DIG 3725C-001
3D Video Game Design
Fall 2019 Fri. 9:00am-12:50pm
ES411, Davie Campus

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Office hours: Tues, Wed, Thu, 3-5pm, or By Appt.
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Course Description:

This course is an introduction to multimedia production for 3D video game design. Students will learn how to create a dynamic 3D environment in the Unity game engine, and then will apply industry-standard design techniques to develop a unique interactive experience. Project work will include exercises to build a first-person hybrid survival adventure game that incorporates shooter, platformer, and RPG game mechanics.

Course curriculum will demonstrate an iterative approach to designing games, first developing a simple prototype level in Unity, and then using the MDA (Mechanics, Dynamics, Aesthetics) design framework to add media assets and complex interactions. Students will create 2D elements for texture maps and sprites in Adobe Photoshop and 3D assets in Autodesk Maya for custom models and animations. Interaction design will be done in Unity through C# coding of event-based game logics.

Techniques covered in this course will include terrain sculpting, low-poly game object modeling, UV texturing and normal maps, audio design, scene lighting, collision detection, using first-person and third-person controllers, character development, real-time particle effects, and GUI-HUD design. Coursework will be supplemented with discussions that explore how video games are designed to be "fun" entertainment, and how design methodologies impact player experience and popular culture.

Course Length:

16 Weeks

Credit Hours:

4

Prerequisites:

Fundamentals of Multimedia (DIG 3110) or Fundamentals of 3D Computer Animation (DIG 3305C).

Instructional Methods:

The material for this course will be taught in the lab by alternating design lectures and software demonstrations with hands-on project work and group critiques.

Explanation of Assignments:

Assignments will mainly consist of project designs and game prototypes. All of the project assignments contribute to the development of a single video game level, so it is important that you complete each component to the best of your abilities. Since we won't be having any written tests, there will be a scholarly component in the form of design papers and a final "Making of…" research poster. Design papers will be 3-5 pages double spaced, 12-point text, with your name, title, at least three references, and 3-5 images or screenshots. A power-point template will be provided for the research poster, and content can be taken from the two papers.

Assignment details will be given in class. The instructor will specify whether an assignment is due as a file to be turned in or a presentation to be shown during class for critique and grading. All papers will be turned in as electronic word or PDF files on the day they are due. Late assignments will receive an automatic 10-point grade reduction for each day past the due date, which will be computed as part of the final grade for the assignment. Final projects will be turned in on exam day.

How to Avoid Plagiarism on Projects & Papers: Students are required to use visual reference and do online research of other game designers as inspiration for developing their own work. In developing game assets, students will need to either self-generate source material through drawing and photography, or sample online images that must then be transformed into unique imagery that no longer resembles the original. All project work turned in for grading must be unique work created for the course, and citations for source imagery and visual influences should be referenced in the design research paper that accompanies each major project. In addition to citing artists and other resources used in developing project work, papers should describe the design principles and techniques used to develop each project. When writing about designers or industry techniques learned through class or research, to avoid plagiarism, always paraphrase or quote the source and provide a citation to a book or online reference.

Course Objectives

The experiential learning approach of this course is to have students gain design knowledge through hands-on project development and practice-based research. In-class exercises and discussions are just a starting point in the game design process, and students are expected to do self-motivated online research and software exploration to further their knowledge and creative abilities. To be successful, students should strive to understand the fundamental frameworks and logics of the game development process, and be able to demonstrate their knowledge in the design of game assets and playable prototypes.

Student Learning Outcomes

Students who successfully complete this course should be able to:
1. Apply fundamental design principles and software tools to produce expressive 3D interactive media.
2. Reference industry-standard design frameworks and vocabulary in critical discussions of interactive media.
3. Utilize online research and software documentation to creatively solve technical and design problems in the interaction design process.

Required Course Materials:

While all needed software will be provided in the lab, students are required to provide a way to back up their work at the end of each class session. Whether through a flash/external hard drive (with at least 16 GB of memory), or an online storage solution like Google Drive/Dropbox, it is the responsibility of each student to save their class work. The lab computers are set to wipe the drives when you log out each day, so back up your projects before you log out, and do not work directly off of a thumb drive (as they frequently crash).

Online Resources:

- Free Sounds: https://freesound.org/
- Free Textures: https://www.wildtextures.com/
- Some free textures: https://www.textures.com/
- Game Design at Naughty Dog: https://www.youtube.com/watch?v=Km-d7RM0U7s
- Video Game Genres: https://www.youtube.com/watch?v=_F6rnWGR-_w
- Evolution of FPS Video Game Graphics: https://www.youtube.com/watch?v=U7NiDuhEDEs
- History of Platformer Games: https://www.youtube.com/watch?v=9SxnNX4DqT0
- Top Ten Point-and-click Adventure Games: https://www.youtube.com/watch?v=LvIkbmhWiok
- A Brief History of…Myst: https://www.youtube.com/watch?v=h4wWITMUop0
- History of Portal: https://www.youtube.com/watch?v=iRAw9q2F4II
- Evolution of Tomb Raider Games: https://www.youtube.com/watch?v=D-P-smim5gQ
- Gamespot's History of Uncharted: https://www.gamespot.com/videos/the-history-of-uncharted/2300-6440402/
- Rise of the Tomb Raider (Making of): https://www.youtube.com/watch?v=i5Yg3a9Wv5Y
- How do Developers Create Massive Open Worlds: https://www.youtube.com/watch?v=K-uBVUGqJss
- Infamous Second Son, Conversation with Creators: https://www.youtube.com/watch?time_continue=326&v=BjfdLNPHGpI
- Are Games Art? (Brenda Romero): https://www.youtube.com/watch?v=L5sBdR4-GGM
- Pixel Pioneers, A Brief History of Game Graphics: https://www.youtube.com/watch?v=QyjyWUrHsFc
- Research paper "MDA: A Formal Approach to Game Design and Game Research": https://www.cs.northwestern.edu/~hunicke/MDA.pdf

- Intro to Mechanics, Dynamics, & Aesthetics (MDA): https://www.youtube.com/watch?v=bB3gNkFmIMA
- Thinking About Games, the MDA Model: https://www.youtube.com/watch?v=oxL3_DRX71U
- How Collisions Work in Games: https://www.youtube.com/watch?v=z7xMIRzIDpU
- How the Inventor of Mario Designs a Game: https://www.youtube.com/watch?v=K-NBcP0YUQI
- 3Cs of Game Development: https://www.pluralsight.com/blog/film-games/character-controls-camera-3cs-game-development
- Games and Art (Game Concepts): https://gamedesignconcepts.wordpress.com/2009/07/16/level-6-games-and-art/
- Art In Video Games (That Game Co): https://www.youtube.com/watch?v=qqmWKGk6Y4g
- Flow in Games (and Everything Else): https://www.jenovachen.com/flowingames/p31-chen.pdf
- Jenova Chen's Flow in Games: http://www.jenovachen.com/flowingames/thesis.htm
- How Do Games Help Us Play Better (Flow): https://www.youtube.com/watch?v=nx08xjV6KBY
- 10-Hidden Video Design Secrets that are Total Genius: https://www.youtube.com/watch?v=9RQYs-3gV6o

Recommended Books:

- Game Design Workshop: A Playcentric Approach to Creating Innovative Games by Tracy Fullerton, 4th edition (2018).
- Situational Game Design by Brian Upton (2017).
- Advanced Game Design: A Systems Approach by Michael Sellers (2017).
- The Art of Game Design: A Book of Lenses by Jesse Schell, Second Edition (2014).
- Unity 3x Game Development Essentials by Will Goldstone (2011), and update site: http://unitybook.net/updates-to-unity-3/
- First Person: New Media as Story, Performance and Game by Noah Wardrip-Fruin and Pat Harrigan, 2006.

Weekly Course Outline (subject to changes on Canvas as needed)

1. **08/24:** Course Intro. Interactive media production pipeline. Creating media assets for a 3D video game. Intro to Unity game engine. Starting a first-person shooter prototype.
   a. **Homework:** Finish your shooter prototype in Unity by adding 3D primitives (platforms, walls, maze, etc) that make achieving a goal more challenging. Start reading the research paper on the MDA framework.
2. **08/31:** Intro to the MDA Design Framework. 3D environment design. Creating a terrain and lighting a 3D scene in Unity. Importing environment assets such as sprites, sounds, models, and textures. Skybox.
   a. **Homework:** Design an island adventure game environment with Unity terrain editor. Import packages to include assets like grass, trees, and skybox textures. Add lighting, shadows, and background sounds. Start researching two games to do an MDA analysis for your first paper. Spend two paragraphs on each component, and

3. **09/07:** Triggering sounds, textures, and animations with collision events in Unity. Coding to detect collisions and drive 3D and GUI textures. Customizing texture maps in Photoshop.
   a. **Homework:** Import the provided game models to your environment, and then add animated power-ups to find. Provide texture and GUI feedback for collecting the power-ups and create a win-state for achieving the goal of finding four power-ups.
4. **09/14:** Creating a coconut throwing shooter mini-game. Animating in Unity to create moving platforms. Developing a custom platformer challenge to win the mini-game.
   a. **Homework:** Finish your adventure game prototype by adding a coconut throwing shooter mini-game to get the last power-up. Add a unique platformer component to customize your mini-game.
5. **09/21: Project #1 Due:** "Island Adventure Game Prototype" due. Presentations, playtesting, and critiques.
   a. **Homework:** Finish Design Paper #1 "MDA Design Analysis of Two Games".
6. **09/28: Design Paper #1 Due!** Designing a custom level using the MDA Design Framework. Using Autodesk Maya to create custom polygon models and UV texture assets.
   a. **Homework:** Create aesthetic design references for a custom level. In Maya, start modeling some custom environment assets to import into Unity. Add UV textures and normal maps for realism.
7. **10/05:** Concept of flow in game design. Developing your prototype into a game level with a unique aesthetic. Texturing in Maya. Importing assets and animations from Maya to Unity.
   a. **Homework:** Create a design plan for how to incorporate flow into your custom level. Continue to develop custom assets in Maya and Photoshop.
8. **10/12: Custom Level Designs Due for Midterm Grades!** Modeling and UV texturing custom models in Maya.
   a. **Homework:** Develop custom models in Maya for your game's aesthetic.
9. **10/19:** Creating a custom skybox and skysphere in Photoshop and Maya. Shooting photography to create a panorama, and then stitching it in Photoshop. UV mapping a 360 polar coordinates image onto the inside of a sphere in Maya. Normals.
   a. **Homework:** Create a custom skybox and/or skysphere for your game level.
10. **10/26:** More 3D modeling and UV texturing of custom game objects in Maya. Playing and triggering custom 2D and 3D sounds in your game environment.
    a. **Homework:** Finish working on at least five custom models with UV textures and a custom skybox or skysphere for your environment. Also trigger at least three custom sound effects and-or background music in your environment that fits your aesthetic.
11. **11/02: Project #2 Custom Game Environment Due!** Present for critique your custom game environment with models, sounds, and a skybox-skysphere. Lecture: Developing your game design doc by adding research questions related to Dynamics and Mechanics. Plan key events and core mechanics that will support your chosen aesthetic, and will improve flow design in your level. Intro to animation in Unity. Moving platforms and opening doors. **Design Paper #2 assigned: "MDA Level Design & Flow".**
    a. **Homework:** Build on your design doc by adding sections on Dynamics and Aesthetics, as well as Flow, then convert your design doc into your second paper.
12. **11/09:** Setting animation keyframes in Maya and importing to Unity. Triggering animation sequences with C# scripts. LERP animation. Triggering a win sequence. Particles.
    a. **Homework:** Finish your second paper to turn in next class. Add dynamic events that incorporate animation for player interaction through your level, and start working on a win sequence.
13. **11/16: Design Paper #2 Due!** GUI and HUD design to show health or scoring. Using GUI text or sound to narrate a story with button choices that trigger events. Spawning the character controller in a death sequence.

a. **Homework:** Add GUI and-or HUD graphics that give player feedback and add a narrative layer of choices to your level design.
14. **11/23:** Thanksgiving holiday, no class this week.
    a. **Homework:** No homework.
15. **11/30:** Finishing up your game level. Create an opening screen with instructions of how to play your level. **Final "Making of…" Research Poster assigned!**
    a. **Homework:** Finish designing your level with custom dynamic events and core mechanics. Use your papers and the poster template to design a final "Making of…" research poster that shows the MDA and Flow design of your game level.
16. **12/07: Final Game and Poster Presentations!** Present custom designed game levels, due as a compiled executable file, along with your final research posters as a PDF. Presentations, playtesting, and critiques.

Course Grading:

Each assignment will count 100 points, and then be calculated as a percentage of your final grade for the course. Final grades for this class will break down as follows:

Prototype #1	15%
Design Paper #1	7%
Custom Level Designs	5%
Midterm Participation	5%
Custom Prototype	15%
Design Paper #2	7%
Character Designs	5%
Final Game Level	20%
Final Research Poster	16%
Final Participation	5%

Grading Legend:

93-100 %	A
90-92.9 %	A-
88-89.9 %	B+
83-87.9 %	B
80-82.9 %	B-
78-79.9 %	C+
73-77.9 %	C
70-72.9 %	C-
68-69.9 %	D+
63-67.9 %	D
60-62.9 %	D-
0 – 59.9 %	F

A grading rubric that defines the evaluation of each assignment will be given on that assignment's handout in class.

Attendance:

Since this is a multimedia production course being conducted in the lab as software demonstrations and hands-on project work, attendance is required. To keep up with all the required material, students should be present for every class of the semester, arriving before class begins and staying until class is dismissed. In the case of absences, students are responsible for finding out what work they have missed and are still expected to turn in assignments on the scheduled due dates. If an absence is unavoidable it is strongly recommended to contact the instructor before the absence and make any arrangements to turn in work early. Special exceptions to these policies include religious observances and absences due to an event or purpose that is officially recognized by the University. Students are expected to notify me in advance of these special exceptions and they will be accommodated on an individual basis.

Tardiness:

Being late to class or when returning from break will be recorded as a tardy and can affect a student's grade as it impacts participation. Tardy policy states that any student who is more than ten minutes late will be considered absent for that class. A student who is late more than three times will receive an automatic 10 point deduction from their participation grade with additional 5 point deductions for each additional instance of tardiness.

Code of Academic Integrity:

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high-quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001.

Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau.edu/counseling/

Disability Policy:

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and

Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/