

Course: DMED 540: Special Topics in Digital Media - Unreal Engine for the Digital Designer | 3 Credits
Term: Summer 2022
Instructor: Bob Kreut
Email: Bob_Kreut@thecdm.ca

Course Description

Unreal Engine is quickly becoming a must have skill for designers in many different industries. It is no longer just a tool for Games, but has expanded to be used in Apps, Film and TV, Broadcast and Live Events, Architectural Visualization, Simulation, and more. The ability to quickly prototype ideas is an essential skill for the Digital Designer and Unreal Engine allows you to see your results without the need to have a programming background. The goal of this course is to introduce students to all aspects of the Unreal Engine and how this program could be used for different industries they may find themselves in. Through discussions, demonstrations, assignments, and a term project, students will have a strong foundation to bring their ideas into reality.

Course Objectives

Upon completion of this course students will be able to:

- Use the Blueprinting system to quickly prototype ideas without the need to know how to code
- Understand the benefits of using Unreal Engine to prototype ideas
- Design and animate UI through the use of Widgets
- Understand how a Real Time Renderer works and how to optimize assets
- Use the Sequencer to create movies and cinematics
- Create Master Materials with parameters to mock up different styles rapidly
- Use different lightning techniques to evoke the right mood
- Add particle effects to give scenes more impact

Format of the course:

This course will involve lectures, class discussions and activities, demonstrations, individual assignments, and a term project.

Course Assignments:

Assignment	Due Date	Weight
Participation: Contribution to class discussion, attendance	Throughout term	10%
1. Assignment 1: Physics Based Game	Week 3	20%

2. Assignment 2: Character Based Game	Week 9	20%
3. Assignment 3: Virtual Production	Week 12	20%
4. Term Project: Game, Movie, or App	Week 14	30%

Assignments in Detail

Participation

This grade is determined by meaningful contributions to the class in the context of discussions and in class activities. Failure to attend class may result in a lower class grade.

Assignment 1 – Physics Based Game

Students will follow along as we create a fully functional physics based game within the time limit of the class. This assignment will serve as an introduction to the many topics we will be covering in more depth in further lessons.

Assignment 2 – Character Based Game

Students will create a game where they will control a bipedal character through a set of obstacles, collecting power ups or collectibles along the way, and reach the end of the level. This assignment will allow students to explore Animations and Animation Blueprints further, and get more exposure to creating and triggering Events.

Assignment 3 – Virtual Production

Students will create a short story using the Sequencer in Unreal Engine. Using assets from Quixel Bridge and the Marketplace, students will create a scene to tell a story. This assignment will allow students to focus on cinematic techniques such as camera movements and lighting effects, and reinforce animation and static mesh concepts introduced in previous lessons.

Term Project

Students will choose to create a Game, Movie, or App that focuses on their area of interest. Using the skills that they have developed over the length of this course, students will build or render a final product that shows their understanding of Unreal. Students will have their ideas approved to ensure it falls within scope of the class.

Course Schedule

Class	Topics
-------	--------

Week 1	<ul style="list-style-type: none"> • Syllabus and course introduction • Overview of how Unreal is used in different industries • Working in a Real Time Renderer • Introduction to UI Navigation, Project Setup, Blueprints, Static Meshes, Lights, Materials in Unreal
Week 2	<p><u>Assignment 1 Introduced: Build your first game in class!</u></p> <ul style="list-style-type: none"> • Level Blueprints • BSP Geometry • Trigger Volumes and Overlap Events • Input Axis Events • Unreal Physics
Week 3 – Victoria Day. No Class. Material delivered through Canvas.	<p><u>Term Project Introduced</u></p> <ul style="list-style-type: none"> • Actor Blueprints, Pawn/Character BPs, Game Mode BPs • Variable Types • Events • Master Material Introduction (**Extra Videos provided for more in depth look outside of this lesson) • Quixel Megascans and the Unreal Marketplace, Quixel Bridge • Static Mesh Breakdown • <i>Unreal Engine 5: Nanite</i>
Week 4	<p><u>Assignment 2 Introduced: Controlling a Character through a Level to fire off Events</u></p> <ul style="list-style-type: none"> • Importing Animations • Animation Blueprints • Character Blueprints • Input Mapping for different controller types • Blend Spaces
Week 5	<ul style="list-style-type: none"> • Event Tick • Traces • Damage Events • Building a Health System • Timers • Pure and Impure Functions • Widgets and HUDs
Week 6	<ul style="list-style-type: none"> • Setting up Lighting for a Real Time Renderer • Lightmass Settings • Fog • Post Process Volumes • <i>Unreal Engine 5: Lumens</i>
Week 7	<ul style="list-style-type: none"> • Tracking Collectibles • Creating Power Ups

	<ul style="list-style-type: none"> • Notify Events • Creating Debug Tools: Level Restart, Print Strings, Breaks • **Bonus Videos: Particle Systems, Landscapes
Week 8	<u>Assignment 3 Introduced: Virtual Production</u> <ul style="list-style-type: none"> • Cinematic Film Making in Unreal Engine • Camera Settings • Camera Moves and Types of Shots • Building Environments to the Camera • Sequencer • Storytelling
Week 9	<ul style="list-style-type: none"> • Types of Virtual Production (All CG, Mixed Realities (Film Set), LED Volumes) • Building for Virtual Production • Hardware/Software for Virtual Production • Resources for Virtual Production • Using MOCAP and Facial Capture in Unreal Engine with Real Time Results
Week 10	<ul style="list-style-type: none"> • Using Unreal for AR, VR, MR • Linking up Unreal Engine to your device • ARCore, ARKit, MRTK • UX Tools for Unreal
Week 11	<ul style="list-style-type: none"> • Optimizing for Real Time Rendering • Culling • LODs and HLODs • Deferred vs Forward Rendering • Creating a Build/Render
Week 12	<ul style="list-style-type: none"> • Assignment 3 Short Stories presentations • Final Project Lab
Week 13 – BC Day. No Class. Material delivered through Canvas.	<ul style="list-style-type: none"> • Bug fixing week • Packaging a game • Packaging settings
Week 14	<ul style="list-style-type: none"> • Final Presentations of Term Projects

Attendance:

Regular attendance is expected of students in all their classes (including lecture, laboratories, tutorials, seminars, etc.). Students who are unavoidably absent due to illness or disability should notify to their instructors of their situation.

Evaluation:

Participation	10
Assignment 1	20
Assignment 2	20
Assignment 3	20
<u>Term Project</u>	<u>30</u>
Total	100

Grading Profile

A+	95-100
A	90-94
A-	85-89
B+	80-84
B	75-79
B-	70-74
C+	65-69
C	60-64
F	0 - 59

Religious Accommodation:

The university accommodates students whose religious obligations conflict with attendance, submitting assignments, or completing scheduled tests and examinations. Please let your instructor know in advance, preferably the first week of class, if you will require any accommodations on these grounds.

Academic Integrity

MDM considers plagiarism to be the most serious academic offense that a student can commit. Regardless of whether or not it was committed intentionally, plagiarism has serious academic consequences and can result in expulsion from the university. Plagiarism involves the improper use of somebody else's words or idea's in one's own work.

It is the student's responsibility to ensure you fully understand what plagiarism is. Please see the SFU website for an explanation of the various types of plagiarism and to take the plagiarism tutorial:
<http://www.lib.sfu.ca/help/writing/plagiarism>

Policies

The student and academic policies of the Masters of Digital Media Program and of Simon Fraser University apply within this course.

Relevant SFU policies can be found at:

- Graduate General Regulations
<http://www.sfu.ca/students/calendar/2021/summer/fees-and-regulations/grad-regulation.html>
- Academic Honesty and Student Conduct Policies
<http://www.sfu.ca/policies/Students/index.html>
- Teaching and Instruction Policies
<http://www.sfu.ca/policies/gazette/teaching.html>
- University Policies (complete site)
<http://www.sfu.ca/policies>