

# Intermediate Game Development

FALL 2019

INSTRUCTOR: Robert Yang <ry14@nyu.edu>, office hours: by appointment

**NEW YORK UNIVERSITY, TISCH SCHOOL OF THE ARTS, GAMES-UT 121-002**

MoWe 4-6:40pm      370 Jay St, room 409

## **COURSE DESCRIPTION:**

This course reflects the various skills and disciplines that are brought together in modern game development: game design, programming, asset creation, and critical analysis. Classroom lectures and lab time will all be used to bring these different educational vectors together into a coherent whole; the workshop will be organized around a single, long-term, hands-on, game creation project.

## **PREREQUISITES:**

Intro to Game Development GAMES-UT 120

## **COURSE STRUCTURE / FORMAT**

This course meets twice a week. The lecture meeting is for instructional demos, discussion of readings, and critiques of student work. *The lab meetings are primarily self-directed work time for students to work on projects and homework.* Students are expected to spend at least 6 hours a week, outside of class meetings, on their homework.

## **COURSE OBJECTIVES / LEARNING GOALS:**

By the end of this course, the student will be able to:

- 1) Describe typical work practice in game development across the game industry.
- 2) Work with a game engine in a 3D context, understand basics of building 3D games.
- 3) Demonstrate development skills through actual implementation of code and assets.

## **READINGS:**

All course readings will be provided. However, here are some recommended books / texts:

10PRINT, by Nick Montfort, et al.

Spelunky (book) by Derek Yu

## **MATERIALS / TOOLS:**

You will need the following:

- A laptop... no tablets, Surface is OK
- A mouse (any cheap USB mouse is fine)
- Unity 2019.2.3+ (free personal edition) <https://unity3d.com/get-unity/update>
- Visual Studio Code ("VS Code") (free) <https://code.visualstudio.com/>
- Autodesk Maya 2019 (free educational version) [autodesk.com/education/free-software/](https://autodesk.com/education/free-software/)
- Adobe Photoshop CC (free Adobe CC license via NYU)

## **CLASS WEBSITE:**

Code and homework at: [github.com/radiatoryang/fall2019\\_gamedev](https://github.com/radiatoryang/fall2019_gamedev) // Slack: #u121-2\_interdev

## **ASSIGNMENTS:**

- Weekly development exercises / prototypes, “devlog” short written responses to reading
- Midterm project: individually, **make a short 3D autobiographical “self-portrait” game**
- Final project: in groups, **study and clone a famous low poly 3D game** and each group member must code/implement 1+ “systems”, 1+ Maya models, and write 1 page of docs.
- Final deliverable: **complete game page** (text description, screenshots, video, builds)

**SCHEDULE:** (subject to change, check class wiki for more details)

**NOTE: homework is always due the week after assigned, on lecture day.**

**(e.g. Week 1 homework is due on Tuesday of Week 2) but check wiki for updated schedule**

September 4

**Week 01: introductions, what is game dev, editor interface, WebGL exporting**

**devlog:** “The Door Problem” [lizengland.com/blog/2014/04/the-door-problem/](http://lizengland.com/blog/2014/04/the-door-problem/)

- Which industry role(s) sound the best and/or worst to you?
- Which role(s) sound surprising, boring, easy, hard, cheap, expensive, or \_\_\_\_?

**make:** recreate a physical place in NYC with 1+ doors and 150+ total 3D GameObjects

- No input or gameplay allowed, just make a somewhat complex static 3D scene
- TIP: To reach the 150+ quota faster, make a detailed object and then duplicate it
- For all homework: export to WebGL, upload to [itch.io](http://itch.io), and link to it on GitHub wiki

**also:** do the “code diagnostic” handout (try your best, no penalty for bad answers)

- VERY IMPORTANT: Update to Unity 2019.2 and install WebGL build target, and install VS Code and Maya

September 9 / 11

**Week 02: review code handout, pair-program text games / movement, intro to Maya (lab)**

**devlog:** “3D Graphics: Crash Course CS #27” [youtube.com/watch?v=TEAtmCYYKZA](https://www.youtube.com/watch?v=TEAtmCYYKZA)

- Why do we rely on *triangles* instead of *quads* (squares) in 3D graphics?
- What’s the difference between *Painter’s Algorithm* vs *Z-Buffer*?
- What is the “surface normal” of the floor in Vector3 notation? Or the ceiling?

**make:** 3 minute-long “treasure hunt” boat game prototype with landmarks and clues

- Code basic keyboard movement, with text clues appearing when near landmarks
- Prototype functionality with gray cubes / sphere before art-passing in Maya
- Spend 2-3+ hours making stuff in Maya, even if you feel like you’re bad at it:
  - Model a “Basic Boat” in Maya [youtube.com/watch?v=4XknV\\_B9bno](https://www.youtube.com/watch?v=4XknV_B9bno)
  - Model at least 4 more objects in Maya: 3 landmarks and 1 treasure object

**also:** “vector math” handout (try your best, no penalty for wrong answers)

September 16 / 18 (ADD/DROP DEADLINE)

**Week 03: review vector math, more Maya, intro to 3D physics + triggers**

**devlog:** "Messing Around in 3D Studio R4" [youtube.com/watch?v=BayZZQFFO\\_s](https://www.youtube.com/watch?v=BayZZQFFO_s)

- Why do you think the user make renders at 2:22 and 3:18? Why do you think we don't regularly make renders when working in Maya today?
- Which functions / buttons from 3DS 4 are in Maya too?
- What year is 3DS 4 from? Google / name two 3D games from that year.

**make:** a 7+ phase Rube Goldberg machine with at least 4 custom objects made in Maya

- Code it so that it doesn't start until the player presses [SPACE]
- Code triggers to activate 3+ different camera positions / angles
- Code a finale trigger; something should activate at the end.
- 2 of your Maya models must use Mesh Colliders in the machine.

**also:** "code: if statements" handout (try your best, no penalty for wrong answers)

- also: as prep for version control next week, download and install SourceTree

September 23 / 25

**Week 04: coding with physics, intro to version control, !!! LAB: BEGIN MIDTERM !!!**

**devlog:** "How to do a Game Jam" [mightyvision.blogspot.com/2013/04/how-to-do-game-jam.html](http://mightyvision.blogspot.com/2013/04/how-to-do-game-jam.html)

- (You've probably read this before but I don't care, you're going to read it again)
- Which steps are the most important, and which are you going to ignore?
- Keeping steps 1-3 in mind, what's your midterm project idea and work plan?

**make:** an initial midterm project prototype with working controls

- Focus on controls / interaction / basic feel, in a blank boring test level
- Put your midterm project on GitHub, link to the repo on the homework wiki

September 30 / October 2

**Week 05: in-class playtest, raycast and instantiation**

**devlog:** Midterm Devlog

- Write a 150+ word devlog entry about your midterm project. What did you do last week, and what are you going to do next? Why? How do you feel about it?

**make:** iterate on your midterm project prototype

- Finish your movement / input tuning
- Make more complicated test levels / puzzles / scenes / systems now
- Start modeling the most important meshes in Maya
- Don't forget to push to your GitHub repo each week, or you'll get a lower grade

October 7 / 9

**Week 06: in-class playtest, UVing in Maya / Texture Painting in Photoshop**

**devlog:** Go to [polycount.com/categories/3d-art-showcase-critiques](https://polycount.com/categories/3d-art-showcase-critiques) and read a thread

- Choose a thread with 10+ posts that interests you, and link to it
- What kind of 3D asset did they make? How did they make it / how making it?
- What kind of feedback are they getting? What was the most important feedback?

**make:** iterate on your midterm project prototype

- Implement an ending, player should be able to play from start to finish
- Texture and polish some of your art for the midterm project

October 15 /16 (NO CLASS ON OCTOBER 14, BUT OCTOBER 15 IS MONDAY SCHEDULE)

**Week 07: in-class playtest, review Maya / Photoshop, sound playback patterns**

**devlog:** 10PRINT, chapter 10 "Introduction", free PDF at [10print.org](https://10print.org)

- What is the difference between platform studies and critical code studies?
- What does the "RND(1)" in 10PRINT do? What does the "1" do?
- What does the 10PRINT result resemble? How would you use it for a game?

**make:** release your midterm game before the weekend, and make others play it

- It's ok to keep fix / patch later, but upload a public version BEFORE the weekend
- Be ready to report back on what different players thought of it

October 21 / 23

**Week 08: debrief midterms, intro to procedural generation / for / while**

**devlog:** 10PRINT, chapter 25 "Ports to Other Platforms", free PDF at [10print.org](https://10print.org)

- Which of the ports do you like most? What does the book say about it?

**make:** a maze generator tech demo (follow the lab instructions)

October 28 / 30

**Week 09: basic code architectures, forking and pull requests, BEGIN FINAL PROJECT**

**devlog:** "What Do Prototypes Prototype?" [citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.224.2119](https://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.224.2119)

- what type of prototype is example 2, and why?
- what type of prototype is example 10, and why?
- what kind of prototype are you making for the final project, and why?

**make:** prototype main game system

- Each group member should try to prototype a different aspect of the game
- Push to your GitHub fork + be ready to show progress to the rest of your group

November 4 / 6

**Week 10: more github review, final project check-in, project planning task boards**

**devlog:** write 150 words on what you've done for the project, and what you'll do next

**Make:** integrate systems prototypes together, iterate on final project

- Be ready to playtest next week

November 11 / 13

**Week 11: in-class playtest, game feel, coding with coroutines**

**devlog:** write 150 words on what you've done for the project, and what you'll do next

**Make:** iterate on final project

November 18 / 20

**Week 12: code review, intro to animation in Maya / Mecanim**

**devlog:** write 150 words on what you've done for the project, and what you'll do next

**Make:** iterate on final project

November 25 (NO CLASS ON WEDNESDAY NOV 27, THANKSGIVING HOLIDAY)

**Week 13: intro to shaders, final project check-in**

**devlog:** write 150 words on what you've done for the project, and what you'll do next

**Make:** iterate on final project

December 2 / 4

**Week 14: in-class playtest, final project check-in**

**devlog:** write 150 words on what you've done for the project, and what you'll do next

**Make:** iterate on final project

December 9 / 11 (LAST WEEK OF CLASS)

**Week 15: last playtest, work time, class debrief**

- Deliverables will be listed in class, due one week after last class (Dec 18)
- no final exam date

## **ASSESSMENT**

Student projects will be graded on demonstrated process and documentation, as well as the playability, readability, clarity of construction, and polish. You will be graded on a point scale, and these points will be added up to determine the final grade, according to the following:

94-100 A

90-93 A-

87-89 B+

84-86 B, etc.

The following are the components of the grade:

Participation 30%

Homework 20%

Midterm 20%

Final 30%

## **ATTENDANCE**

Attending and arriving on time to all class sessions is required and expected. This includes all labs, recitations, and critiques. If you will be missing a class due to illness, or unavoidable personal circumstances, you must notify your professor in advance via email for the absence to be excused. Unexcused absences and being late to class will lower your final grade. Three unexcused absences lower your final grade by a letter. Each subsequent unexcused absence will lower another letter grade. Two tardies will count as one unexcused absence. Arriving more than 15 minutes late to class will also count as an unexcused absence.

## **STATEMENT OF ACADEMIC INTEGRITY / PRINCIPLE**

The core of the educational experience at the Tisch School of the Arts is the creation of original academic and artistic work by students for the critical review of faculty members. It is therefore of the utmost importance that students at all times provide their instructors with an accurate sense of their current abilities and knowledge in order to receive appropriate constructive criticism and advice. Any attempt to evade that essential, transparent transaction between instructor and student through plagiarism or cheating is educationally self-defeating and a grave violation of Tisch School of the Arts community standards. Plagiarism is presenting someone else's work as though it were your own. More specifically, plagiarism is to present as your own: a sequence of words quoted without quotation marks from another writer or a paraphrased passage from another writer's work or facts, ideas or images composed by someone else. For all the details on plagiarism, please refer to page 10 of the Tisch School of the Arts, Policies and Procedures Handbook, which can be found online at:

<http://students.tisch.nyu.edu/page/home.html>

## **HEALTH AND SAFETY**

Your health and safety are a priority at NYU. If you experience any health or mental health issues, we encourage you to utilize the support services of the 24/7 NYU Wellness Exchange 212-443-9999.

## **ACCESSIBILITY**

All students who may require an academic accommodation due to a qualified disability, physical or mental, please register with the Moses Center 212-998-4980.

## **TITLE IX**

Tisch School of the Arts is dedicated to providing its students with a learning environment that is rigorous, respectful, supportive and nurturing so that they can engage in the free exchange of ideas and commit themselves fully to the study of their discipline. To that end, Tisch is committed to enforcing University policies prohibiting all forms of sexual misconduct as well as discrimination on the basis of sex and gender. Detailed information regarding these policies and the resources that are available to students through the Title IX office can be found by using the following link:

<https://www.nyu.edu/about/policies-guidelines-compliance/equal-opportunity/title9.html>