WOODBURY UNIVERSITY
FOUNDED IN 1884

DEPARTMENT OF
APPLIED COMPUTER SCIENCE

TECH 1711
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.

This Monday-Wednesday class will be substituted for a Saturday 5-hours intensive class up to three times during the semester. Dates TBD.

Term
Fall 2018

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 Microsoft Hololens, HTC Vive, and Apple iOS/ARKit
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
01/17/18

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
01/22/18

Instructor away

AND

One day guest speaker (Intro to Unity), one day no class - schedule TBD
- Note: Class time will be accounted for with a Saturday class later this semester.

Session 03
01/24/18

Session 04
01/29/18

What is *"Creative Coding"*?
- Coding as writing
- Coding as prototyping

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

Session 05 Into to Unity Continued
01/31/18 Introducing C#
- C# vs `JavaScript`

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

Session 06 Design principles continued
02/05/18
- VR Health and Safety concerns
- Thinking about different scales
- What is *"room-scale"*?

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

Session 07 `Programming++`
02/07/18
- classes and objects
- public vs private
- Debugging/Testing

Pseudocode and planning
Unity colliders and triggers

Session 08 Design principles continued
02/12/18
- User interaction and expectations continued
- HTC Vive hand controllers: form + function

VR in Unity
- Using the SteamVR plug-in

Session 09 C# recap - Create a C# "cheat sheet"
02/14/18 Unity recap
- Summarize concepts and workflow

02/19/18 **Presidents Day - No Class**

Session 10 Introduce VR group project
02/21/18 Introduce project organization/management
Catch-up/recap as needed

Session 11
02/26/18

No Class - To be replaced by Saturday intensive (11A/13A) - Date TBD

AND Lab open for project work or catch up
Instructor available for questions

Session 12
02/28/18

Session 11A/12A **Saturday Session** - Group-project intensive **(Date TBD)**

Session 13
03/05/18

Introduce midterm project
Design Process

- Double Diamond model
- Minimum Viable Product

Session 14
03/07/18

Midterm Project Proposals & Discussion
Vive recap
Catch-up as needed

03/12/18 - 03/16/18 **Spring Break - No Class**

Session 15
03/19/18

Midterm workshop

- Advanced interactions in VR
- Individual Questions

Session 16
03/21/18

Individual midterm meetings
Midterm workshop

- Topics TBD as needed

Session 17
03/26/18

Midterm Projects Due

- In-class showcase and discussion

03/28/18 **Cezar Chavez Day - No Class**

Session 2A/3A **Saturday Class (Date TBD)**
BIG UNITY RECAP

- Unity Animations
- Keyframes and Curves

Session 18
04/02/18

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
- Microsoft Hololens
- Mobile AR (Apple ARKit)

Session 19
04/04/18

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

Session 20
04/09/18

Final project pitches and individual meetings

Session 21
04/11/18

Available resources: HoloToolkit
- Don't re-invent the wheel

Building to Hololens
- Using the Microsoft MixedReality Toolkit for Unity
- Previewing to a device over the network

Session 22
04/16/18

Final Projects Check-In
- Setting Milestones

Final Project Workshop
- Raycasting
- Hololens Spatial Mapping
- Individual Questions

Session 23
04/18/18

Final Project workshop and notes
- Topics TBD as needed

Session 24
04/23/18

Final Projects - Final Lab day
- If you are doing AR, today should be the day you troubleshoot your final build.
- Individual Questions & Cleanup

Studio Final
04/25/18

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.