WOODBURY UNIVERSITY
FOUNDED IN 1884

DEPARTMENT OF
APPLIED COMPUTER SCIENCE

CSMA 113
3 Units

Mixed Reality Studio

1st Year | 2nd Year | 3rd Year | 4th Year

Course Description
This class will explore various platforms for the design and creation of AR and VR applications. Emphasizing hands-on experimentation, this experiential studio is meant to be a collaboration between both programmers and designers to research and develop new paradigms for user experience and new pipelines for the creation of 3D content. Using the Unity game engine and various hardware equipment, such as the Microsoft Hololens, HTC Vive, and mobile devices, students will work individually and in teams to practically apply novel design principles, culminating in a semester project demonstrating a critical approach to designing for these emerging forms of media.

Term
Spring 2020

Instructor
Ivaylo Getov
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Prerequisite
None

Required Text
None

Outcomes

Participants will show proficiency in the following student learning outcomes.

1. Develop understanding of Mixed Reality design and development concept and practices
2. Develop familiarity with a cross-section of Mixed Reality hardware.
3. Develop proficiency designing for *experience* and *space* rather than pixels.
4. Complete hands-on exercises and projects to demonstrate familiarity with concepts of Mixed Reality.

Content

The following course content will be covered.

1. Introduction to the Unity game engine.
2. Introduction to C# Programming
3. Introduction to “Creative Coding”
4. Intro to simulated Physics
5. The history of Virtual/Augmented/Mixed Reality.
6. Differences between Augmented/Mixed/Virtual Reality.
7. Designing for space instead of screens.
8. Hands-on work with HTC Vive, Apple iOS/ARKit, Magic Leap One, Microsoft Hololens, and other hardware platforms.
9. Basic User Interface (UI) and User Experience (UX) design.
10. Introduction to project design/organization methods (MVP, Agile, Double-Diamond, etc.)

Assignments

Students will complete the following requirements, assignments, and projects.

1. In-class group discussions and exercises
2. Midterm Project (VR)
3. Final Project (AR or VR)
4. Assigned Reading TBD

Materials

The following materials of instruction are required.

1. None

Schedule

The following weekly schedule is subject to instructor revision.

Session 01
Jan 14, 2020
(Tuesday)

Introductions, course overview, housekeeping
Intro to AR/VR design principles
- A brief history
- Defining terms
- Designing the "real world"

Choosing our tools for efficient prototyping
- What is abstraction?
- Why use game engines?

Session 02
Jan 17, 2020
(Friday)

Intro to Unity
What is *"Creative Coding"*?
- Coding as writing
- Coding as prototyping

Design principles continued
- designing the real world (continued).
- User interaction and expectations

Session 03
Jan 21, 2020
(Tuesday)

Into to Unity Continued
Introducing C#
- C# vs JavaScript

Basic Programming Concepts Review
- variables and functions
- operations and assignment
- "returning" a value

C# in Unity

Session 04
Jan 24, 2020
(Friday)

Design principles continued
- VR Health and Safety concerns
- Thinking about different scales
- What is *"room-scale"*?

Designing for "Experience"
- UX and UI
- Diegetic vs Non-Diegetic

`Programming++`
- classes and objects - Intro to OOP
- `public` vs `private`

Session 05
Jan 28, 2020
(Tuesday)

VR in Unity
- Using the SteamVR plug-in

Building a "teleport" behavior for VR
- Pseudocode and planning

Session 06
Jan 31, 2020
(Friday)

Individual VR Exercises
- Bring Unity scenes into VR
- Troubleshoot scripts

Session 07
Feb 4, 2020
(Tuesday)

Topics TBD

Session 08
Feb 7, 2020
(Friday)

Topics TBD

Session 09
Feb 11, 2020
(Tuesday)

Introduce Midterm Project
- Midterm Project Proposals & Discussion

Design Process
- Double Diamond model
- Minimum Viable Product

Catch-up/recap as needed

Session 10
Feb 14, 2020
(Friday)

Intermediate Unity
- Layers & Tags

Intermediate C#
- Arrays and Lists
- Loops and working with many objects (`foreach`)

Further developing our VR Teleport script
Coming up with new solutions for movement

NO CLASSES
Feb 18, 2020
(Friday)

WU Enrichment Day

Session 11
Feb 21, 2020
(Friday)

Midterm workshop
- Topics TBD as needed
- Individual Questions

Session 12
Feb 25, 2020
(Tuesday)

Midterm workshop
- Topics TBD as needed
- Individual Questions

Session 13
Feb 28, 2020
(Friday)

Midterm workshop
- Topics TBD as needed
- Individual Questions

Session 14
Mar 3, 2020
(Tuesday)

Midterm workshop
- Topics TBD as needed
- Individual Questions

Session 15
Mar 6, 2020
(Friday)

Midterm Projects Due
- In-class showcase and discussion

NO CLASSES
Mar 10, 2020 (Tues)
Mar 13, 2020 (Fri)

Spring Break

Session 16
Mar 17, 2020
(Tuesday)

Welcome back!
Intro to AR
- Designing for a layer *on top* of the world instead of everything the user sees
- Sensing the real world

Overview of AR Devices
- Magic Leap
- Mobile AR (Unity AR Foundation)

Session 17
Mar 20, 2020
(Friday)

VR/AR/MR outside of Unity
Topics TBD

Session 18
Mar 24, 2020
(Tuesday)

VR/AR/MR outside of Unity
Topics TBD

Session 19
Mar 27, 2020
(Friday)

VR/AR/MR outside of Unity
Topics TBD

Session 20
Mar 31, 2020
(Tuesday)

Introduce final project
Recap available tools/resources
"Tech for Me vs Tech for You"
- technology as design process for the artist/creator VS technology as final deliverable/medium for the user
- Using AR/VR as tools for the “Generalist"

Session 21
Apr 3, 2020
(Friday)

Final project pitches

Session 22 **Apr 7, 2020** **(Tuesday)**	Final Projects Check-In • Setting Milestones
Session 23 **Apr 10, 2020** **(Friday)**	Final Project Workshop • Topics TBD as needed • Individual
Session 24 **Apr 14, 2020** **(Tuesday)**	Final Project Workshop • Topics TBD as needed • Individual Questions
Session 25 **Apr 17, 2020** **(Friday)**	Final Project Workshop • Topics TBD as needed • Individual Questions
Session 26 **Apr 21, 2020** **(Tuesday)**	Final Project Workshop • Topics TBD as needed • Individual Questions
Session 27 **Apr 24, 2020** **(Friday)**	Final project individual meetings Final Project workshop and notes • Topics TBD as needed • Individual Questions
Session 28 **Apr 28, 2020** **(Tuesday)**	Final Project workshop and notes • Topics TBD as needed
FINAL **May 1, 2020** **(Friday)**	Final Project presentation and discussion Class Topic Recap • Revisit "The Future of Media" Final Project Public Demo Day (Alt date TBD)

Assessment

Students will be evaluated based on the following criteria.

Evaluation Standards

1. Active and verbal participation in in-class discussion to demonstrate completion and understanding of assigned reading.
2. Careful attention to execution, technique and completion of projects
3. Personal challenge and effort in project development
4. Deadline compliance
5. Performance in student learning outcomes

Activity	Points
Participation, attendance, in-class projects/ exercises	**60**
Midterm Project	**15**
Final Project	**25**
Total	**100**

Final Grade Criteria | Studio Course		
A	93-100%	Clearly stands out as **EXEMPLARY** performance and exhibits consummate command of learning outcomes
A-	90-92%	
B+	87-89%	Grasps subject matter at a **PROFICIENT** level, considered to be good to very good, and exhibits command of learning outcomes
B	83-86%	
B-	80-82%	
C+	77-79%	Demonstrates an **ACCEPTABLE** comprehension of the subject matter, and exhibits satisfactory understanding of the learning outcomes
C	73-76%	
C-	70-72%	Quality of work is below average and **INADEQUATE**, and exhibits only minimal understanding of the learning outcomes. Skills are not sufficient to continue in the studio sequence.
D+	67-69%	
D	60-66%	
F	59%	Quality and quantity of work is **UNACCEPTABLE** and does not exhibit understanding of the learning outcomes

Guidelines

Students are expected to observe the following class guidelines.

1. **Students are responsible for information missed due to tardy or absence.**
2. Late or incomplete assignments and projects are discouraged and will adversely affect the students overall grade.

Policies ***Please review the following policies.***

Attendance
Regular and prompt attendance at all university classes is required. The instructor is not obligated to assign extra work or to prepare additional examinations for classes missed. It is understood that when 15% of the class time has been missed, the student's absence rate is excessive.

Accommodations for Disabilities
Woodbury University is committed to making reasonable accommodations to assist individuals with disabilities in reaching their academic potential. Students desiring accommodations due to a physical, learning or psychological disability must first complete an *Accommodations Request Form*, which can be downloaded from http://go.woodbury.edu, and found under "Academic Resources." Accommodations cannot be granted prior to the instructor's receipt of a *Notification of Special Needs Release Form* from the Disabilities Coordinator. Accommodations are never provided retroactively. (For more information, contact the Disabilities Coordinator in the Whitten Center (818) 394-3345.)

Archive Policy
Students are required to include a Woodbury ID label containing the following information on the back of all projects submitted to the instructor:

- class number
- class name
- semester
- instructor's name
- student's name
- student's contact information

Media should be labeled on the package, and name, class and year should be included on the media/ disc. A printable pdf of the Woodbury ID label is available on the portal in the MCD: Animation link on the Student page. Blank Avery labels may be purchased at the bookstore. Projects will not be accepted without this information. The university reserves the right to retain student work for archival purposes. See the Woodbury Catalog for the official policy on archiving of student work.

Outsourcing
Outsourcing is defined as obtaining created work or acquiring outside services to produce created works in any aspect of course-assigned project development and/or production. This includes work or services that are paid for and work or services that are not. It includes work or services from any individual including fellow students and outside professionals. Outsourcing of project production elements is prohibited unless specifically stated in your course syllabus and/or guidelines. Outsourced elements must be acknowledged through complete, accurate, and specific references. The intellectual authorship of the project must belong to the submitting students. Outsourcing will not be permitted under following circumstances:

1. If a program or course learning outcome is designed to assess the production of physical or digital components and outsourcing involves these components.
2. If the effect of outsourcing changes or impacts the students' original design, or creative vision, or process at any stage of the project from development to final production or installation.
3. If the effect of outsourcing changes or impacts the students' original design, or creative vision, or process at any stage of the project from development to final production or installation.

Academic Honesty Policy

Because the integrity of the academic enterprise of any institution of higher education requires honesty in scholarship and research, academic honesty is required at Woodbury University. The University views academic dishonesty as one of the most serious offenses that a member of our community can commit. Adherence to the Academic Honesty Policy reflects the commitment of our community to the ideals of learning, research, and scholarship. *The full policy and examples of academic dishonesty can be found on the Student Portal*.

Definitions of Academic Dishonesty

Cheating: Cheating is the act or attempted act of deception by which an individual seeks to misrepresent that he/she has mastered information on an exercise that he/she has not mastered.

Fabrication: Fabrication is the use of invented information or the falsification of research or other findings in an academic exercise.

Facilitating Academic Dishonesty: Facilitating academic dishonesty is intentionally or knowingly helping or attempting to help another commit an act of academic dishonesty.

Plagiarism: Plagiarism is the submission of another's work as one's own, without adequate attribution. When an individual submits work that includes the words, images, music, ideas, or data of others, the source of the information must be acknowledged through complete, accurate, and specific references, and, if verbatim statements are included, through quotation marks or indentation as appropriate. By placing his/her name on work submitted, the author certifies the originality of all work not otherwise identified by appropriate acknowledgements. Plagiarism covers unpublished as well as published sources.