Course Syllabus - SP25-IT383002-Advanced Topics in Game Design

Class time and location:

Monday and Wednesday from 11:30 AM to 1:00 PM, GITC 3200 (the MIXR lab space)

The 1.5-hour lab sessions will be divided into lecture time, discussion, group work, and practical experimentation for developing, presenting, and demonstrating XR games. Attendance and participation throughout the entire class are highly recommended to ensure the successful completion of the course.

Office hours:

By appointment only. GITC 3802, Monday and Wednesday from 1:00 PM to 2:00 PM (immediately after class).

TA: Derrick Sanchez, djs225@njit.edu

TA office hours: Tuesday and Thursday's 4:00-5:30pm

Discord: **https://discord.gg/mk4gBn5E (https://discord.gg/mk4gBn5E)**

Overview

The course will build a Virtual Reality game for Oculus, Vive, and Quest and a Mixed Reality Game for phones, tablets, or HoloLens. The course will teach best practices for building Cross-Reality applications. We will follow and discuss the latest AR/VR trends for games. This is a hands-on course utilizing Unity 3D. This course is hands-on; It will use Unity 3D or Unreal Engine. The end-of-the-year project will showcase all the skills and knowledge acquired throughout the semester. The class projects will be used for students' portfolios or as a basis for Undergraduate Research and Innovation proposals.

Course Outcomes

Upon completing this course, students will:

C1. Be able to communicate effectively and critically, both verbally and in writing, on various topics in XR.

C2. Be able to design, implement, and evaluate XR applications.

C3. Be able to identify user needs in the context of XR applications.

Grading

Grades will be distributed as follows:

Technology Critical Blog/Vlog (https://njit.instructure.com/courses/46753/pages/blog-slash-vlog)	**10%**
Development project (https://njit.instructure.com/courses/46753/pages/development-project)	**45%**
Topic of interest (https://njit.instructure.com/courses/46753/pages/topic-of-interest-in-teams-of-two)	**15%**
Midterm & Final Exam (https://njit.instructure.com/courses/46753/pages/tests)	**30%**

Grading Legend

Letter Grade to % Correspondence

	Undergraduate	
Grades	**Significance**	**Approx. points**
A	Superior	90-100
B+	Excellent	86-89
B	Very Good	80-85
C+	Good	76-79
C	Acceptable	70-75
D	Minimum	60-69

F	Inadequate	0-59

Late Grading policy

- *Late submission will have severe consequences – 10% off each day you are late. In other words, if you were late for one day, your grade will be 90% or less; 2 days late, and your mark will be 80% or less.*
- *You will receive 0 for a missed presentation or final exam. If you know you will not be on your presentation or exam day, please inform me at least a week before making alternative arrangements. There will be no make-up exams otherwise.*

Technology Critical Vlog

During the course, you will produce two short vlogs or blogs discussing a subject of interest related to XR games. It can be a review of an XR game, a technical discussion, or a tutorial. Other ideas are also welcome. Marks will be given in the following order:

2.5% for **Quality** of your content - the content has to be original, exciting, and relevant to the course material. Try your best to use the contents we discussed in class.

2.5% for **Creativity** in the presentation of the content.

Your peers will also mark this assignment.

Two Dates to note:

Weeks 6 - The first Vlog/Blog is due.

Week 13 - The second Vlog/Blog is due.

Development project

The Project will be divided into different stages throughout the semester. You will need to complete all milestones to get full marks. The project will be based on different concepts discussed in class throughout the semester and will develop a game of your choosing. Through the various stages of the project, you are to demonstrate your mastery of the concepts, methods, tools, and techniques covered in class. You can choose to work in a group of two or three people. The scope of the project will be proportional to the group size. You will be required to view the project from many angles. It is essential to make sure to discuss each stage of the project with me before submission and also make sure to submit each milestone on time for full marks. Details about the project will be posted on Canvas.

Individual rubrics and checklists will be provided with each stage/milestone, but see below the general guidelines you should follow throughout the project.

- **Novelty:** How unique is your project? Does it do something other projects do not (both in class and in the world)? Does it achieve something other people have not, or does it explain something unique?
- **Relevance:** Is the project based on the guidance given in the class? Does it achieve the goals of the project? Is it related to XR?
- **Feasibility:** Does the project make sense in general? Does it work? If it is a small-scale version, would it work at full scale? Is it usable? If it is a tool, can it be used?
- **Submission: Have the submission guidelines and deadlines been** followed?

The entire project will be managed in GitLab to align with industry requirements and help you with project management issues.

Dates to note:

- Week 1: 1. Group partner 2. Learn or freshen up your skills in **Unity or Unreal (https://njit.instructure.com/courses/22489/pages/tutorials)**
- Week 2: 1. Approve game teams and themes (Due at the end of the Week). 2. Configure a Gitlab project and add all the group members, course instructors, and TAs.
- Week 3: 1. Goals and Objectives document. 2. The GitLab project is set up with milestones and tasks.
- Week 4: Short progress report describing tasks achieved in GitLab + Video of your scene.
- Week 5: Navigation Page + progress report describing Navigation Milestone and tasks achieved in GitLab + Video of your scene.
- Week 6: Write a short progress report describing tasks achieved in GitLab + a video of your scene.
- Week 7: Write a short progress report describing tasks achieved in GitLab + a video of your scene.
- Week 8: Manipulation, Page + Progress report, describing Selection and Manipulation Milestone and tasks achieved in GitLab + Video of your scene.
- Week 10: Short progress report describing tasks achieved in GitLab + Video of your scene.
- Week 11: Write a short progress report describing tasks achieved in GitLab + a video of your scene.
- Week 12: UI page + Progress report describing UI Milestone and tasks achieved in GitLab + Video of your scene.
- Week 13: Evaluation plans, including a Consent form and Study questionnaires
- Week 14: Write a short progress report describing tasks achieved in GitLab + a video of your scene.
- Week 15: Results from the game evaluation.
- Week 16: Final project report, project presentation, and final video.

Topic of Interest (In teams of two)

During the semester, you will be asked to choose two topics not covered in class and give two 15-minute presentations + 5 minutes of a Q&A period. The presentation will be evaluated based on critical thinking and evaluation of the topic, as well as on oral presentation skills and PowerPoint presentation. Details about the project will be posted on Canvas. Part of the mark would also include students'

participation in the Q&A session for other presentations. You can choose to work in pairs or individually. The scope of the project will be proportional to the group size.

Possible topics

- Navigation technique in VR or AR
- Selection technique in VR or AR
- Manipulation technique in VR or AR
- UI in VR or AR
- Evaluation of AR/VR applications

The presentation weeks are from week 3 to week 13.

Important Dates

- Week 1: Topics of interests, group names for the topic of interest
- Week 2: Dates you would prefer to present.
- Week 3: Reading list for topic 1 (5 references)
- Week 7: Reading list for topic 2 (5 references)
- Week 4 to Week 13 - Presentations

References

Suggested readings will be provided weekly, **but no books are required** for purchase.

A possible book you might want to use as a reference:

LaViola Jr, J. J., Kruijff, E., McMahan, R. P., Bowman, D., & Poupyrev, I. P. (2017). 3D user interfaces: theory and practice. Addison-Wesley Professional.

Academic Integrity

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at:

***http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf* (Links to an external site.) (Links to an external site.) (http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf)** .

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. ***Any student found in violation of the code by cheating, plagiarizing, or misusing any online software will result in disciplinary action. This may include a failing grade of F and/or suspension or dismissal from the university.*** *If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at* ***dos@njit.edu (mailto:dos@njit.edu)***

Illustrative Schedule *Color Coding: Development project, Topic of interest, Technology Critical Vlog/Blog, Tests*

Week 1: January 22– 26

- *W Class: Intro class. XR Overview.*
- *Tasks: Select project groups for development project and project topics; 2. Learn or freshen up your skills in **Unity or Unreal** (https://njit.instructure.com/courses/22489/pages/tutorials) 3. Selecting project groups for the topic of interest.*
- ***Due End of the Week:** 1. Topics of interest and group names for the topic of interest. 2. Names for the development project.*

Week 2: January 27 – Feb 2

- *M Class: Gamification and game design principles for XR.*
- *W Classes: Project Management Techniques. GitLab and Trello. Game Design Document; VR & AR builds.*
- *Tasks: Start developing a Game Design Document. 2. Identifying and working through tutorials to get familiar with Unity or Unreal; 3. Put together a bullet point draft listing reading for the topic of interest.*
- ***Due End of the Week:** 1. Approve game teams and themes. 2. Creating GitLab projects. 3. Topic of interest dates.*

Week 3: February 3 - February 9

- *M & W Classes: Navigation*
- *F: Reading discussion – Example.*
- *Tasks: Build a mock-up scene.2. Put together a bullet point draft listing reading for the topic of interest.*
- ***Due end of the week:** 1. Goals and Objectives document. 2. The GitLab project is set up with milestones and tasks. 3. Reading list for 1st topics of interest.*

Week 4: February 10 – February 16

- *M & W Classes: Navigation.*
- *Tasks: Make your character move. 2. Integrate the XR device into your project.*
- *Discussion: Topic of interest presentations.*
- ***Due end of the week:** Short progress report demonstrating tasks achieved in GitLab + Video of your scene.*

Week 5: February 17– February 23

- *M: Navigation.*
- *W: Working with objects – Selection; Review; Discussion: Topic of interest presentations.*

- *Tasks: Improve navigation and use a rigged character. 2. Add audio capabilities.*
- ***Due at the end of the week:*** *Navigation, Page + progress report, describing Navigation Milestone and tasks achieved in GitLab + Video of your scene.*

Week 6: February 24 – March 1

- *M & W* classes: Working with Objects - Manipulation
- Tasks: Working with props in your game – picking them up and operating them.
- Discussion: Topic of interest presentations.
- ***Due end of the week:*** *1. Short progress report demonstrating tasks achieved in GitLab + Video of your scene. 2. First Vlog/Blog is due.*

Week 7: March 2 – March 8

- *M & W* classes: Working with Objects - Manipulation
- Tasks: Debugging the project.
- Discussion: Topic of interest presentations.
- ***Due end of the week:*** *1. Short progress report demonstrating tasks achieved in GitLab + Video of your scene. 2. Topic of interest dates.*

Week 8: March 9 – March 15

- *M* class: Review
- W: Midterm
- Tasks:1. Winning interface 2. Losing Interface 3. Inventory.
- Discussion: Topic of interest presentations.
- ***Due at the end of the week:*** Manipulation Page + Progress report describing Selection and Manipulation Milestone and tasks achieved in GitLab + Video of your scene.

Week 9: March 16 – March 22 [Spring Recess]

Week 10: March 23 – March 29

- *M & W classes*: User Interfaces
- *Tasks:* Complete and develop outstanding tasks
- Discussion: Topic of interest presentations
- *Due end of the week: Short progress report describing tasks achieved in GitLab + Video of your scene.*

Week 11: March 30 – April 5

- *M & W classes*: User Interfaces
- *Tasks:* Working on UI, AI, and project modifications.
- Discussion: Topic of interest presentations.

Week 12: April 6 – April 12 [Note: April 7th is the last day to withdraw;]

- *M & W classes: UX evaluation.*
- Discussion: Topic of interest presentations.
- *Tasks: Write a system evaluation plan and prepare for system evaluation.*
- ***Due end of the week*: *UI page + Progress report describing UI Milestone and tasks achieved in GitLab + Video of your scene.***

Week 13: April 13 – April 19

- *M class: AR applications*
- *W class: Application Testing*
- Discussion: Topic of interest presentations.
- ***Due end of the week**: 1. System Evaluation Plan including a Consent form and Study questionnaires. 2. Second Vlog/Blog is due.*

Week 14: April 20 – April 26

- *M & W Classes*: *Application Testing*
- *Tasks:* 1. Testing your applications 2. Correcting final bugs and preparing for usability testing
- ***Due end of the week:** Short progress report describing tasks achieved in GitLab + Video of your scene.*

Week 15: April 27 – May 3

- *M: Application Testing*
- *W Class: Review For the Exam*
- *Tasks:* Testing your applications
- ***Due at the end of the week**: Results from the game evaluation.*

Week 16: May 4 - May 10

- *M Class:* Project presentations.
- ***Due:*** Final project report + video.

Final Exam to be announced

May 18 Final Grades Due