Course Syllabus

Course Information

Course Number/Section	CS4361.003
Course Title	Computer Graphics
Term	Fall 2025
Days & Times	Tuesday/Thursday 4:00pm - 5:15pm
Classroom	AD 2.216
Instructional Mode	Face-to-Face

Professor Contact Information

Professor	Congyi Zhang
Office Phone	972-883-4280
Email Address	congyi.zhang@utdallas.edu
Office Location	ECSS 4.230
Office Hours	Thursday 1:30pm-3:30pm

Course Pre-requisites, Co-requisites, and/or Other Restrictions

Formal prerequisites for this course are MATH 2418 (Linear Algebra), CS/CE 2336/2337 (Computer Science II), and CS/CE/SE 3345 (Data Structures and Introduction to Algorithmic Analysis). You should have some familiarity with geometry, and good working knowledge of C++ programming.

Course Description

This course provides an introduction to computer graphics, with a focus on the fundamentals of modeling, rendering, and basic animation. We will learn about the modern programmable graphics pipeline with vertex and fragment shaders. Implementations will mainly use three.js, WebGL, and javascript. The focus will be on the mathematical, conceptual, and algorithmic foundations of computer graphics.

Student Learning Objectives/Outcomes

After this class, students can:

- explain the algorithmic steps used in rendering 3D models
- interpret and explain (hierarchical) affine transformations using diagrams, linear algebra, and implement the related code in a common graphics API

- write code that implements the graphics pipeline, with an emphasis on vertex shaders and fragment shaders
- read, write, and modify code for graphics applications using a common graphics API
- explain the behavior of common illumination models and the assumptions they make with regard to physics and perception
- describe and appreciate the creative potential of modern computer graphics and current capabilities and trends in computer graphics

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Textbooks and Materials
Steve Marschner and Peter Shirley, "Fundamentals of Computer Graphics", 5th Edition.

Assignments & Academic Calendar

Week	*Topic/Lecture*	*Assignments*
1	Introduction & Rendering Overview	
2	Math Review, Transformations	
3	Transformations	Assignment 1 Release
4	Forward and Inverse Kinematics, Scene Graph	
5	Camera Transformation and Projection	Assignment 2 Release
6	Culling, Clipping, Visibility	
7	Visibility, Midterm Review	Assignment 3 Release
8	Midterm Exam	
9	Rasterization	Assignment 4 Release
10	Lighting and Shading	
11	Texture Mapping	Assignment 5 Release
12	Shaders, Shadows, and Ambient Occlusion	
13	Global Illumination, Ray Tracing	
14	Ray Tracing	
15	Final Project Presentation and Demo	

Important: The topics and their order in this schedule are only for your reference and they may be changed due to unpredictable adjustments. Please refer to the exact due time on eLearning for the assignments and projects. If the class needs more time and examples to understand a concept we will modify the schedule. If the class is ready to skip a topic or go faster we will modify the schedule. Therefore, it is the student's responsibility to check what we covered in class and the changes in the schedule announced during class.

Grading Policy

The final grade will be based on programming assignments, midterm exam, final project proposals, demos, presentations, and class attendance. Each student is required to complete programming assignments **individually**. The assignments will be programming projects using C++. The final project could be implemented using any programing language of your interest, and could be completed with a team of up to 4 members. All programming assignments, and the final project are mandatory. It is **prohibited** to use any AI tools for completing the assignments and projects. The midterm exam will be **closed-book** with **no electronic devices allowed**.

The final grade will be composed of the following parts:

- Theory & Programming Assignments: 50%
  - Assignment 1 (10%)
  - Assignment 2 (10%)
  - Assignment 3 (10%)
  - Assignment 4 (10%)
  - Assignment 5 (10%)
- Midterm Exam: 20%
- Final Project: 25%
  - Project Proposal (5%)
  - Project Demo, Presentation, and Report (20%)
- Class Attendance: 5%

Course & Instructor Policies

Make-up exams

No make-up exams for this course.

Extra Credit

No extra credit available for this course.

Late Work

Late submission of programming assignments will be accepted with a penalty of deduction in grades by 10% per day.

Special Assignments

No special assignments for this course.

Class Participation

The students are expected to **come to class**, read and study the materials and textbook. Download and print available materials from eLearning prior to coming to class. Primary material of this course will

come from the recommended textbook. In addition, material from recent articles or relevant reference books will be presented. Numerous slides and video clips on computer graphics will be shown. Students are advised to attend the class and follow the lecture notes closely. It is the student's responsibility to check what we covered in class and the announcements during class if he or she did not attend.

Class Materials

The instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course; however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class or uploaded to other online environments except to implement an approved AccessAbility Resource Center accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Class Attendance

The University's attendance policy requirement is that individual faculty set their course attendance requirements. Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty. In some courses, instructors may have special attendance requirements; these should be made known to students during the first week of classes.

Class Participation

Regular class participation is expected. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty. Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Class Recordings

Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the AccessAbility Resource Center has approved the student to record the

instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments except to implement an approved AccessAbility Resource Center accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

Accommodations for Students with Disabilities

Please review the section within the UT Dallas Syllabus Policies and Procedures webpage.

Academic Support Resources

Please visit the Academic Support Resources page to view the University's academic support resources for all students.

UT Dallas Syllabus Policies and Procedures

Please visit the Syllabus Policies page to view the University's policies and procedures segment of the course syllabus.

Please review the catalog sections regarding the credit/no credit or pass/fail grading option and withdrawal from class.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.