3D Engines in Practice (CEN 4930/DIG 4930)
Principles of 3D Engine Systems (CIS 6930)
Academic Term: Fall 2025

Instructor

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Course Description

Focuses on basic technical knowledge and skill in design, conceptualization, and visualization for three-dimensional engine content production. Coverage of scene and agent development, multi-disciplinary teams, complexes pipelines, and production processes. Project-based, culminating in a practical 2D, 2.5D, or 3D application. (3)

Course Pre-Requisites / Co-Requisites

Some prior programming experience

Course Objectives

By the end of the semester, successful students should be able to:

- Conceptualize and plan the systems, design, and visual aesthetics for a 2D/2.5D application.
- Develop an industry standard design document using corer principles of the design process..
- Consider and integrate designs regarding usability and user experience.
- Create a final application build including multiple levels in a cohesive executable package.

Required Textbooks and Software

No media purchases are required. All materials will be provided. The College of Engineering requires students to have a mobile computing device (laptop) capable of running Windows, which students are required to bring to class.

Relation to Program Outcomes (ABET)

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Medium
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	
3. An ability to communicate effectively with a range of audiences	
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	Low
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	Medium
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Medium

*Coverage is given as high, medium, or low. Empty boxes indicate outcomes not covered or assessed in the course.

Attendance & Make-Up Policy

Requirements for attendance and make-ups for exams and other work in this course are consistent with university policies: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa.html

Course Schedule

Wk	Subject	Quiz	Deliverables
0	Syllabus, Game / Sim History, Virt. Env. Design	Q0, Q1	-
1	Tool Setup, Scenes, & Objects	Q2, Q3	GT-A
2	C# Fundamentals, Game Loop, & Input	Q4, Q5	GT-B, Ex0, Pitch
3	Using Signals, Basic Design Patterns	Q6, Q7	GT-C, Ex1, Team Formation
4	Physics & Collision Detection	Q8	Design Draft, Check-In (Design)
5	Version Control	Q9	Design Document
6	Animation	Q10	Ex2, Check-In (Prototype), Peer Evaluation
7	User Interfaces	Q11	-, Peer Evaluation
8	***Prototype Presentations***		Prototype, Peer Evaluation, Reviews
9	***ASYNCHRONOUS WORK WEEK***		Ex3
10	User-Experience Design	Q12	Check-In (RC1)
11	Lighting & Audio	Q13	Peer Evaluation
12	Inventory Factory Pattern & Object Spawning	Q14	Check-In (RC2)
13	Integrating Object Properties / Advanced Topics	Q15	Check-In (PR)
14	***Post-Mortem Presentations***		Production Release, Peer Evaluation. Reviews

Evaluation of Grades

General Coursework		
Quizzes (16-Drop-2)	10 x 14	14%
Group Tasks (3)	3 x 10	3%
Project Milestones		
Pitch	40	4%
Design Document	50	5%
Prototype Presentation	75	7.5%
Post-Mortem Presentation	125	2.5%
Prototype Milestone	100	10%
Production Release	200	20%
Engagement (13-Drop-1)		
Presentation Reviews (4) Peer Evaluations (4) Meetings (5)	7.5 x 12	9%

Differentiated Work	***Undergraduate***		***Graduate***	
Professionalism (UG)	10	1%		
Exercises (4)	35 x 4	14%	12.5 x 4	5%
Lit. Presentation (G)			100	10%

Grading Policy

Percent	Grade	Pts	Percent	Grade	Pts
93 – 100	A	4.00	73 - 76	C	2.00
90 – 92	A-	3.67	70 – 72	C-	1.67
87 – 89	B+	3.33	67 - 69	D+	1.33
83 – 86	B	3.00	63 - 66	D	1.00
80 – 82	B-	2.67	60 – 62	D-	0.67
77 – 79	C+	2.33	00 – 59	E	0.00

UF policy information is also in the catalog (link).

Graduate-Level Work

Students in the graduate section of the course are expected not only to play a leadership role in their teams but also to act as mentors and domain experts who will guide younger practitioners. Graduate students are expected to spend approximately 133% of the time on the course compared to undergraduate students. This will include a topical presentation for 8% of the final grade in the class.

Quizzes. Taken regularly on previously assigned content for reinforcement.
Exercises. Short assignments intended to reinforce fundamental engine concepts.
Group Work. Work completed in early weeks by student groups. (***no individual submissions***)
Project Milestones. Student teams will complete the following milestones throughout this course:
Evaluations, Reviews, and Meetings. Honest and constructive meetings, reviews, and evaluations of peers.

Project Pitch – One-minute "elevator pitch" for project
Design Document – Shows key elements (hardware sketch, back-end dataflow chart, and/or UI wireframe)
Design Prototype – "Proof of Life"; demonstration of "vertical slice" of functionality
Prototype Presentation – Live presentation of prototype work to peer audience
Production Release –Feature complete version of the project (final submission)
Post-Mortem Presentation – Post-project evaluation of project challenges, successes, and overall outcomes

Course Expectations

Read and adhere to the syllabus. Emails requesting information contained in the syllabus will receive the lowest priority for response with no guaranteed turnaround. Practically, this means responses will come only after the remaining email queue of the instructor is otherwise empty. This condition occurs approx. once every 24 months.

Students must act with honor; academic dishonesty will be strictly addressed. Sharing / copying, "borrowing" of code structure, discussing code structure, looking at code from another student, providing such code, and plagiarism, in addition to other dishonest behaviors, are considered academic dishonesty. No information regarding assignment solutions may be shared by students except at a conceptual level. If students implement algorithms from other sources, they must be cited. Students may not copy code from the Internet or other sources under any circumstances. Any student found to have violated these rules, whether a provider or receiver or unauthorized help, will be assigned a **grade of E (failing) in the course** and referred to the Honor Court. **When in doubt, ask.**

Grade reviews must be requested within one week of a grade being posted. After two weeks, no grades will be revisited. In the event of a grade review, the entire assignment will be reviewed.

All assignments are due by the time listed on Canvas. Projects and homework with a cascading deduction: one (1) weekday late for 10% penalty; two (2) for 25% penalty; or three (3) for 50% penalty. Quizzes and presentations may not be completed late for credit except with instructor approval for extenuating circumstances (see below).

Quiz, presentation, and meeting make-ups will not be permitted except in extenuating circumstances. For make-up consideration students will be required to submit written documentation from a reputable source as evidence. For any planned event (e.g., a wedding), the student is expected to contact the instructor no less than two weeks in advance for consideration. Please note that there is no guarantee that requests will be accommodated. Social, networking, and club events may be taken into consideration strictly at the discretion of the instructor.

Students should visit office hours for project help and grade questions. Do not send email to, send private messages to, or "@" instructors or TAs about project help or grades. The TAs and instructor will often try to answer questions in the chat when possible, but the way to get personalized help is to visit or make arrangements!

Students should not distract others in the lab. Students should refrain from watching videos; playing games; talking; sleeping; howling; biting toenails; screeching like a banshee; and other distracting behaviors in the lab.

Important non-project correspondence be via email. The chat system is helpful for simple questions and allows students to help one another, but students should not expect responses to important questions via chat. Please allow 48 business hours for responses; instructors and TAs have many responsibilities and respond as is practical.

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Campus Resources

Health and Wellness

U Matter, We Care:
Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 911.

Counseling and Wellness Center: https://counseling.ufl.edu, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence
If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Academic Resources

E-learning technical suppor*t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling; https://career.ufl.edu.

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

Writing Studio, 302 Tigert Hall*,* 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

Student Complaints Campus*:* https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/; https://care.dso.ufl.edu.

On-Line Students Complaints*: https://distance.ufl.edu/state-authorization-status/#student-complaint*.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.