

Course Overview

Course Info

Computer Graphics

Tuesdays/Thursdays at 3:30pm

Austin 304 and Online

[Teams Page](#)[Links to an external site.](#)

Instructor Info

Dr. David Hart

hartda23@ecu.edu

Sci & Tech C-106

252-328-9693

Course Description

Welcome to the fascinating world of Computer Graphics! This course is designed to provide a comprehensive overview of the discipline, combining theory and practical elements to guide you through the many aspects of this field.

This course will be broken into three major sections. First, we will explore 3D graphic software pipelines, starting from the basics of 3D modeling to building realistic environments. Second, we will delve into the fundamental mathematics and algorithms that allow 3D graphics to be created, beginning with point transformations and ending at raytracing techniques. Finally, you will be introduced to programming packages for 3D graphics such as OpenGL and shaders. You will be able to integrate 3D graphic pipelines into your existing code.

This class has a final project, where you will get to choose one of these three major topics and explore it more on your own.

Prerequisites

CSCI 2540 or SENG 2000

Students should be comfortable with programming and jumping into new coding frameworks. Students should also feel comfortable with matrices and linear algebra.

Textbooks and Required Materials

There is no required textbook for this class. For reference material, we will use *3D Math Primer for Graphics and Game Development*, 2nd ed. by Dunn and Parbery. It can be found for free online at <https://gamemath.com/>.

Course Learning Outcomes

- Understand the 3D graphics software pipeline.
- Model 3D objects using sculpting and texture techniques.
- Create 3D environments using lighting and compositing.
- Define matrices that perform transformations on 3D data.
- Mathematically define the 3D rendering pipeline.
- Mathematically define the color of a 3D object based on lighting conditions.
- Implement ray tracing via point-testing techniques.
- Program in 3D software packages.

Grading

Your final grade will be determined by the following categories:

Assignments	70%
Final Project	20%
Practice Quizzes	10%

Assignments

The largest portion of your grade will be determined by the various skills-based and programming assignments that are given through this course. There will be three minor and two major assignments. They will allow you to demonstrate your competency in building 3D graphics systems in modern software and coding frameworks.

Final Project

This course will have a final project that will allow you to build on one the major topics discussed in class. During finals time, you will present a 5-8 minute demonstration of your final project.

Practice Quizzes

Throughout the course, I will provide opportunities to practice the fundamental math and algorithms related to this course. The practice homeworks and quizzes are for your benefit to solidify concepts and can be resubmitted as many times as you need/desire for full credit.

Approximate Schedule

The tentative assignment and exam deadlines can be seen by going to the Canvas calendar. They approximately follow this schedule:

Week	Topic	Assignments
Week 1	Introduction to 3D Graphics	
Week 2	3D Modeling	
Week 3	UV Editing	3D Modeling Lab
Week 4	Lighting and Shading	
Week 5	Compositing and Rendering	Build a 3D Scene Lab
Week 6	Matrices and Transformations	
Week 7	Perspective Projection	
Week 8	3D Rendering Pipeline	Rendering Lab
Week 9	The Lighting Equation	
Week 10	Point Collision Tests	
Week 11	Ray Tracing	Ray Tracing Lab
Week 12	OpenGL	
Week 13	Shader Programming	Shader Lab

Week 14	Software Pipelines	
Week 15	Additional Topics	

Final Project Presentations: Thursday, April 25 at 2pm

Class Policies

Late Policy

All assignments must be submitted by midnight on the due date. Late assignments will be penalized 10% (of the maximum score) per day up to a maximum penalty of 50%. Weekends and university holidays are excepted, so any work turned in by the following day of university classes will incur only one day's penalty. No extra credit, if any, will be given for assignments that are turned in late.

All late work must be turned in by the last day of university classes at the end of the semester.

Communications and Announcements

For any information that affects our class meeting or curriculum, I will communicate with you all using the Announcements tab in Canvas, and any announcements posted there carry the same weight as if they were made in class. For things that are time-critical, I'll make sure to also send a copy by e-mail.

Q/A and Resources

We will use Microsoft Teams for class discussions and questions. We will also use Teams for online video conferencing when needed. You will receive an invitation to our [Teams page](#)Links to an external site. at the start of the semester. If you have a question, look to see if it's been asked there, and if not, please feel free to post your own question. If you can contribute to helping answer someone else's question, please also do so. If you need additional assistance, come to office hours or reach out to me.

Grading Breakdown

This course will use the standard letter grade scales.

Undergraduate Student Scale

A	93-100
A-	90-92
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62
F	0-59

Graduate Student Scale

A	90-100
B	80-89
C	70-79
F	0-69

Attendance Policy

This is a hybrid class and you are expected to attend face-to-face or virtually through the class streaming feed. Even if you miss a class, you will be expected to meet the same

deadlines for assignments unless you have a university-excused absence. Please notify me before class if you will be missing class because of a university-excused absence.

If you miss a class, it is up to you to watch the recording of that class period. If you are having trouble keeping up with the work in this course, come to office hours or the tutoring center.

Academic Honesty

All work must be completed in a manner consistent with the ECU Academic Integrity. Please refer to the Student Handbook for further information on ECU's policy on academic integrity. Students who copy other students' work, or who allow their work to be copied, or who copy their work from other sources, will receive a failing grade. Academic integrity violations may result in a report of the incident to the university.

ChatGPT, AI, and Other Online Tools

Though you shouldn't need it, you are allowed to use advanced automated tools (artificial intelligence or machine learning tools such as ChatGPT or Dall-E 2) on assignments in this course if that use is properly documented and credited. If a tool is used in an assignment, you must also include a brief (2-3 sentences) description of how you used the tool, in addition to citing the use of any tool used.

You may not use any tool that completes substantial parts of your assignment for you. Use of such tools will be considered an academic integrity violation.

Online Proctoring

This course requires exam proctoring through the Canvas LockDown Browser. The systems used for verification of student identity and integrity for proctored examinations require the use of webcams, audio, recording of the computer screen and the student, capturing of other identification information such as student ID cards, and the storing of this collected data for review of security and integrity of the examination(s). As part of the exam experience, you may be asked to comply with reasonable proctoring methods, including a scan of computer monitors and the immediate desktop testing area with your webcam. If a live proctor is used and if you are suspected of using unallowed resources, you may be asked to point your webcam in the direction you are looking off camera.

Students with Disabilities

East Carolina University seeks to comply fully with the Americans with Disabilities Act. Students requesting accommodations based on a covered disability must go to the Department for Disability Support Services, located in Slay 138, to verify the disability before any accommodations can occur. The telephone number is 252-737-1016

Office Hours and Contact Information

Instructor

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In-Person Office Hours: Wednesdays 12:00 - 3:00pm

Virtual Office Hours: Fridays 12:00 - 2:00 pm

You may also reach out to me on Teams at anytime. I usually respond within 24 hours.