CS F480 Game Design and Architecture

Dr. Jonathan Metzgar

University of Alaska Fairbanks

Instructor	Dr. Jonathan Metzgar
Email	jbmetzgar@alaska.edu
Office	Duckering 543
Office Phone	(907) 474-6104
Office Hours	TH 11:15am-12:15pm, 2-4pm, or by appointment
Course Number	CS F480
Credits	3
Prerequisites	CS F202, MATH F253X, and PHYS F212X
Method	Lecture
Course Website	https://classes.alaska.edu
Location	UAF Campus in DUCK 535
Meeting Time	Tuesday/Thursday 8-9:30 am
Final	8-10 am, Friday, May 1
Reading Materials	*Art of Game Design 3e* by Jesse Schell. ISBN 9781138632059
Recommended Reading	*Game Programming Patterns* by Robert Nystrom. ISBN 9780990582908
Recommended Reading	*A Theory of Fun for Game Design 2e* by Raph Koster. ISBN 9781449363215
Recommended Reading	Research papers selected by instructor

1. INTRODUCTION

Catalog Description. Learn about game design and architecture including experiences, elements, themes, iteration, game mechanics, puzzles, stories, design patterns, and more! Concepts are integrated with extensive programming, design and study of a game engine.

1.1. Welcome

In this class, we are going to investigate game architecture and design. Our focus is to survey the state of the art in game design and couple that with practical skills expected for game programmers.

2. COURSE OUTCOMES

In this section, we cover the list of course outcomes. This is what you should expect to be able to do when the course is completed.

- Apply game design patterns
- Understand the various roles in game design
- Write a game engine from scratch
- Understand the state of the art in a game research field
- Apply game design lenses to improve a game design
- Understand how rating systems are applied to games
- Understand systems of game design abstraction
- Identify and apply libraries and game frameworks
- Apply graph theory and automata theory to game design
- Write a game from scratch
- Write a one page design document
- Write a game design document using LaTeX

3. GRADING OVERVIEW

The course load consists of a two exams, several homework assignments, a class game engine/genre game project, and a industry accepted final game competition. The lowest *non-zero* homework grade will be replaced by the average grade of the remaining homework grades (0's included!), so ALL homework must be completed. The exams are primarily based on the content of the assigned readings or videos. This is summarized in the table below.

IMPORTANT! Homework and Project Deliverables are due before midnight. Late homework may get penalized one whole letter grade each day that it is late starting at 12:00am and late homework after 3 days may receive no credit. I encourage students to communicate if they are having difficulties. If Blackboard is down for maintenance, then submit when it comes back online the next day.

3.1. Grading Division

Points	%	Type
3000	30%	Examinations
2000	20%	Final Game Compo
3000	30%	Homeworks
2000	20%	Class Game/Engine Project
10000		

3.2. Grading Schema

A+	97-100	**A**	93-96	**A-**	90-92		
B+	87-89	**B**	83-86	**B-**	80-82		
C+	77-79	**C**	73-76	**C-**	70-72		
D+	67-69	**D**	63-66	**D-**	60-62		
F	0-59						

3.3. Homework Grades

The homeworks are graded with the following scheme. Several items are pass/fail for the entire homework assignment. In other words, they must be completed or no credit at all is given regardless of the completion of the other items. Secondly, a rubric is used to assign points for homeworks turned in. All homeworks must be turned in with the PDF format using the Overleaf Template described in class. Students will be graded according to the following scheme.

3.3.1 Undergraduate Homework Expectations

- Deliverables

    - All games should be complete and have a win/lose condition
    - In your research paper section, write a sentence describing the importance and main idea so that a non expert can understand it.
    - Your GitHub activity should show a progression of work

3.3.2 Graduate Homework Expectations

- Deliverables

    - Generally fulfil/exceed all the undergraduate standards
    - In your research paper section, write a paragraph explaining one or more research papers so that a non expert can understand the results.
    - Your GitHub activity should reflect professional standards
    - Your homeworks should reflect graduate level sophistication

3.4. Homework Rubric

The rubric points are divided into 5 categories: Novice (0%), Advanced Beginner (30%), Competent (50%), Proficient (80%), and Expert (100%). The key to success here is to design first, work iteratively, log your work, and prepare a report reflecting on the process. This cannot be done in one day, so pace yourself.

- (Pass/Fail) Program runs

- (Pass/Fail) Overleaf Report submitted as a PDF

- (Pass/Fail) Source Code included in Overleaf Report

- (500 pts) Deliverables

    - (100 pts) One page design, post mortem, research paper report
    - (100 pts) GitHub commit message quality (list them in report)
    - (100 pts) Game programming patterns (screenshot and explanation)
    - (100 pts) Game mechanics design (screenshot and explanation)
    - (100 pts) Game design elements (aesthetics, mechanics, story, technology)

3.5.   Game Engines

You are free to use a professional game engine in the games that you write for your homework. However, do not underestimate the amount of time needed to learn to use that engine. The instructor recommends that you use the engine we are designing to provide the most learning benefit and integration with the course material.

3.6.   Class Game + Engine Project

We are going to write our own 2D game engine and a genre based game from scratch. We will design all the game engine components in the first half of the semester and design the game in the second half of the semester. The game engine can be used by students for any of the game jams. The grading of these elements will be based on a write-up by the student detailing their commit messages, quality of code, and in class participation.

3.7.   Final Game Compo

Instead of a traditional final examination, we will participate in the Solo Ludum Dare competition held during the semester. Each student will write a game from scratch and submit it. The day of the final, we will do presentations on our games and review the comments/feedback.

4. SCHEDULE

Week	Topics	Items Due
1	Course Introduction, Computer Graphics	Overleaf/GitHub
2	Actors, Design Patterns, Game Design	Game Engine 1
3	Ideas, Stories, Paperwork	Game Jam 1
4	Character, Camera, Controls	Game Engine 2
5	Theory of Fun, Audio	Game Jam 2
6	Jumping, Platformers	Game Engine 3
7	Enemy AI	Game Jam 3, Test 1
8	Network Communication	Game Engine 4
9	Spring Break	
10	Game Research	Class Game 1
11	Roguelikes	Game Jam 4
12	Creative Synthesis	Class Game 2
13	Animation	Game Jam 5
14	Miscellaneous Topics	Class Game 3, Test 2
15	Class Game Review, Course Summary	Final/Ludum Dare
16	Finals Week	Final Projects