**ABET Course Syllabus – CS4555**

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| **Code** | CS4555 | **Credits** | 3 |
| **Title** | Introduction to 3D Computer Game Programming | **Coordinator** | Eun-Young Kang |

**Course Information**

1. **Catalog Description:** 3D game genre and styles; 3D game engines and their components; Scripts; GUI; Models; Textures; Sound and Music. Hands-on experience and rapid development.
2. **Prerequisites:** CS 3112
3. **Contact Hours:** Lecture 3 hours
4. **Required/Elective:** This course is an elective in the BS program.

**Textbook**

No formal textbook; Online materials compiled and provided by the instructor.

**Course Goals**

The Student Learning Outcomes that are addressed by the course are:

*SLO #1. Students will be able to apply concepts and techniques from computing and mathematics to both theoretical and practical problems.*

*SLO #2. Students will be able to demonstrate fluency in at least one programming language and acquaintance with at least three more.*

*SLO #3. Students will have a strong foundation in the design, analysis, and application of many types of algorithms.*

*SLO #5. Students will have the training to analyze problems and identify and define the computing requirements appropriate to their solutions.*

*SLO #6. Students will have the training to design, implement, and evaluate large software systems working both individually and collaboratively.*

*SLO #7. Students will be able to communicate effectively orally and in writing.*

Other outcomes of instruction. At the end of the course, students are able to

1. Describe game genres and game design process.

2. Use a game programming language and work under a common game programming architecture.

3. Explain and describe topics, issues and solutions in game math, collision detection, and physics, 2D/3D graphics, and animation.

4. State a list of game engines and their features.

5. Prototype a 3D Game using a Game Engine.

6. Use modeling and animation tools and create custom models and animations.

**Topics covered**

1. Introduction to Computer Games (Genre, Styles, and Designs)
2. Introduction to 3D Computer Graphics and Mathematics for Game programming
3. Introduction to Common Game Programming Languages (Python or C#)
4. Introduction to Open-source 3D Game Engines
5. Graphics, 3D Modeling and Animation
6. Scene Graph- Characters and Character Controls
7. Camera Control
8. Rendering (texture, fog, lighting, etc.)
9. Controls and Event in a Game Engine
10. Collision Detection and Handling
11. AI in Game
12. Intelligent NPC (Non-Player Character)
13. Search Space : Waypoint Graph and Navigation Mesh
14. Path-finding Algorithms
15. Game Physics
16. Multimedia: video and sound
17. 2D graphics, sprites, and HUD (Heads-Up Display)
18. Rapid game development
19. Performance tuning