G54GAM Games

Revision

Exam

- 1 hour
- Answer 2 of 3 questions, 15 marks each
  - i.e. 30 minutes per question
  - i.e. Do not answer 3 questions
- Knowledge
  - Bookwork, recall of factual information
- Comprehension
  - Or ‘understanding’, where students are asked to perform such actions as to describe, explain, classify ideas or concepts
- Application
  - Undertake an ‘unseen’ task by using knowledge in a new way

The Nature of Games

- What is a game?
  - Games as a subset of play
  - Play is a component of games
- Design philosophies
  - Simulation, narratology, ludology
- Core mechanics
  - Define
  - Examples
- Genre classifications
  - Define
  - Examples

Meaningful Play

- Actions and outcomes
  - Discernable, integrated, descriptive, evaluative
    - What?
- Interactivity
  - Cognitive, functional, explicit, cultural
- Meaningful choice
  - Micro
  - Macro
  - Failure states
  - > Anatomy of choice

Elements of Game Design

- Mechanics, Dynamics, Aesthetics
- Formal Elements of Game Play
  - x8
- Dramatic Elements of Game Play
  - Challenge
    - Pure and applied
    - Uncertainty and risk
  - Play
  - Premise
  - Narrative

Progression and Balance

- Flow
    - Elements of enjoyment
- Dimensions of challenge
- Expected increase in skill
- Progression mechanisms
- Poor forms of progression
- Balance
    - Dominant strategies
    - Transitive and intransitive relationships
    - Dynamic balance
        - Feedback mechanisms

Premise and Narrative

- Narrative components
- Premise vs story
- Characters
- Conflict
- Dramatic Arc
- Storylines
  - Linear, branching, concurrent

Game Architectures

- Separation of work
  - Data-driven design
- Components and subsystems
  - What’s in a game engine?
- Game Loops
  - Different kinds
- Software design patterns
  - MVC vs Component

Multiplayer

- Software design patterns
- Client-Server architectures
- Issues with real time
  - Lag, bandwidth, reliability
- Approaches for
  - Replication, authority, prediction

Physics and Motion

- Kinematics and Dynamics
  - Issues and errors
- Collision Detection
  - Issues and approaches
- Collision Resolution
  - Approaches and approximations

Q1 (2017)

- **This question concerns game architectures**

(a) Describe the architecture of a *decoupled multi-threaded* game loop for a typical game engine, and give a reason why this would be considered advantageous in practice over the basic game loop.

[2 marks]

(b) A simplistic physics engine is simulating a small body, moving at very high speed towards a thin wall.

i. What is the likely outcome if this simulation progresses,andwhy?

[2 marks]

ii. What new calculations should the physics engine perform to resolve this situation efficiently?

[4 marks]

(c) You are implementing a role-playing game with different character classes; warriors, archers and wizards, and a number of weapons and abilities; swords, arrows and spell casting. Describe how you would model these classes in a game engine such as Unreal, including a diagram of the various class hierarchies and identifying both the *is-a* and *can-it* properties of each class.

[7 marks]

Q2 (2017)

This question concerns game design theory

(a) Tracey Fullerton identifies 8 formal elements that can be used to describe a game as a formal system. State and briefly describe these elements with reference to a game.

[8 marks]

(b) You are developing a simple space-shooter action game, similar to Space Invaders. The game consists of waves of alien space ships that the player needs to destroy before they reach the planet. Draw and describe an appropriate *difficulty* curve that corresponds to the player's expected development of skill.

[4 marks]

(c) Describe how one of the game challenges in this game could be modified to appropriately support a change in difficulty that matches your answer to 3(b)

[3 marks]

Q3 (2014)

This question concerns balance and progression in games.

A game can be said to be *balanced* when the success of the player is largely determined by their skill.

(a) You are designing a first-person shooter (FPS) game that contains three weapons – a knife, a gun, and a rocket launcher, that reduce an opponent's health by 5, 10 and 100 points respectively. Explain how you would introduce an appropriate relationship between these objects, and state appropriate other objects or factors that you would introduce to ensure *static* balance. You should include an appropriate *pay-off* matrix in your answer.

[6 marks]

(b) State and describe two strategies for maintaining balance *dynamically* within a game, and state how a game could possibly become *imbalanced*

[4 marks]

(c) Explain how a player's skill might be expected to change over time, and describe a basic progression mechanic for a simple scrolling shoot-em-up game that would maintain an ideal state of *flow*.

[5 marks]

Q4 (2014)

This question concerns the implementation of game engines and systems.

(a) State the structure of a typical *game loop* for a game engine.

[3 marks]

(b) Explain how *decoupling* fixed-updates from rendering can be used to provide smooth but deterministic game play experience on a variety of different computers.

[4 marks]

(c) You are implementing a networked, multiplayer game that requires quick movements and fast, synchronised gameplay. Describe how you would structure the architecture of the client and the server in order to ensure speed, synchronisation and reduce bandwidth requirements.

[8 marks]