MERCER County Community College

COURSE OUTLINE

Course Number	Course Title	Credits
GAM-245	Game Programming II	3.0

Hours: 1lecture/4 lab	Pre-requisite: GAM-145	Implementation 2019F

Catalog description (as it appears in 2014-2015 edition):
This course builds upon the existing skills developed in GAM-145. Students will expand upon their knowledge of the Unity3D Game Engine and C# programming language to learn higher-level programming techniques for topics such as quaternion application, AI behaviors, pathfinding, networking, advanced collision detection, and task management for large-scale games.

Is course New, Revised, or Modified? New

Required texts/other materials:

Revision date: 12/2018 **Course coordinator:** Ric Giantisco x3458

Information resources: *Artificial Intelligence for Games* by Ian Millington, CRC Press. ISBN-10: 0123747317, ISBN-13:978-0123747310

Other learning resources:

Course Competencies/Goals:

The student will be able to:

1. Design basic enemy AI behaviors for video games.
2. Create algorithms to enable AI pursuit and evasion.
3. Develop two-dimensional and three-dimensional navigation and pathfinding for enemy AI and other objects.
4. Design formation behaviors for enemy AI and other objects.
5. Build decision and behavior trees, implement rule-based systems, task scheduling, event managers, and other related tools.
6. Create basic herding and flocking AI behavior.
7. Construct and implement layered trigger mechanics and systems.
8. Apply class inheritance, static fields and methods, the singleton pattern, and other various programming techniques to build game prototypes.
9. Create and execute coroutine functions to control repeating or large tasks such as parsing extensive word banks.
10. Prototype various game types such as SHMUPs, card games, word games, and action-adventure games.

Course-specific Institutional Learning Goals (ILGs)/General Education Goals.

Institutional Learning Goal 1. Written and Oral Communication in English. Students will communicate effectively in both speech and writing.
Institutional Learning Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
Institutional Learning Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.
Institutional Learning Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.
Institutional Learning Goal 5. Social Science. Students will use social science theories and concepts to analyze human behavior and social and political institutions and to act as responsible citizens.
Institutional Learning Goal. 6. Humanities. Students will analyze works in the fields of art, music, or theater; literature; philosophy and/or religious studies; and/or will gain competence in the use of a foreign language.
Institutional Learning Goal 9. Ethical Reasoning and Action. Students will understand ethical frameworks, issues, and situations.
Institutional Learning Goal 10. Information Literacy: Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.
Institutional Learning Goal 11. Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Units of study in detail.

Unit I Game Managers & Menu Systems

Learning Objectives

The student will be able to...

- Define and distinguish between several different game prototypes (ILG1-4, 9-11).
- Demonstrate proficient knowledge of basic algorithms and data structures (ILG1-4, 9-11).
- Design and manage game prototypes using programming techniques such as class inheritance, static fields and methods, coroutines, etc. (ILG1-4, 9-11).
- Identify standard UI designs and hierarchies utilized in video games. (ILG1-4, 9-11).

- Construct and prototype basic HUD and game menu functionality. (ILG1-4, 9-11).

Unit II **Basic AI Movement & Behavior**

Learning Objectives

The student will be able to...

- Design and employ basic 2D & 3D movement (ILG1-4, 9-11).
- Identify AI behavior mechanisms and complexity (ILG1-4, 6, 9-11).
- Create "seek", "flee", "wander", "pursue", and "evade" behaviors (ILG1-4, 9-11).
- Develop obstacle and collision avoidance (ILG1-4, 9-11).
- Create formation and tactical movement (ILG1-4, 9-11).

Unit III **AI Pathfinding**

Learning Objectives

The student will be able to...

- Conceptualize and layout level paths and obstacles (ILG1-4, 9-11).
- Design pathfinding graphs and data structures (ILG1-4, 9-11).
- Construct hierarchical pathfinding (ILG1-4, 9-11).
- Create dynamic pathfinding (ILG1-4, 9-11).

Unit IV **AI Decision Making**

Learning Objectives

The student will be able to...

- Create decision, state, and behavior trees (ILG1-4, 6, 8-11).
- Demonstrate proficient knowledge of Markov systems (ILG1-4, 9-11).
- Create layered trigger mechanics and systems. (ILG1-4, 9-11).
- Develop rule-based systems (ILG1-4, 9-11).

Evaluation of student learning:

Each project will be evaluated on several factors. The specific goals, deliverables, and requirements of each project will be identified in the description sheet for each project.

Projects:	60%
Quizzes:	20%
Attendance:	10%
Homework:	10%

Academic Integrity Statement:

Students are expected to comply with the college-wide requirements for academic integrity. Mercer County Community College is committed to Academic Integrity—the honest, fair, and continuing pursuit of knowledge, free from fraud or deception. This implies that students are expected to be responsible for their own work. Presenting another individual's work as one's own and receiving excessive help from another individual will qualify as a violation of Academic Integrity. The entire policy on Academic Integrity is located in the Student handbook and is found on the college website:
www.mccc.edu/admissions_policies_integrity.shtml