CMPM121: Game Technologies
Course Syllabus

Summer 2020, Session 1 (June 22 - July 24, 2020)

Instructor - Ishaan Paranjape (ishaan@ucsc.edu, iparanja@ucsc.edu)
Teaching Assistant - Isaac Karth (ikarth@ucsc.edu)

Course Description
This course provides an introduction to making games using Unreal Engine.

Course Outcomes -

- Students will be able to apply C++ and the blueprint visual scripting languages to create games.
- Students will learn core features of the Unreal game engine such as actors, inputs, user interfaces, collisions, graphics, animations, audio, diagnostics and optimizations.
- Students will be able to apply best practices to the design of their games.
- Students will be able to read and identify recurring design patterns in other works within the context of Unreal Engine.
- Students will explore their own creativity within the context of the game engine.
- Students will design and develop well-designed, extensible projects.
- Students will learn to work with complex platforms, frameworks and toolsets.

Course Materials -
All the required course material is available on Canvas. The material will be in the 'modules' section. A major useful resource is the Unreal Engine documentation. All of the concepts covered in this class will be referencing the Unreal Engine documentation.
Instructor information

- Name and preferred mode of address - Ishaan Paranjape, Ishaan
- Office hours and format - Thursday 12:00pm - 3:00pm, Friday 3:00pm - 6:00pm; Zoom.
- Preferred mode of contact - Email (ishaan@ucsc.edu, iparanja@ucsc.edu), Canvas messages
- Communication practices - Response within 24 hours
- TA Contact information - Isaac Karth (ikarth@ucsc.edu)
- My approach to teaching this course - Lectures (live, with recordings available after class), discussions (Zoom breakout rooms, Canvas), shared resource contributions and demonstrations on working with some core features.

Course Schedule

**Week 1** (June 22 - June 28):

**Topics** -

1. Basic introductions to game engines and UE4.
   a. Editor introductions
2. Unreal Engine programming and blueprints
   a. Git, version control
3. Blueprints and C++ with screen management
4. Actors introduction

**Important dates** -

- Assignment 0 - Run a project on Unreal (July 23rd). (Confirmation by Thursday July 25)
- Core Assignment 1 due on Monday June 29 11:59pm.
- Participation Assignment 1 contributions evaluated by Monday June 29 11:59pm.
**Week 2 (June 29 - July 5):**

1. Actors conclusion
2. Collisions
3. Player inputs

**Important dates -**
- Core Assignment 2 due on Tuesday July 7th 11:59pm.
- Participation Assignment 2 contributions evaluated by Monday July 6th 11:59pm.

**Week 3 (July 6 - July 12):**

1. Raycasting
2. Graphics and animations, an introduction -
   a. Lighting, materials and textures and shaders and particle effects on Unreal.

**Important dates -**
- Core Assignment 3 due on Tuesday July 14th 11:59pm.
- Participation Assignment 3 contributions evaluated by Monday July 13th 11:59pm.

**Week 4 (July 13 - July 19):**

2. Audio
3. Diagnostics and optimizations
   a. Introduction to design patterns as a way of optimizing game development
   b. Objects and object lifetimes

**Important dates -**
- Core Assignment 4 due on Monday July 20th 11:59pm.
- Participation Assignment 4 contributions evaluated by Monday July 20th 11:59pm.
Week 5 (July 20 - July 24):

1. Additional topics - NPCs using behavior trees, python scripting to automate editor tasks, etc.
2. Final Presentations of the integration assignments.

Important dates -

- In-class presentations on July 22nd during class time. (Necessary for the final grade)
- Integration assignment documentation, code and video submission due by July 24th. (Necessary for the final grade)

Course Resources

All course materials will be on Canvas (link) in the modules section. Additional resources include -

- Learn cpp - C++ tutorial and best practices guide - This can be used for an intuitive understanding of the basic concepts regarding C++ programming.
- CPP Reference - This can be used for understanding and examples of standard template library classes and functions. Many ideas in the Unreal Engine API are picked up from here. This means that if documentation is scarce, you can refer to the analogue here.
- Git SCM - For an introduction to version control system git. Explanations of the git commands are presented here. There is a book ‘Pro Git’ at this link as well, if anyone is looking for intuitive explanations in git.
- Unreal Engine C++ API reference - For details regarding classes and their members within the Unreal Engine.
- Additional resources will be released with each module on Canvas.
Course Assignments and grading policy

All assignments will contribute towards the construction of a portfolio piece and towards development of shared resources which would be useful for working with Unreal Engine in the future thus covering each of the proposed learning outcomes.

- **Four core assignments**, each worth 15% of the grade (3 major tasks worth 5% each), due at the end of each of the first four weeks (Video, report and/or code submission). This will require an understanding of the core features of the engine.

- **(Final exam) - One integration assignment**, worth 20% of the grade. This would evaluate integrating the features/components learned and created throughout the course (with additional features if possible) (Video and code submission)(7.5%). Detailed documentation of the project (5%) and a final presentation (with demo) (7.5%) is required.

- **Five ongoing participation assignments**, each worth 4% of the grade evaluating contributions to shared resources (such as google docs and canvas discussions). This will be evaluated at the end of each week.

- **Rubric** for each of the assignments will be released with the graded assignment.

- **Grading points revision** - If the first submission was on time and scored 50% at least, 1 resubmission is allowed for 100% of the grade until the end of week 5.

- **Students will receive feedback on their work within two weeks.**

- **Extra credit opportunity** - If there is a detailed study and/or implementation (in one of the projects) of an interesting feature beyond course materials (or plugin or anything released for free on the marketplace) such as hair simulations or chaos destruction, extra credit will be awarded. In addition to this, some extra credit tasks will also be specified in each assignment.

- **Final grades** will be submitted by July 30.

Course policies -

**Policies regarding missed, late or makeup assignments or exams**

- A grace period of upto 1 week is allowed on at the most one assignment.
- Assignments submitted after the deadline are eligible for 80% of the total points upto one week and then 50% of the points upto two weeks (upto the final day of
the term (session 1)). Since a resubmission is allowed, it would be a great idea to submit it on time!

- If there is a compelling reason for a potential missed or late submission, please let me know as early as possible.

**Policy regarding DRC Remote Accommodations**
The Disability Resources Center reduces barriers to inclusion and full participation for students with disabilities by providing support to individually determine reasonable academic accommodations. Operations continue via remote appointments. If you have questions or concerns about exam accommodations or any other disability-related matter, email the DRC Schedulers at drc@ucsc.edu for an appointment.

**Policies regarding academic dishonesty**
Academic integrity is the cornerstone of a university education. Academic dishonesty diminishes the university as an institution and all members of the university community. It tarnishes the value of a UCSC degree. All members of the UCSC community have an explicit responsibility to foster an environment of trust, honesty, fairness, respect, and responsibility. All members of the university community are expected to present as their original work only that which is truly their own. All members of the community are expected to report observed instances of cheating, plagiarism, and other forms of academic dishonesty in order to ensure that the integrity of scholarship is valued and preserved at UCSC. In the event a student is found in violation of the UCSC Academic Integrity policy, he or she may face both academic sanctions imposed by the instructor of record and disciplinary sanctions imposed either by the provost of his or her college or the Academic Tribunal convened to hear the case. Violations of the Academic Integrity policy can result in dismissal from the university and a permanent notation on a student’s transcript. For the full policy and disciplinary procedures on academic dishonesty, students and instructors should refer to the Academic Integrity page at the Division of Undergraduate Education.

**Policy regarding Title IX**
The university cherishes the free and open exchange of ideas and enlargement of knowledge. To maintain this freedom and openness requires objectivity, mutual trust, and confidence; it requires the absence of coercion, intimidation, or exploitation. The principal responsibility for maintaining these conditions must rest upon those members
of the university community who exercise most authority and leadership: faculty, managers, and supervisors. The university has therefore instituted a number of measures designed to protect its community from sex discrimination, sexual harassment, sexual violence, and other related prohibited conduct. Information about the Title IX Office, the online reporting link, applicable campus resources, reporting responsibilities, the UC Policy on Sexual Violence and Sexual Harassment, and the UC Santa Cruz Procedures for Reporting and Responding to Reports of Sexual Violence and Sexual Harassment can be found at titleix.ucsc.edu. The Title IX Office is actively responding to reports and requests for consultation. If you are not currently working with someone in the office and want to make a report/request a consult, you can expect the fastest response by using our online reporting link. For more information please visit the Title IX Operations under Covid-19 page.