|  |  |
| --- | --- |
| **University of the Incarnate Word** | Professor: Jingtian Li (jili1@uiwtx.com) |
| ANGD 3372 • Game Programming IV  Spring 2025 MW 10:30AM -1:15 PM AD 405 | Office: AD 408 • 210-832-5496  Hours: Tuesday: 10:30 AM - 1:00 PM  Thursday: 10:30 AM - Noon  Friday: 11:00 AM - 1:00 PM |

**Course Overview:** This studio/lecture course builds on the topics covered in Game Programming I, II, and III. Students will implement more advanced game features and systems, experiment with newly-emerging technologies, such as AR and VR, and delve into end-of-development tooling and polish. It is the final part of a series of courses designed to train practical skills that will help prepare students to do game development professionally.

**Course Outcomes:**

Create a game that implements synchronous networked gameplay, running over LAN or the internet. Create projects that work with mixed-reality hardware (VR headsets, AR on mobile devices), or other emerging technologies, to create new gameplay experiences. Leverage automated deployment processes to speed development and testing, such as TestFlight, Unity Cloud Build, etc., depending on chosen game engine / framework / target platform. Work with, as well as create, performance profiling tools to diagnose and resolve technical issues, and get their projects into a ‘release-ready’ state. Work with, and create, content delivery and internationalization systems and tools, which could be used to deliver a game that is fully translated to one or more languages.

**Audience:** This is a Junior level course required of ANGD BFA majors in the Programming Track.

**Course Text:** *None.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Lecture** | **Exercise** | **Personal Projects** |
| **Battle Infinity - Unreal Engine GAS and Multiplayer Game Project** | | | |
| 1/13 | Project Setup. Create the Player Character, AnimInstance Class, and Basic Movement Control. | Create the Battle Infinity Project and Make the Walk, Jump, and Look control as well as the Animation Blueprint | Personal Project Proposal |
| 1/15 | First Personal Project Proposal Presentation. Add the Ability System Component and Attribute Set, Set up Attribute Replication and UI. | Introduce the GAS module of Unreal Engine and Set it with up with The Player Character and the UI. |  |
| **Professional Development Week** | | | |
| 1/20 | Participating in the Global Game Jam |  |  |
| 1/22 | Participating in the Global Game Jam |  | **Global Game Jam Final Project.** |
| 1/27 | Create the Melee Combo Ability, And Ability Input Mapping. | Code the Base Class of the Gameplay Ability & Create the Basic Melee Combo Ability, Code the Gameplay Event Animation Notifies, and Implement the Combo Logic. | Schedule a Code Review Session with Me |
| 1/29 | Create the Melee Combo Ability Cont’d. | Define the Targeting Events and Melee Sweep Locations. |
| 2/3 | Create the Ground Blast Ability. | Code the Ground Blast Ability, the Ground Pick Target Actor. The Passive Launch and Stun Ability and Associate Gameplay Tags. |
| 2/5 | Ability Widgets. | Create the Ability Widget and Ability Widget List class, Implement the Cost, Duration, and Cooldown Display. Add Tool Tips and Localization. |
| 2/10 | Enemy AI. | Implement a Simple Enemy AI with Behavior Tree, add the Kill Rewards. |
| 2/12 | Shop Item and Asset Manager. | Create the Shop Item Primary Data Asset and the Shop Item Widget. Implement the Async Loading of Shop Items with the Asset Manager. |
| 2/17 | Inventory Component and Inventory Item. | Implement the Inventory Component, Inventory Item, Inventory Item Handle, and the Networking Communications. |
| 2/19 | **First Personal Project Presentation** | | |
| 2/24 | Inventory Widget. Second Personal Project Presentation | Create the Inventory Widget and Inventory Item Widget. Implement the Drag, Drop, Use, and Sell Mechanics of the Inventory. | Second Personal Project Presentation |
| 2/26 | Combining Items. | Set up the Item Combination System. | Schedule a Code Review with Me. |
| 3/3 | Draw Item Combination Tree. | Create the Tree Widget Class, the Spline Widget, and the Tree Node Interface, Recursively Draw the Combination Tree of the Inventory Item. |
| 3/5 | Online Identity, Online Sessions Creation and Join. | Configure the EOS project. Set up Login, Session Creation, and Join Session Mechanics. |
| 3/17 | Lobby Creation and Join. | Create the Lobby Widget, and Implement the Session Creation, Discover, and Joining Logic. |
| 3/19 | Team and Hero Selection System. | Build the Team and Hero Selection System and Widget, Implement the Start Game, Game Level Loading, and Spawn Location Setup. Download and Build the Source Version of the Unreal Engine. |
| 3/24 | Build the Dedicated Server and Game Client. | Package the Game Client and Dedicate Server Executable. Setup the Launching Arguments, Pack the Dedicate Server with Docker and manually Test the Dedicated Server and Client Connection on Local Machines. |  |
| 3/26 | **Second Personal Project Presentation** | | |
| 3/31 | Team Project Presentation. The Server Coordinator. | Program the Server Coordinator to Automatically Launch the Containerized Dedicated Server when a Session is Requested. | Team Project Presentation. |
| 4/2 | Configure the AWS EC2 instance to Host and Manage Servers. | Deploy and Test the Dedicated Server on an AWS EC2 Instance. | Schedule a Code Review with Me |
| **The Rendering Engine – C++ and OpenGL Realtime Renderer** | | | |
| 4/7 | Project Configuration and Basic Framework. | Defining the Structure and Its Dependencies with CMake, Set Up the Window Display, Layout the Basic Classes and Game Loop. |  |
| 4/9 | Hello Triangle, The Graphics Pipeline. | Code the Basic Graphics Pipeline and Shaders, Draw a Triangle with the Engine. |
| 4/14 | Transformation and Coordinate System, Camera Implementation. | Review Foundational Linear Algebra Behind the 3D Graphics. Add the Transformation Capability to Geometries. Implement the Camera and Input. |
| 4/16 | Lighting & Materials. | Implement the Basics of Lighting, Light Passes, and Shader Creation. Create and Test Material Definitions. |
| 4/23 | Material Textures. | Intergrade Textures into the Material Definition. |
| 4/28 | Loading Models and Textures. | Intergrade 3D Model Loading Library and Implement the Model Class. |
| 4/30 | GUI Integration. And Final Build | Intergrade ImGUI to the System. Implement the Basic Mesh Loading GUI. Refactor the Project, Build the Documentation, and Build the Application. |
| **5/7** | **Final Team Project Presentation 1:30 PM – 3:30 PM.** | | |
| Final | **Team Project Due May 8th Before Midnight.** | | |

# Grading Activities: Your final grade will be based on attendance and assignments, your grade will be based upon the percentage of 100 pts you have earned. 100-90=A, 89-80=B, 79-70=C, 69 and below =F.

# Attendance: Attendance is mandatory.  After one absence, each additional absence will result in a letter drop in your final grade. *If you are late 3 times, that counts as an absence*. Illnesses or doctor's appointments are excused, but try to avoid appointments during class time. If you miss 30% of class (for this class XX meetings) for any reason - even if medically excused - you will need to withdraw; the class needs to be retaken.

**Late Work Policy**: No late assignments accepted. All assignments are due before the beginning of class on the day they were due. If you are sick or had to miss class, the assignment is still due. There are no redos. Make every project you turn in count.

**Grade:** There are 6 items to grade, 2 personal project each with 10 points, a global game jam project with 10 points. 1 team project with 20 points, 3 code reviews, each worth 10 points. The total amount of points you can get are (the points you got)/80 \* 100. Do not miss the code review.

<https://my.uiw.edu/registrar/academics/grading-scale.html>

**Academic integrity Policy**: Self Plagarism: No work previously completed in another section or another course can be turned in. AI use or downloaded content is prohibited in all coursework, unless otherwise specified by your instructor.

**ANGD Phone/Device Policy**: When in class, no phones or devices. Keep them put away unless otherwise specified by your instructor. Phone usage in class will be considered a tardy. Three phone uses in class equals and absence and thus a letter drop in grade.

**UIW Course Policies, Guidelines and Accommodation:**

This course complies with all UIW academic policies and federal guidelines, including but not limited to: academic integrity, disability accommodations, pregnancy accommodations, Title IX non-discrimination, and class absences for religious observances.  Current policy statements will be provided to all students through the learning management system and in information provided on the first day of class.

<https://www.uiw.edu/academics/academicpolicies.html>