

CSCE 4255/5255 Programming for Math and Physics in Games

Instructor Contact

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Student Hours: Mon 1:00pm-2:30pm, Thurs 3:00pm-4:00pm, Fri 12:30pm-2:00pm, or by appointment
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Meets: Tues/Thurs 8:30am-9:50am in F204
Final: Tues 10-December 8:00am-10:00am in F204

Communication Expectations: The best way to reach me outside of class/office hours is via email. During the week I will respond to your email within 24 hours. During the weekend, response time may be longer. This includes personal concerns or questions about the class or an assignment. The TA's and I strive to get grades back between 1-1.5 weeks from the due date, though that is not always possible when the class is large. Communication is expected to be professional and respectful. [Online Communication Tips](https://clear.unt.edu/online-communication-tips) (<https://clear.unt.edu/online-communication-tips>) are available. **Please include "CSCE 4255" or "CSCE 5255" in the subject line of all emails.**

Course Description

Fundamentals of game math and physics for game development, including linear algebra, matrix math for graphics, quaternions, basic physics equations, game math and physics implementation, physics engines.

Course Prerequisites or Other Restrictions

You are required to have passed CSCE 3110 (Data Structures and Algorithms), MATH 2700 (Linear Algebra and Vector Geometry), PHYS 1710/PHYS 1730 (Mechanics)

Course Objectives

Course outcomes are measurable achievements to be accomplished by the completion of a course. These outcomes are evaluated as part of our ABET accreditation process. By the end of this course, students will be able to:

1. Demonstrate knowledge of linear algebra applied to computer games and graphics.
2. Demonstrate knowledge of geometry applied to computer games and graphics.
3. Demonstrate a basic understanding of mechanics sufficient to understand and solve problems involving bodies in motion.
4. Construct discrete implementations from continuous mathematical models demonstrating knowledge of numerical methods and programming paradigms.
5. Demonstrate competency in the writing and testing of math and physics-related code for computer games.

Required Materials

None.

Teaching Philosophy

This course is very hands-on. I expect you to apply material from prior courses as well as learn new skills as appropriate to the assignments. My slides are just talking points. They are not replacements for the text, nor should they be the sole material that you study.

Course Requirements

This is a tentative list of assignments. Percentages may change slightly.

Assignment	Points Possible	Percentage of Final Grade
5 Programming Assignments	500	90%
iClicker and Class Participation	varied	10%

If you believe that there is a mistake in the grading of one of your assignments, you must bring these inquiries to the professor within one week of when the assignment is returned. After this period, it is too late to consider, except for an arithmetic error in calculating the score.

Program source code must be submitted on Canvas before midnight on the due date. Late submissions are not accepted unless there is a documented emergency.

Course Evaluation

Student Perceptions of Teaching (SPOT) is the student evaluation system for UNT and allows students the ability to confidentially provide constructive feedback to their instructor and department to improve the quality of student experiences in the course. When SPOT becomes available (generally in the last week or so of the course) you will receive an email. I offer a small amount of extra credit if class participation is over 80% of the students.

Course Calendar

It is hard to anticipate the exact dates of activities, but here is a tentative list.

Week	Date	Major Topics	Due
1	8/22	Intro	
	8/24	Linear Algebra	
2	8/29	Linear Algebra	
	8/31	Linear Algebra	
3	9/5	Blank Game	
	9/7	Collision	
4	9/12	Collision	
	9/14	Collision	Prog 1
5	9/19	Collision	
	9/21	Quadrees	
6	9/26	Rigid Body Physics	
	9/28	Rigid Body Physics	
7	10/3	Soft Body Physics	Prog 2
	10/5	Soft Body Physics	
8	10/10	Box2D Engine	
	10/12	Three Modules	
9	10/17	Three Modules	
	10/19	2D Joint Toy	
10	10/24	2D Joint Toy	Prog 3
	10/26	Cannon Game	
11	10/31	Cannon Game	
	11/2	More Fun	
12	11/7	Bullet Physics Engine	
	11/9	Bullet Physics Engine	
13	11/14	Rube Goldberg Machines	Prog 4
	11/16	Line Drawing	
14	11/21	No Class (Thanksgiving)	
	11/23	No Class (Thanksgiving)	
15	11/28	Kissing Numbers	
	11/30	Quaternions	
16	12/5	TBA	Prog 5
	12/7	TBA	
	12/9	Presentations	

Grading

I guarantee that these percentages will be the maximum required for a letter grade. I usually lower these as needed to avoid having a large number of students on a grade boundary. Anyone I feel is on a boundary will receive the higher of the two grades.

A = 90% - 100%

B = 80% - 89%

C = 70% - 79%

D = 60% - 69%

F = 0% - 59%

ALL requests for extensions on assignments must be made prior to the due date and must be for a valid “emergency” reason. In extreme circumstances, contact after the due date may be accepted if there is a **COMPELLING** reason.

Course Policies

Class attendance is regarded as an obligation as well as a privilege. All students are therefore expected to attend each class meeting. *A student who misses class is still responsible to find out what was discussed and to learn the material that was covered and obtain the homework that was assigned on the missed day.* The instructor is not responsible for re-teaching material missed by a student who did not attend class. Therefore, each student is accountable for and will be evaluated on *all* material covered in this course, regardless of attendance.

Syllabus Change Policy

The instructor reserves the right to change the course as needed, specifically (though not limited to) the case of topics, due dates, and assignments/assessment items. Any changes are done after careful consideration of the course objectives and student progress.

UNT Policies

Academic Integrity Policy

Academic Integrity Standards and Consequences. According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University.

Based on this policy, any form of “unauthorized assistance” constitutes cheating. If the use of artificial intelligence is not authorized for the assignment in question, then a violation has occurred.

ADA Policy

UNT makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide a student with an accommodation letter to be delivered to faculty to begin a private discussion regarding one's specific course needs. Students may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the [ODA website \(https://disability.unt.edu/\)](https://disability.unt.edu/).