

Montgomery County Community College  
 CIS 276  
 Game & Simulation Programming Foundations  
 3-2-2

**COURSE DESCRIPTION:**

This course introduces students to the necessary mathematical techniques and physical modeling principles for electronic game and simulation development. Students will learn mathematical tools underlying the development of gaming software algorithms. They will use a range of software products to implement these algorithms and modeling methods.

**REQUISITES:***Previous Course Requirements*

- CIS 111B Computer Science II: Object-Oriented Programming, with a minimum grade of "C"

*Concurrent Course Requirements*

None

LEARNING OUTCOMES Upon successful completion of this course, the student will be able to:	LEARNING ACTIVITIES	EVALUATION METHODS
1. Apply geometric principles to achieve translations, rotation, and scaling of objects in 2 and 3 dimensional spaces.	Assigned Readings Lecture Discussion Hands-On Lab Exercises Homework Assignments Projects Quizzes/Exams	Tests or Quizzes Final project
2. Apply trigonometric principles to compute relative forces in the motion of objects in 2 and 3 dimensional spaces.	Assigned Readings Lecture Discussion Hands-On Lab Exercises Homework Assignments Projects Quizzes/Exams	Tests or Quizzes Final Project
3. Apply linear algebraic techniques to model linear and non-linear translations, rotations and mappings in 2 and 3 dimensional spaces.	Assigned Readings Lecture Discussion Hands-On Lab Exercises Homework Assignments Projects Quizzes/Exams	Tests or Quizzes Final Project

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
4. Demonstrate the ability to mathematically model 2d and 3d kinematics with systems involving reflections, linear motion in constant gravity fields, and inelastic collisions.	Assigned Readings Lecture Discussion Hands-On Lab Exercises Homework Assignments Projects Quizzes/Exams	Game Development Projects Final Project
5. Demonstrate the ability to use mathematical tools in a rapid software development environment (such as a game engine) by developing gaming scenes and interactions.	Assigned Readings Lecture Discussion Hands-On Lab Exercises Homework Assignments Projects Quizzes/Exams	Game Development Projects Final Project
6. Explain the fundamentals of video hardware design and how it impacts the software design of gaming/simulation products.	Assigned Readings Lecture Discussion Hands-On Lab Exercises Homework Assignments Projects Quizzes/Exams	Tests or Quizzes

At the conclusion of each semester/session, assessment of the learning outcomes will be completed by course faculty using the listed evaluation method(s). Aggregated results will be submitted to the Associate Vice President of Academic Affairs. The benchmark for each learning outcome is that *70% of students will meet or exceed outcome criteria*.

#### SEQUENCE OF TOPICS:

1. Geometric Modeling in 2 and 3 Dimensions
2. Use of Vectors and Matrices to Model Objects in Higher Dimensional Spaces
3. Transformations – Rotations, Scaling, Linear and Non-Linear Mappings
4. Review of Popular Tools for Creating and Manipulating 2d and 3d Worlds
5. Linear Motion in 2 Dimensions
6. Linear Motion in 3 Dimensions
7. Review of Game Engines as a Programming Environment
8. Video Graphics Chip Design and Its Impact on Software and Algorithm Design

## LEARNING MATERIALS:

Menard. (2015). *Game Development with Unity, 2<sup>nd</sup> ed.*

Other learning materials may be required and made available directly to the student and/or via the College's Libraries and/or course management system.

## COURSE APPROVAL:

Prepared by: Kendall Martin	Date: 11/2004
Revised by: Alan Evans	Date: 3/2005
Revised by: Jason Wertz	Date: 4/2008
Revised by: Jason Wertz	Date: 7/25/2013
VPAA/Provost or designee Compliance Verification: Victoria Bastecki-Perez, Ed.D.	Date: 7/29/2013
Revised by: Pat Rahmlow and Debbie Dalrymple	Date: 1/11/2018
VPAA/Provost or designee Compliance Verification:	Date: 1/30/2018



*This course is consistent with Montgomery County Community College's mission. It was developed, approved and will be delivered in full compliance with the policies and procedures established by the College.*