GAME 180 : GAME PROGRAMMING

Section 501, CRN 56112
Spring 2021

Instructor: Ian Burch
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Office and Hours: Online on Zoom & Learn (Tuesday & Thursday, 1:00 - 4:00 or by appointment. Link to be posted in Learn)

Course Prerequisites:
Intro to Game Engines (GAME 102) OR Game Scripting (GAME 120)
Recommended: Intermediate Algebra (MATH 1215) or higher

Course Goals:
This course explores the algorithms and ideas required to program video games. Students will learn how to program collisions, pathfinding, and basic AI. Students will gain a conceptual understanding of vectors and randomness, and use them to program motion, fractals, and procedural levels. Best practices for coding will also be explored, such as debugging techniques, code documentation, and version control.

Materials:
- Internet Access, for Learn, Zoom, and Youtube.
- Gamemaker Studio 2 (GMS2)
- Unreal Engine 4 (UE4)
- (Optional) Github account & software

This course requires a computer. If you do not have one, let me know and we can work with campus IT to let you borrow a laptop with the necessary software.
- Unreal Engine 4 is free, and can be gotten from https://www.unrealengine.com/
- Gamemaker Studio 2 can be gotten from https://www.yoyogames.com/gamemaker or through Steam. It costs $99 for a lifetime license, or $39 for a yearly. You can also request a laptop with this already installed.

Optional Reading:
- *Spelunky* by Derek Yu
- *Game Programming Patterns* by Robert Nystrom: Game Programming Patterns
- *The Book of Shaders* by Patricio Gonzalez Vivo and Jen Lowe: https://thebookofshaders.com/

Learning Objectives:

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

(1) Use best practices when programming

(2) Program core algorithms for games

(3) Program AIs with states and pathfinding

(4) Understand and implement the concepts behind motion

(5) Understand and implement random generation

Course Content

The course is broken up into several small sections, each exploring a different topic over a span of 1 to 3 weeks. Expect to submit 1 assignment each week, with the last week of each section being a little larger than the others. These will usually require uploading an algorithm, game file, or screenshot to UNM Learn. There will also be discussion forum posts graded independently.

The first half of the semester will use Gamemaker Studio 2, a 2D game engine, to introduce and explore simpler concepts. The second half will use Unreal Engine 4, as 3D engines are better for learning about vectors and pathfinding. The final 3 weeks of the semester are left open for student suggested topics!

Grade Breakdown:

Discussion Posts   20%

Weekly Assignments 80%

As there are 16 weeks in the semester, each weekly assignment will count for 5% of the grade. Letter grades will be given as follows, with + or - given for the highest and lowest 3% in each range, respectively. Incomplete (I) grades will not be assigned without documented, extenuating, circumstances.

90% - 100%   A

80% - 89%   B

70% - 79%   C

60% - 69%   D

0% - 59%   F

Tentative Schedule:

This schedule is subject to change, but all topics listed will be covered during the semester

Date	Week	Topic	Software	SLOs
1/18	1	Installations, Intro to GMS2	GMS	-

1/25	2	Collisions (AABB, Radius)	GMS	2, 4
2/1	3	Collisions & Debugging	GMS	1
2/8	4	Finite State Machines	GMS	2, 3
2/15	5	Finite State Machines	GMS	2, 3
2/22	6	Procedural Generation	GMS	1, 5
3/1	7	Procedural Generation	GMS	1, 5
3/8	8	Procedural Generation	GMS	1, 5
3/15	-	Spring Break	-	-
3/22	9	Vectors	UE4	4
3/29	10	Vectors	UE4	4
4/5	11	Pathfinding	UE4	2, 3, 4
4/12	12	Pathfinding	UE4	2, 3, 4
4/19	13	Pathfinding	UE4	2, 3, 4
4/26	14	Special Topic	?	-
5/3	15	Special Topic	?	-
5/10	16	Special Topic	?	-

Late Work / Absences:

As we are still dealing with Covid-19 and its effects, I'll be lenient on due dates. Email me if you're going to be late on an assignment and I'll generally give an extension. Any assignments not submitted by the end of the semester (5/16) will be graded 0

Expectations:

Students are expected to conduct themselves in a professional and collegial manner. During Zoom meetings, be professional, appropriate, and mute when not speaking. When posting on discussion boards, be polite, concise, and avoid using internet slang. If you need an extension on an assignment, please email or message me before it is due. Students missing more than 4 consecutive assignments may be dropped from the course.

Disability Statement:

In accordance with University Policy 2310 and the Americans with Disabilities Act (ADA), academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. It is imperative that you take the initiative to bring such needs to the instructor's attention, as I am not legally permitted to inquire. Students who may require assistance in emergency evacuations should contact the instructor as to the most appropriate procedures to follow. Contact Accessibility Resource Center at 277-3506 or arc.unm.edu for additional information.

If you need an accommodation based on how course requirements interact with the impact of a disability, you should contact me to arrange an appointment as soon as possible. At the appointment, we can discuss the course format and requirements, anticipate the need for adjustments and explore potential accommodations. I rely on the Disability Services Office for assistance in developing strategies and verifying accommodation needs. If you have not previously contacted them I encourage you to do so.

Academic Integrity:
Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, up to and including dismissal, against any student who is found guilty of academic dishonesty or otherwise fails to meet the standards. Any student judged to have engaged in academic dishonesty in course work may receive a reduced or failing grade for the work in question and/or for the course.

Academic dishonesty includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or without the University; and nondisclosure or misrepresentation in filling out applications or other University records.

Credit-hour Statement:
This is a three credit-hour course. Class is asynchronous, but videos and feedback will be given equivalent to two 75-minute sessions of direct instruction for fifteen weeks during the Fall 2021 semester. Students are expected to complete a *minimum* of six hours of out-of-class work (or homework, study, assignment completion, and class preparation) each week.

Title IX :
In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered "responsible employees" by the Department of Education (see pg 15 - http://www2.ed.gov/about/offices/list/ocr/docs/qa-201404-title-ix.pdf). This designation requires

that any report of gender discrimination which includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the Office of Equal Opportunity (oeo.unm.edu). For more information on the campus policy regarding sexual misconduct, see:
https://policy.unm.edu/university-policies/2000/2740.html

Citizenship and/or Immigration Status: All students are welcome in this class regardless of citizenship, residency, or immigration status. Your professor will respect your privacy if you choose to disclose your status. As for all students in the class, family emergency-related absences are normally excused with reasonable notice to the professor, as noted in the attendance guidelines above. UNM as an institution has made a core commitment to the success of all our students, including members of our undocumented community. The Administration's welcome is found on our website: http://undocumented.unm.edu/.