CREATIVE MEDIA INDUSTRIES INSTITUTE (CMII)

VR / AR Asset Creation
Course Overview

In this course, you will learn Virtual Reality and Augmented Reality asset creation techniques. This course is designed for students who are new to virtual reality and want to learn about the principles of VR and AR technology including optics, displays, stereopsis, tracking, and major hardware platforms. Students don't require any programming experience to get started. Animation fundamentals will be utilized throughout the course to develop storytelling narratives and character performance interaction, as well as virtual environment production. By the end of this course, students will have created and deployed a VR application. Students will understand the physical principles of VR and use that knowledge to create a VR application with Unity, UE4 & Reallusion content generation tools.

Texts


Instructor
James C. Martin

Phone
786-380-3339

Email
jmartin148@gsu.edu

Office Location
25 Park Place, 212

Office Hours
Monday/Friday 11am – 12pm

Additional content will be posted on the course Website – papers, articles, blog posts, videos, podcasts, and other resources.
Learning Objectives

The primary objective of the course is to focus on the fundamentals of using the Unity Game Engine to build beautiful and performant VR scenes, and learn how to make your VR experience more dynamic and responsive by using the Unity interface.

- How VR and AR assets are concepted, designed, and developed and rendered for use
- To understand design elements associated with VR and AR (Characters, Scenes, Props)
- To establish a grasp of the full creation process for VR, AR, Gaming and traditional media
- Students will demonstrate a proficiency in identifying VR and AR creation methods and app creation

Course Assignments:

- In-Class Assignments where students will create, apply and author VR and AR app designs
- A Design Journal where students will write a weekly entry about a particular experience they have had or are interested in exploring
- A VR or AR Project where students will build out a plan showcasing the fundamentals of VR design including ergonomics, user testing, and interface design, as they establish a solid foundation to approach any VR design task.
- A Design Analysis where a student will choose an VR or AR production design and break it down into its various parts to understand the flow of the pipeline tools, how it was a success or failure, and a short developed concept that would suggest how its methods could be adapted for other technologies, venues, or projects

Grading:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>In-Class Assignments</td>
<td>20%</td>
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<tr>
<td>Design Journal</td>
<td>25%</td>
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<tr>
<td>Design Project</td>
<td>30%</td>
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<tr>
<td>Design Analysis</td>
<td>25%</td>
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Topics

- Narrative + Environment Design
- Ergonomics
- Animation Fundamentals
- Story architecture
- User Testing
- Virtual Camera Composition
- Character Design and Creation
- Interface Design
- Facial Motion Capture
- Body Motion Capture
- Interactive Storytelling
- Game Asset Creation
- Physics Emulation
- Prop Simulation
- Character Interaction
- Immersive storytelling best practices
- Cinematics
- VR and AR trends
- 360 Media
- Mobile Performance
- Head Mounted Displays
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<tr>
<th>Class</th>
<th>Topics</th>
<th>Assigned Course Content</th>
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| Week 1  | Intro to iClone User Interface & the Content Creation Pipeline | **Lecture:**  
**DO:** Students are required to animate standard primitive geometry using Transform Tools and Key-Frame fundamentals, save their work, then also, render a basic MP4 video. |
| Week 2  | Camera Basics - Intro to Light and Camera systems | **Lecture:**  
**DO:** Students create and animate a Camera using Key-Frame fundamentals along with Camera Transform Tools, learning to identify the working camera in the scene and become comfortable using the Preview Camera tools. Then, to render a basic MP4 video showcasing Basic working Camera knowledge within the Week 1 project.  
**Journal:** Students enter first impressions based on knowledge of basic keyframe animations |
| Week 3  | Simple 360 Stages. Basic Stage creation toolsets  | **Lecture:**  
**DO:** Students apply and customize Basic 360 Stage creation toolsets to the project file from Week 2. Then, render a basic 360 video showcasing the awareness of the background and foreground  
**Journal:** Students will give a basic concept design idea for a full VR or AR Environment and create a outline showcasing scene elements |
| Week 4  | 360 Set Design Solutions. Basic 360 content creation features and toolsets | **Lecture:**  
**DO:** Students will provide multiple elements to create a 360 Scene including 1 or more 360 scene elements such as Skydomes and Terrains. |
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<tr>
<th>Week 5</th>
<th>Creating 3D Characters. Intro to the Character Creator, &amp; CrazyTalk User Interfaces</th>
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|        | **Lecture:** Students create 2 custom Characters using the tools found in Character Creator covering Hair application, custom Face and Body creation, 3D soft-cloth clothing, footwear, exporting and the archiving of each iClone avatar. **Then,** showcase creative thought and concept application through Character design along with an applied knowledge of both the Character Creator interface, tool set (sliders, morphs, accessories)  
**Journal:** Students give in-depth description of Character Designs, covering all aspects of the overall concept. |

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<th>Week 6</th>
<th>Customizing 3D Characters. Dynamic Appearance Textures in Character Creator</th>
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|        | **Lecture:** Students continue to refine the overall appearance of the Character design via the use of multi-layered dynamic texture editing settings in Character Creator, while incorporating Material creation concepts and custom Skin creation. Students will continue to enhance custom avatar designs in Character Creator using DATS Substance Based sliders and texture channels to modify, then save Materials in the Skin Custom asset library in Character Creator.  
**Journal:** Students enter progress report on character design and identify any revisions or modifications for Final character look dev. |

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<tr>
<th>Week 7</th>
<th>Animating Avatars. Intro to Basic Character Body Motion creation features and toolsets</th>
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|        | **Lecture:** Students begin to develop movements using a variety of Basic Character Body motion toolsets located in the Animation Tab. (Default double-click application, Motion Puppet, Edit Motion Layer, Reach Targets) Instant full body animation is easily created directly within the software. Students will create a different Basic Walk Cycle for each of their custom characters. Students will animate 2 different examples of a Walk Cycle using 1 or more of the Character Body motion toolsets. Each student's motion files will be saved in their Animation Tab custom asset library, then, render a basic MP4 video.  
**Journal:** Students will draft a motion library of character motions they intend to create and methods chosen to use in the development process. |

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<th>Week 8</th>
<th>Making Conversation. Intro to Basic Character Facial Animation features and Facial Motion Capture</th>
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<td></td>
<td><strong>Lecture:</strong> Students will create custom Basic Character Facial animation by recording a script of their own directly to 1 of the avatars using their own voice as a WAV file. Then students will continue to animate the facial rig developing emotion and muscle movement via the use of Facial Animation features (Face Puppet, Face Key) via both traditional key-frame creation and direct, multi-pass puppeteering. Students add and edit dialog to 1 or more of their custom avatars using their own voice recording while displaying a general knowledge of Facial Animation refinement methods and features, then render an MP4 video sample. Students will also be made aware of the Faceware Real-time for iClone plug-in and will begin facial animation motion capture training.</td>
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<td>Week 9</td>
<td>Mobile Performance and 360 Media creation</td>
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<td><strong>Journal:</strong></td>
<td>Students will create a rough draft of a dialog for one or more characters, then identify methods of Facial Animation creation.</td>
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<td><strong>Lecture:</strong></td>
<td>Students learn to identify managing and mitigating heat issues to analyzing inefficient algorithms, learn the three most important considerations in mobile VR: performance, performance, and performance! 360 rendering implemented and then output to a mobile device for VR showcase and review.</td>
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<td><strong>DO:</strong></td>
<td>Students choose a mobile platform to output to and record 3 reasons for choosing said platform.</td>
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<th>Week 10</th>
<th>High Immersion Unity - Introduction to HTC VIVE</th>
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<td><strong>Review:</strong></td>
<td>Unity Virtual Reality Projects</td>
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<tr>
<td><strong>DO:</strong></td>
<td>Students learn Vive development fundamentals, how to use SteamVR to give your user locomotion and hand physics, and how to maximize performance for Desktop VR.</td>
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<td><strong>Journal:</strong></td>
<td>Students prepare rough draft of overall VR or AR application design and list all characters and scene elements used in the process.</td>
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<th>Week 11</th>
<th>Rube Goldberg Machine Creation - Intro to Physics</th>
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<td><strong>DO:</strong></td>
<td>Students in this project have a chance for you to create a fully-functional high-immersion VR game. Students will create a Rube Goldberg game that challenges players to create contraptions that solve physics puzzles. First, import SteamVR and set up the scene environment. Then students add locomotion, grabbing physics, and a menu system.</td>
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<td><strong>Journal:</strong></td>
<td>Student’s record if their build was successful or identify key factors that resulted in success for failure.</td>
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<th>Week 12</th>
<th>High Immersion Unreal - Intro to UE4</th>
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<td><strong>Lecture:</strong></td>
<td>Students will be introduced to UE4 and use Unreal Engine 4 to create VR experiences that utilize 6 degrees of freedom headsets and motion controllers, and master Roomscale and Standing scale VR design.</td>
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<tr>
<td><strong>Journal:</strong></td>
<td>Students enter a final draft of over-all VR or AR asset design and list all characters and scene elements used in the process for approval.</td>
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<th>Week 13</th>
<th>Advanced Character Animation, Motion Capture Tools, Intro to 3DXchange</th>
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<td><strong>Lecture:</strong></td>
<td>Students personify their characters by creating Character Animation using cutting edge Motion Capture Tools (Perception Neuron, Xsens) to puppeteer any avatar bone rig directly in-scene, utilizing real-time recording and playback features to create multi-pass motion clips that are accessible for further editing and Clip Collection via the Timeline Motion Tracks for each character animated separately. Students will capture custom Conversational motion clips to accompany the Facial Animation applied to the avatars previously. Both the avatar’s Facial Animation and Full Body mocap animation will be combined and exported for external use in external production scenarios such as Game Asset Development, Film and TV production, Augmented reality &amp; Virtual</td>
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Spring 2019
reality solutions (AR - VR) as well as, 3D and 2D animation and design, via the use of 3DXchange and the MotionPlus format

**Journal:** Students create a shot-list for their final project.

| Week 14 | **High Immersion Unreal - [cont.]** | **DO:** Students will have their first chance to build an Unreal VR experience based around locomotion. Students will create a find-the-object style of game, create a set of blueprints that randomly hides an object, and develop a locomotion method that allows you to move around the scene so you can find the object |
| Week 15 | [continued] | **DO:** Students present a completed VR or AR user experience using either Unity or UE4 showcasing the skills acquired. In class peer review and critique. Wrap-Up. |

### Grades

There will be plus and minus grades in this course. Grades will be determined according to the following scale:

- 93-100 A
- 90-92 A-
- 87-89 B+
- 83-86 B
- 80-82 B-
- 77-79 C+
- 70-76 C
- 60-69 D
- Below 60 F

Incompletes: Incompletes are only given in special hardship cases.

### Participation

Class participation comprises 10% of your grade. You are required to be on time and in class for each meeting. Excused absences are only those that are documented medical or family emergencies; all other absences will affect your participation grade. In general, you are expected to attend all class meetings, to actively participate in class discussions and critiques and to
demonstrate your command of the assigned material. For each unexcused absence over 3, you will lose 3 points from your Participation Grade.

Assignments and Projects

All projects and assignments are expected to be completed and submitted on time. For every day late a project will lose 2 points from the total number of possible points.

Courtesy

You may use your own phones and electronics in class for class related work. Please refrain from personal use of electronics during class.

Academic Honesty

The university's policy on academic honesty is published in On Campus: The Undergraduate Co-Curricular Affairs Handbook, available online at http://www.gsu.edu/~wwwcam. The policy prohibits plagiarism, cheating on examinations, unauthorized collaboration, falsification, and multiple submissions. Violation of the policy will result in failing the class, in addition to possible disciplinary sanctions.

Each assignment is expected to be created during the current semester and not used as a graded project for another class.

Withdrawals

Students withdrawing on or before the mid-semester point (see http://calendar.gsu.edu/calendar) will receive a W provided they are passing the course. Students who withdraw after the mid-semester point will not be eligible for a W except in cases of hardship. If you withdraw after the mid-semester point, you will be assigned a WF, except in those cases in which (1) hardship status is determined by the office of the dean of students because of emergency, employment, or health reasons, and (2) you are passing the course.

Changes to the Syllabus

This syllabus provides a general plan for the course. Deviations may be necessary.