USC University of Southern California

Course title and number: **CTPR 445: Realtime CG Filmmaking**

Units: 3

Prerequisites: CTPR 294 or CTPR 507

Term—Day—Time: Fall 2022 / Wed 4-7 PM Lecture / Thu 1-4 PM Lab

Location: RZC 117

Instructor: Emre Okten

Contact Info: okten@usc.edu

Teaching Assistant:

Contact Info:

Course Description

This course is the first step to a new kind of filmmaking. Suited for Production students without prior CG experience, goal is to shed the preconceived notions of what is possible in a short film and to be creative beyond the scope of live action filmmaking. Students will be encouraged to make the best use of the possibilities of CG filmmaking, achieve a level of unprecedented creative control and learn to use the software on every step of the creative workflow. Students will be able to use these skills to create previs, pitchvis, CG films and quick experiments to practice their creativity without being on set.

Prototyping is an important part of the class: Worldbuilding with large strokes, quick, imperfect iterations, exploring ideas and embracing your limitations. By using premade CG assets as their building blocks, students will achieve a rough visual representation of their ideas quickly and learn the indie approach to CG filmmaking. The course will be centered around the creation of a short animatic up to 5 minutes in length, with each assignment focusing on smaller pieces and building up to the final product.

A significant portion of the class will be dedicated to learning the software, but always with an emphasis on how it aids the creative process. The technology is here to empower the creatives; working in a digital environment with minimal resources will enable them to express their ideas under any circumstance and the fundamental knowledge of CG pipeline gained in this class will help students further navigate the fields of virtual production and 3D animation.

Learning Objectives

- Incorporate the game engine into the creative workflow
- Use online marketplaces as a library of digital assets
- Utilize and customize CG assets to build scenes
- Use virtual production tools such as cameras, lights and animation timelines
- Create previs for scenes that involve live action filming
- Navigate a new way of filmmaking and the storytelling possibilities that are unique to the digital environment

Recommended Preparation

Think of a creative idea that can be explored with the digital assets provided for the class. Review the asset store to find extra assets to fill in the gaps and add some customization.

Technological Proficiency and Hardware/Software Required

A game engine and an editing software is required. Knowledge of CG pipeline is not necessary as the game engine technology allows an entry into this field with basic necessary tools and assets already implemented into one software.

Description and Assessment of Assignments

Assignment 1: Master Scene
With the techniques learned in class and inspired by an existing movie or artwork, create a master scene with an environment, materials and simple character animation. Apply lighting and camera to the scene and render a 30 second animatic with different shots and cuts.

Assignment 2: Environment Blockout
Using greyboxing techniques, block out an environment for your project and perform a location scout.

Assignment 3: Storyboard / Concept Stills
Capturing stills from the CG environment, construct a storyboard for one scene or tell a story with 10 frames, adding lighting, characters and props to communicate basic blocking.

Assignment 4: Scene Animatic
Animate a sequence and make an animatic following your storyboard with animated characters and cameras.

FINAL: Completed Animatic
Your final work, fully rendered and up to 5 minutes in length. Can be a trailer, a pitchvis, or a completed short film. Use additional filmmaking techniques such as sound design and editing to convey your vision for the project.

Grading Breakdown

Assignment	% of Grade	Due Date
Master Scene	10	Week 5-6
Environment Blockout	15	Week 7
Storyboard / Concept Stills	20	Week 9
Scene animatic	25	Week 11
Final animatic	30	Finals Week
Total	100	

Course Schedule

Weekly courses will follow a similar structure where the first half of the class is dedicated to the instruction of the new concepts, and the second half for practicing these techniques in small in-class assignments.

[08/24] Week 1: What Is Realtime?
Reviewing the realtime CG production landscape. Going through the uses of game engines, how and why they became an important part of CG filmmaking. Short films and other uses of the realtime production pipeline. Short demonstration of the software.

[08/31] Week 2: Introduction to Game Engines and Greyboxing
Basics of game engines and CGI. Creating a project, important settings, review of the provided assets. Using primitive geometry and terrain to prototype environments.

> ***[09/01] LAB:*** *Import asset and packages, change transforms and place them in a scene.*

[09/07] Week 3: Look Development and Blocking Out Scenes
Further tools for greyboxing and terrain. Shaders and the material editor to customize the existing properties of the assets, creating materials to aid in look development. Review of customizing provided assets for world building.

> ***[09/08] LAB:*** *Create a rough layout level, customize materials.*

[09/14] Week 4: Character Animation and Timeline
Importing animation assets, prepare them for use with custom characters. Using imported animation in timeline, introduction to keyframe animation.

> ***[09/15] LAB:*** *Import a character and animated them in a scene with a prop.*

[09/21] Week 5: Cinematography – 1
Basics of realtime lighting and HDRP. Using lighting actors and volumes to quickly emulate sky and atmosphere effects, similarities and differences between virtual and real world lighting fixtures.
ASSIGNMENT 1 – MASTER SCENE DUE

> *[09/22] LAB: Choosing a still from a movie, recreate the light, mood and atmospheric effects in the engine.*

[09/28] Week 6: Cinematography – 2
Basics of realtime camera. Procedural camera layout with cinemachine and timeline. Basic rendering.
ASSIGNMENT 1 – RENDER DUE

> *[09/29] LAB: Create a master sequence with different shots.*

[10/05] Week 7: Virtual Production
Link other devices to use as a virtual camera. Record character animation with puppeteering tools. Animate props and objects with live tools.
ASSIGNMENT 2 DUE

> *[10/06] LAB: Save a handheld shot operated from an external device.*

[10/12] Week 8: Photogrammetry
Review the assignments. Ways to capture and use real world locations and props in the engine. Decals and terrain tools.

> *[10/13] NO LAB – FALL RECESS*

[10/19] Week 9: VFX
Intro to VFX graph and simple particle effects.
ASSIGNMENT 3 DUE

> *[10/20] LAB: Make a simple floating dust effect.*

[10/26] Week 10: Facial Animation
Review the assignments. Using game engine's live facial capture system on a human character. Recording facial animations independent of the body animation.

> *[10/27] LAB: Record facial animation. Make an adjustment to the animation.*

[11/02] Week 11: Visual Scripting
Visual scripting can be an easy way into programming. They can be used to automate actions, introduce shortcuts, customize assets and build new asset types for your needs.
ASSIGNMENT 4 DUE

   [11/03] LAB: Make a "practical" light using scripting and simple geometry.

[11/09] Week 12: In-class work on final projects
Working in class on their projects with the help of the instructor and the SA. Reviewing concepts and techniques that need additional instruction.

   [11/10] LAB: Work on final projects.

[11/16] Week 13: In-class work on final projects
Working in class on their projects with the help of the instructor and the SA. Reviewing concepts and techniques that need additional instruction.

   [11/17] LAB: Work on final projects.

 [11/30] Week 14: In-class work on final projects
Working in class on their projects with the help of the instructor and the SA. Reviewing concepts and techniques that need additional instruction.

   [12/01] LAB: Work on final projects.

[12/07] FINAL
Presentation of the completed, fully rendered animatic of up to 5 minutes in length. Discussing how the tools and practices helped achieve the purpose of the animatic, and how to use the learned tools in the next stages of production.
FINAL ANIMATIC DUE

Educational Resources
Unity Learn
https://learn.unity.com/
Unity Manual
https://docs.unity3d.com/2022.1/Documentation/Manual/index.html
Perforce U: Virtual Production 101
https://perforceu.perforce.com/vp/virtual-production-101

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on Research and Scholarship Misconduct.

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.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
studenthealth.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
suicidepreventionlifeline.org
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call
studenthealth.usc.edu/sexual-assault
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086
eeotix.usc.edu
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298

usc-advocate.symplicity.com/care_report
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776
osas.usc.edu
OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - (213) 821-4710
campussupport.usc.edu
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - (213) 740-2101
diversity.usc.edu
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
dps.usc.edu, emergency.usc.edu
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call
dps.usc.edu
Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)
ombuds.usc.edu
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

*Occupational Therapy Faculty Practice - (323) 442-33*40 or otfp@med.usc.edu
chan.usc.edu/otfp
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.