

# CSCE 4255/5255 Programming Math and Physics for Games

**Instructor:** Ian Parberry    **Place:** Remote    **Office Hrs:** M 5-6, Th 4-5    **Phone:** 940-565-2845  
**Semester:** Fall 2020    **Time:** TR 2:30 -3:50pm    **Office:** Remote    **Email:** ian@unt.edu

## Course Description

Programming math and physics for video games involves a balancing act between execution speed, numerical accuracy, and veracity while avoiding the many common pitfalls that await the unwary programmer. As the title suggests, the emphasis in this class is on coding, not memorizing formulas.

## Prerequisites

[MATH 2700](#), [CSCE 3110](#), [PHYS 1710/PHYS 1730](#), each with a grade of C or better.

## Course Delivery

Course content will be delivered using Zoom, Canvas, and a dedicated Subversion server.

## Course Material

This class does not have a textbook. Lecture notes and source code will be provided.

## Required Technology

Access to a Windows 10 Gaming PC is mandatory. Prior experience with Visual C++, DirectXTK12, Box2D, Git, and Subversion is useful but not required. You will need a reliable connection to the internet and a microphone in order to participate in Zoom lectures. A webcam would help me to get to know you better, but its use is not mandatory.

## COVID-19 Statement

I am mindful of the COVID-19 epidemic and its effects on your ability to learn and get work done on time. I am committed to giving you the best experience in this class possible in the current environment.

## Attendance Policy

Attendance during lectures is encouraged. Attendance will not be taken after the mandatory period.

## Late Work Policy

Late work will not in general be accepted. Exceptions can be made for unavoidable and unforeseen circumstances such as serious illness, family emergency, zombie apocalypse, or civil war.

## Learning Outcomes

1. Demonstrate knowledge of linear algebra applied to video games and graphics.
2. Demonstrate knowledge of geometry applied to video 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 writing and testing math and physics-related code for video games.

## Grades

You will be graded on 5 programs consisting of source code to which you must add functionality. Your code will be graded on correctness, conciseness, clarity, professionalism, organization, and efficiency. Programs 1-4 are worth 1/6 and program 5 is worth 1/3 of your final grade, which will be curved to take into account any variation in difficulty compared to previous years. Group work is not permitted. There are no exams. Students enrolled in CSCE 5255 will have harder tasks than those enrolled in CSCE 4255, and they will be held to higher standards. There are no examinations. Students must present their final program to the class on the final class days, December 1, and 3, 2020.

## Class Calendar

Date	Topic	Date	Topic
Aug. 25	Introduction	Aug. 27	Tools 1
Sep. 1	Tools 2	Sep. 3	Tools 3
Sep. 8	Trigonometry 1	Sep. 10	Trigonometry 2
Sep. 15	Rigid body physics 1	Sep. 17	Rigid body physics 2
Sep. 22	Collision detection & response 1	Sep. 23	Collision detection & response 2
Sep. 29	Soft body physics 1	Oct. 1	Soft body physics 2
Oct. 6	Introduction to Box2D	Oct. 8	Box2D modules 1
Oct. 13	Box2D modules 2	Oct. 15	Box2D modules 3
Oct. 20	Box2D joints 1	Oct. 22	Box2D joints 2
Oct. 27	Box2D contact listeners	Oct. 29	3D math 1
Nov. 3	3D math 2	Nov. 5	3D math 3
Nov. 10	3D math 4	Nov. 12	Bullet Physics
Nov. 17	TBA	Nov. 19	TBA
Nov. 24	TBA	Nov. 26	Thanksgiving – no classes
Dec. 1	Student presentations	Dec. 3	Student presentations

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## UNT Policies

UNT policy makes it mandatory to include the following material, which you will therefore probably see many times. If you have seen it before, then you can skip everything below the dotted line above.

### 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.

### 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/).

### Emergency Notification & Procedures

UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Canvas for contingency plans for covering course materials.