

CTIN 499 Unreal Game Engine Fundamentals

Units: 2

TERM FALL 2025 – Mondays 6 to 8:50PM

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Course Description

This course is an introduction to game engine practices for students of various creative majors. The Unreal game engine (by Epic Games) is a ubiquitous tool of choice for artists and professionals today. Through weekly assignments, students learn the techniques of both rendered and real-time approaches to their discipline.

In recent years, Unreal's use has expanded into fields beyond video game development, including 3D animation, cinema previsualization, design visualization, and virtual production. Virtual production is a filmmaking process that integrates video game software with photographic cameras, motion capture data, and an LED wall (aka: volume).

Further, the class couples the goals of learning Unreal with an ongoing analysis of the tool in the larger context of software studies. It is valuable to weigh the power a specific game engine provides while it favors its use in game, cinema and visualization genres.

Ultimately, this class prepares students for various intermediate and advanced USC classes that focus on either animation, 3D modeling, world building, or virtual production. The course challenges students to consider: how does Unreal compel the creator towards particular designs and narratives?

Learning Objectives

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

- Understand and apply fundamental concepts used in the operation of game engines
- Identify and modify the characteristics of lights, cameras, and materials to achieve different visual effects
- Implement visual compositions using game elements such as actors, primitives, models, lights, and cameras
- Implement a dynamic cinematic scene using the sequencer, take recorder, animations, and custom inputs
- Execute a cinematic sequence involving multiple cameras, visual effects, post processing effects, and audio
- Package an Unreal project as an executable and render a real time cinematic to compressed video
- Employ functional critique to improve work
- Create and maintain an accessible online portfolio showing their work and creative process.
- Present their work using professional documentation and presentation techniques.

Prerequisites / Corequisites: None

Required Readings and Supplementary Materials

Some course materials will be required. Description and links will be provided in Brightspace to support completion of your work. These required elements may include the following graded activities:

- Completion of online tutorials
- Learning style surveys
- Self-assessment surveys
- Literacy research and reports

Grading Breakdown

| <i>Assessment Tool (assignments)</i> | <i>Points</i> | <i>% of Grade</i> |
|--|---------------|-------------------|
| Weekly Project Review/Critique and Participation (Includes 25pts / 10% Participation Grade) | 100 | 20 |
| Weekly In-class lecture and lab assignments | 100 | 20 |
| Weekly Homework assignments | 200 | 40 |
| Final Portfolio presentation website | 100 | 20 |
| TOTAL | 500 | 100 |

Basic Grading Rubric for Weekly assignments

| <i>Graded Element</i> | <i>% of grade</i> |
|--|-------------------|
| Proper naming convention | 10 |
| All required elements complete and present | 60 |
| Assignment posted on time in the location required | 10 |
| Provided written critique as assigned | 10 |
| Presentation (in-class, website, behance) | 10 |

Grading Scale

| <i>Letter Grade & Percentage Range</i> | | | |
|--|---------------|-----------|---------------------|
| A | 95-100 | C | 73-76 |
| A- | 90-94 | C- | 70-72 |
| B+ | 87-89 | D+ | 67-69 |
| B | 83-86 | D | 63-66 |
| B- | 80-82 | D- | 60-62 |
| C+ | 77-79 | F | 59 and below |

Grading Timeline

All assignments use a checklist rubric to guide the completion of your work. Assignments are graded on:

- Professional practice (naming conventions, delivery (format/posting location and date, etc.))
- Level of completion (according to the checklist)
- Collaboration and critique
- Iterative improvement (revise and resubmit)

Course Schedule

| WEEK | Lecture Topic / In-class Workshop | Homework |
|--------|--|--|
| Week 1 | <p>Lecture:</p> <ul style="list-style-type: none"> Syllabus Review What is a Game Engine? What is software? <p>Workshop:</p> <ul style="list-style-type: none"> Primitives and Actors Materials Part 1: Color | Course Overview |
| Week 2 | <p>Lecture:</p> <ul style="list-style-type: none"> A Brief History of Game Engines <p>Workshop:</p> <ul style="list-style-type: none"> Importing Models Physics | <p>Honor an Abstract Painting</p> <p>Capture screenshots of 2 levels you have populated with primitives inspired by the abstract paintings of Sonia Delaunay, Nicolas Dubreuille, or Philippe Halaburda. Choose one painting from 2 of the above painters.</p> |
| Week 3 | <p>Lecture:</p> <ul style="list-style-type: none"> A Brief History of Game Engines <p>Workshop:</p> <ul style="list-style-type: none"> Materials Part 2: Textures and Photoshop; Built in Shaders Lighting 1: Sky Light World Building 1: Water | <p>It's Raining Cats and Dogs</p> <p>Capture a video of your Unreal project running in the editor. The scene depicts a simple room or minimal outdoor setting. On game start, various imported models drop into the frame before they bounce on the ground in different ways, based on your tailored physics settings.</p> |
| Week 4 | <p>Lecture:</p> <ul style="list-style-type: none"> Unreal Adoption Case Study: From <i>The Witcher 3</i> to <i>The Witcher 4</i> <p>Workshop:</p> <ul style="list-style-type: none"> Cameras - Cinematography Before and After Virtual Worlds Cameras - "Possession" and Priority | <p>Beneath the Surface</p> <p>Capture a video of your Unreal project running in the editor. The point-of-view looks down on a body of water. Beneath, we can see various animals and objects drifting and bobbing. The scene is lit by a Sky Light.</p> |
| Week 5 | <p>Lecture:</p> <ul style="list-style-type: none"> Games Engines and Genre - The Philosophy of Prototyping <p>Workshop:</p> <ul style="list-style-type: none"> Lighting Part 2: Types and Settings Packaging a Project | <p>Shaping Attention, Version 1</p> <p>You will be given a template scene populated with various actors. You are invited to change and add the content.</p> <p>Capture 16 screenshots organized in pairs. Each pair presents the same content with the same camera transform, but our attention is drawn to different aspects of the two images. You shape our attention by manipulating the materials of your actors as well as the camera settings (such as the focus). Your 8 pairs should depict a variety of focal lengths, providing distinct aesthetics and moods.</p> |
| Week 6 | <p>Lecture:</p> <ul style="list-style-type: none"> Games Engines Survey: Why We Use Unreal <p>Workshop:</p> <ul style="list-style-type: none"> Filmmaking Part 1: The Sequencer | <p>Shaping Attention, Version 2</p> <p>Augment Version 1 and capture 16 new screenshots, once again organized in pairs. But this time our attention is shaped primarily by the lighting.</p> |

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| <p>Week 7</p> | <p>Lecture:</p> <ul style="list-style-type: none"> • Blueprints Are Templates <p>Workshop:</p> <ul style="list-style-type: none"> • Filmmaking Part 2: Movie Rendering • Filmmaking Part 3: Video Compression • Materials Part 3: Animated Textures | <p>Shaping Attention, Version 3 Capture (and edit) a video of a <i>packaged</i> version of your Shaping Attention project. Animate the camera so that it transitions between the various transforms and settings of your cameras featured in Version 2.</p> |
| <p>Week 8</p> | <p>Lecture:</p> <ul style="list-style-type: none"> • Connecting Game Developers and Their Players - Fortnite and UEFN <p>Workshop:</p> <ul style="list-style-type: none"> • World Building Part 2: Landscapes, water (review), and foliage. | <p>The Tortoise and the Hare, Version 1 Using the provided character models for import, animate a video. Make use of camera cuts and movement to tell a story of a chase between 2 or more characters. Further, this project should manifest the content of many of the lectures and workshops from prior weeks. For this week, focus your efforts on the characters and leave the world mostly unrealized. Package the project before rendering and compressing it appropriately.</p> |
| <p>Week 9</p> | <p>Lecture:</p> <p>Workshop: Gameplay Part 2: Takes Recorder - Playing (Pawning) a Movie Character</p> <ul style="list-style-type: none"> • Gameplay Part 1: GameModes for Pre-Vis and Visualization - Controllers and Pawns | <p>The Tortoise and the Hare, Version 2 Build a detailed and compelling world around your Tortoise and Hare using the tools from last week's workshop. Package the project before rendering and compressing it appropriately.</p> |
| <p>Week 10</p> | <p>Lecture:</p> <ul style="list-style-type: none"> • Examples of "one-take" scenes in cinema. <p>Workshop:</p> <ul style="list-style-type: none"> • Gameplay Part 2: Takes Recorder - Playing (Pawning) a Movie Character • Lighting Part 3: Lightmaps and Baking | <p>A Self-Assessment This is a written assignment. Referring to the syllabus, create a list of the topics we have covered in our workshops and lectures. Detail your comfort and interest in each. Further, describe how you think each can be useful with greater mastery.</p> |
| <p>Week 11</p> | <p>Lecture:</p> <ul style="list-style-type: none"> • Iconic "One Take" Film Scenes <p>Workshop:</p> <ul style="list-style-type: none"> • Sound • Inputs and Character Animations | <p>One-Take Haunted House, Version 1 Depict a haunted house from the point of view of a person walking through it. After composing a low fidelity layout of the haunted house, use the Takes Recorder to pilot your player character through the environment.</p> |
| <p>Week 12</p> | <p>Lecture:</p> <ul style="list-style-type: none"> • Movie trailers and the final project <p>Workshop:</p> <ul style="list-style-type: none"> • Postprocessing • Mannequins, Metahumans, and Manipulating Animations | <p>One-Take, Version 2 Add to your project. Pilot the non player characters as they move and perform animations in the environment. Then layer those takes to compose your final version.</p> |

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| Week 13 | <p>Workshop:</p> <ul style="list-style-type: none"> Niagara Review Principles Through Your Project Progress | Pretend Movie or Game Trailer, Part 1 |
| Week 14 | <p>Lecture:</p> <ul style="list-style-type: none"> <p>Workshop:</p> <ul style="list-style-type: none"> Review Principles Through Your Project Progress | Pretend Movie or Game Trailer, Part 2 |
| Week 15 | <p>Workshop:</p> <p>Lessons learned</p> | Pretend Movie or Game Trailer, Part 3 |
| EXAM Week | Pretend Movie or Game Trailer Final – integrated into Online Portfolio Website | |

Academic Integrity

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university’s mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the [USC Student Handbook](#). All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or “recycle” work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

Academic dishonesty has a far-reaching impact and is considered a serious offense against the university. Violations will result in a grade penalty, such as a failing grade on the assignment or in the course, and disciplinary action from the university itself, such as suspension or even expulsion.

For more information about academic integrity see the [student handbook](#) or the [Office of Academic Integrity’s website](#), and university policies on [Research and Scholarship Misconduct](#).

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment or what information requires citation and/or attribution.

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University’s educational programs. [The Office of Student Accessibility Services](#) (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.