-one, personalized meeting with Dr. Koppelman or one of the OSE Advisors. No matter your questions, we will work with you to find a solution that helps you achieve your goals.

Disability and/or Special Accommodations

Students with disabilities (apparent or invisible) are invited to confidentially discuss their situation with the disability coordinator, Heather Thrush, Associate Dean for Student Engagement and Success. If a student wishes to receive an academic accommodation, it is required that his documentation of the disability be on file with Dean Thrush, who can, in confidence, provide information and guidance. Early notification helps us all work together in the most effective ways. To make an appointment with Dean Thrush, call (x6347), or email thrushh@wabash.edu. Appointments can be available via Zoom, if needed.

This is a tentative schedule, I will adjust it a little bit based on the feedback. Considering there will be holidays and exams during the semester, I only prepare and list 13 weeks of course content arrangement.

Course Content Arrangement	
Week #	Course Content
Week 01	Course Introduction & Environment Setup; Overview of computer graphics and OpenGL; Installing libraries (GLFW, GLAD, etc.) and creating a window
Week 02	The Rendering Pipeline Basics; Understanding the graphics pipeline; Drawing first triangles and working with vertex data
Week 03	Shaders & GLSL; Vertex and fragment shaders; Compiling and linking shader programs
Week 04	Buffers & Attributes; Vertex buffer objects (VBOs), element buffer objects (EBOs); Vertex array objects (VAOs)
Week 05	Transformations I; Translation, rotation, and scaling using transformation matrices; Introduction to GLM (OpenGL Mathematics library)
Week 06	Transformations II; Model, view, and projection matrices; Perspective vs. orthographic projection
Week 07	Textures I; Loading and applying 2D textures; Texture coordinates and sampling
Week 08	Textures II; Multiple textures and texture units; Texture wrapping and filtering methods
Week 09	Coordinate Systems & Camera I; Coordinate system overview (local, world, view, clip space); Basics of camera transformation (lookAt function)
Week 10	Camera II; Implementing a free-moving camera; Keyboard and mouse input for navigation
Week 11	Review & Mini-Project I; Integrating shaders, transformations, and textures; Mid-semester project: Render a textured 3D scene
Week 12	Advanced Rendering Preparation; Depth testing and face culling; Framebuffers overview
Week 13	Toward Lighting & Shading Models; Introduction to lighting concepts (preview of next-level topics); Phong model basics (ambient, diffuse, specular ideas)