**University of the Incarnate Word** Professor: Jingtian Li (jili1@uiwtx.com)

ANGD 2321 - 02 • Technical Direction Office: AD 408 • 832-5496 | Hours:1:30-3:00 PM Mon 1:30-2:45 PM TR

 11:00 Am – 1:00 PM Fri

Fall 2024 TR 10:30 AM – 1:15 PM Teams | Hours: 8:00 – 9:00 PM MTWR

**Course Overview:** This studio course covers technical issues and solutions for the game and animation production pipeline. It includes rigging, visual effects (VFX), scripting, standalone computer tools, applications, and plug-in development. Effective rigging tools and VFX techniques will be taught. Various coding languages and their applications will be explored.

**Outcomes:** Upon successfully completing this course the student will be able to: Produce effective rigs for characters and creatures; Build VFX for games and film; Write software plug-ins and simple computer

applications.

**Audience:** This is a sophomore-level course required for all BFA ANGD majors

**Course Text:** *None.*

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| **Date** | **Lecture** | **Exercise** | **Homework**  |
| **Rigging** |
| 8/27 | Humanoid Skeleton Setup and Skining |  Rig a Given Humanoid Character | **1 –** Refine the Skin Weighting of the Character |
| 8/29 | Skining With NG Skining Tool | Layer based Skinning Method and Workflow | **2 –** Refine the Weight Painting with NG Skining Tool |
| 9/3 | Basics of Controllers and the Arm Rig 01 – Controllers, and IKFK Setup. | Create the IK FK Setup for the Left Arm. | **3 –** Create the IK FK Setup for the Right Arm |
| 9/5 | Basics of Controlelrs and the Arm Rig 02 –Node Editor, Expression, and IKFK Blending. | Use the Node Editor and Maya Expressions to Setup IKFK Blend, Visibility Control and Color Colding for the Left Arm | **4 –** Impelment the IKFK Blend, Visibility Control, Color Coding for the Right Arm. |
|  9/10 | Spine Rig with IK Spline  | Use the IK Spline to Implement the IK Spine. | **5 –** Refine the Skin Weights of the Body. |
| 9/12 | Eyebrow Rig | Implement the Joint Base Eyebrow Setup on the Left.  | **6 –** Rig the Right Eyebrow. |
| 9/17 | Eyelid Rig  | Create the Eye and Eyelid Rig With Joints and Set Driven Keys. | **7 –** Finalize the Eye Rig. |
| 9/19 | Auto Rig | Use Auto Rig Plugin to Rig the Character. | **8 –** Refine the Skin Weighting of the Auto Rig. |
| 9/24 | Rig to Game Engines & Retargetting. | Export the Rig to Unreal Engine and Unity.  | **9 –** Write a Blog Post on the Forums, Explain How to Export a Rig to Unreal Engine and the Important Settings to Take Care of. Comment on Another Post, Point Out if There is Any Issue. |
| **Python Scripting** |
| 9/26 | The Python Programming Language, Variables, Types, Operators, Containers, Input, Output, and Flow Control 01. | Install Python, VS Code, and Explore the Basics of Python. Create a Simple Rock Paper Scissors Game. | **10 –** Write a 2 Page Article Explaining What Are Variables, Lists, Dictionaries, If Statement, and For Loop. |
| 10/1 | Flow Control 02, Function & Arguments | Create a Python Script that Cleans an Unreal Engine Project | **11 –** Creates a Python Scripts that Search and Replace Names in a Directory. |
| 10/3 | Python Fundamentals Exercises 01 | Solve 3 Generic Programming Problems with Python. | **12 –** Solve 3 More Given Problems. |
| 10/8 | Python Fundamentals Exercises 02 | Solve 3 More Generic Programming Problems with Python. | **13 –** Solve 3 More Given Problems. |
| 10/10 | Classes. Attribute and Method (Members) | Explore the Basics of Classes and Object Oriented Programming.  | **14 –** Write a Blog Post on the Forums, Explain What is Class, What is the Constructor, What Are Members. Comment on Another Post, Point Out if there is Any Issue. |
| 10/15 | Python OOP Exercises. | Create a Class that Represents Time | **15 –** Create a Class that Represents Date. |
| 10/22 | Python in Maya 01 – Automate Rigging with Python.  | Create a FK Rigger in Maya | **16 –** Add the Orientation, Thickness and Size Control for the FK Rigger. |
| 10/24 | Python in Maya 02 – Build a Trim Sheet UV Layout Tool. | Build a Trim Sheet UV Layout Tool that can Layout any UV Shell to a Designated Trim Sheet Slot. | **17 –** Create Another Scripts that Solves a Modeling Issue. |
| 10/29 | Git Source Control, Distrubute and Document your Scripts. | Use Git to Track Project History, Document the Scripts, and Publish it On GitHub. | **18 –** Refine and Publish Your Tool Created in the Previous Assignment. |
| 10/31 | Substance To Unreal Engine 01 - Unreal Engine Substance Material Builder. | Create a Python Script that Loads A Mesh and Substance Textures in a Directory into Unreal Engine, and Build the Material. | **19 –** Comment Each Line of the Code Done In class, Explain What They Do. |
| 11/5 | Substance To Unreal Engine 02 – Send From Substance to Unreal Engine.  | Connect Substance Painter With Unreal Engine, and Automatically Send Mesh and Texture to Unreal, and Build the Materials. | **20 –** Finish Add Roughness and Base Color Mutiplication and Offset Control to The Substance Material in the Code. |
| 11/7 | Substance To Unreal Engine 03 – Debug, Improve, Document and Deploy. | Create an Installer, Document and Deploy the Plugin to GitHub. | **21 –** Create Another Quality of Life Improvement Tools.  |
| **Proceduralism** |
| 11/12 | VEX code, and Houdini Expressions. How to Think Procedurally. | Making a Procedural Grass. | **22 –** Make another Simple Procedural Model (Chair, Barrel, Crate). |
| 11/14 | Procedural Rock Generation 01 Basic Shape Cutting. | Create the Basic Cutting and Sculpting Network. | **23 –** Make another Simple Procedural Model. |
| 11/19 | Procedural Rock Generation 02 Baking and HDA Setup. | Add Windows, Doors to the Building | **24 –** Improve One of the Procedural Model You Made and Make a Working HDA with Baking Capabilities. |
| 11/21 | Procedural Rock Generation 03 Texturing in Substance Desginer. | Create the UV and Material for the Building | **25 –** Make a Texturing Network for Your Model. |
| 11/26 | Procedural Rock Generation 04 Building and Using the Substance 3D Asset in Unreal Engine.  | Making a Houdini Digital Asset for the House | **26 –** Use Your Tools to Generate A Collection of Assets. |
| 12/3 | Unreal Engine PCG, Basics of Surface Sample, Transform Points, Random and Seeds, Static Mesh Instancing. | Create Various Scattering Tools to Help with Procedural Generating a Grassland | **27 –** Making a Tutorial Explaining Each of the PCG Grapth Made in Class. |
| 12/5 | Create a Natural Environment with PCG | Create a Procedural Grassland with and Simple Procedural Landscape, and PCG Graphs Made Previously |  |
| Final Week | Final Project |  |  |

# 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.

**Assignments**: Every Assignment is Worth 10 Points, there are 27 Assignments. Final Project will be worth 30 points, so you will have 300 points in total, your final grade is your points divided by 3 and them mapped to UW Grading Scale.

**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>