

Sul Ross State University

A Member of the Texas State University System

CSAT2315– Introduction to Game Programming – Fall, 2015

Instructor: Dr. Kennard Lavers

Office Location: ACR 107

Office Telephone: (432) 837-8500

Electronic Mail: Kennard.lavers@sulross.edu

Office hours:

M 8:30-9:00 & 1:30pm - 2:30pm

T 8:30-9:30 & 2:00pm - 2:30pm

W 8:30-9:00 & 1:30pm - 2:30pm

R 8:30-9:30 & 1:30pm - 2:30pm

F 8:30-9:00 & 1:30pm - 2:30pm

Program Learning Objective

1. Understand the fundamental concepts of computer science including algorithms and data structures.
2. Understand modern computer systems, databases and networking.
3. Display an understanding and ability to implement current programming methodologies.
4. Become proficient with systems design based on object-oriented programming.
5. Work as a team in workgroup environments.

Course Objectives

This course will introduce computer science students to the theory and practice of developing modern 2D and 3D games using the Unity game engine. Practical concerns will be balanced by discussion of relevant theory from the literature of computer science (graphics, software engineering, and multimedia), cognitive psychology, game-related mathematics, motion-based physics, Finite State Machines (FSM) and sprite/atlas management. Students will understand the full life cycle of developing a game for one of the mobile platforms like the Apple App Store or Google Play Store. Students will learn the basics of the C# programming language. Students

will also participate in individual and group projects to design, implement, and evaluate entry-level games. Students who take this class will:

(a) Develop basic user interface design skills, such as menus, inventory systems ...

(b) Develop an understanding and be able to implement basic examples of lighting, physics, 3D Modeling, animation, character controllers, rigging and skinning, camera/atmospheric effects, particle systems, and 3D world terrains.

(c) Understand the use of vector math to animate objects in 2 and 3 dimensions

(e) Understand Finite State Machines and be able to implement them for animations and simple AI systems, and UI game flow.

Schedule:

Week 1

Subject: Course Overview

Goal: Allow students to understand the full scope of this course and what the expectations are for successful completion of the class.

Learning Objective:

1. Students will be able to identify at least 5 different types of games
2. Students will be able to start a project in Unity
3. Students will be able to identify at least three industries that are making use of game engines to solve their software requirements.

Notes:

Week 2

Subject: Unity Overview

Goal: Allow students

Learning Objective:

1. Students will be able to identify the inspector, project, scene, hierarchy, and game views and know what each one is used for.
2. Students will be able to attach scripts to gameObjects and be able to access basic transform information from the script.

Notes:

Week 3

Subject: Programming Overview Part I

Goal: To ensure all students are able to program at a basic level needed to successfully complete project assignments in this course.

Learning Objective:

1. Students will know how to implement identifiers, work with basic input/output functions, for and while loops, and know how to construct the basic structure of a typical object oriented programming language.
2. Students will be able to perform basic Boolean math.

Notes:

Week 4

Subject: Programming Overview Part II

Goal: To ensure all students are able to program a basic user interface.

Learning Objective:

1. Students will know how to implement a graphic interface using Unity.
2. Student will be able to integrate buttons in an application
3. Students will be able to implement dynamic labels and input fields in their applications
4. Students will be able to implement Toggles
5. Students will be able to implement Scroll lists
6. Students will be able to import and use sprites in the interface
7. Students will understand how to use anchors in their interface

Notes:

This module will require a significant amount of self study if the student has not done any graphic programming before. Student will be provided links to additional tutorials to aid them.

Week 5

Subject: Object Oriented Programming

Goal: This module is designed to ensure students understand object oriented programming will enough to be able to effectively design the systems using UML which is based on object oriented development.

Learning Objective: Students will understand and be able to effectively implement:

1. Classes
2. Member Variables

3. Methods
4. Constructors
5. Protection levels
6. Static vs. Dynamic Classes and Types
7. Abstraction
8. Overriding methods
9. Interfaces

Notes: The goal for this module should be met by taking the object oriented programming class but this should serve as a nice refresher if the student is rusty in this area.

Week 6

Subject: Graphics

Goal: This module will introduce the students to graphics programming

Learning Objective:

1. Understand the role 2D graphics play in a game and how to import textures to Unity projects
2. Understand the role 3D graphics play in a game and how textures relate to 3D meshes

Notes:

Week 7

Subject: Vector Math Refresher

Goal: This module will introduce students to vector math

Learning Objective:

1. Know how to use a 2 and 3D coordinate system
2. Gain a familiarity with vectors and how they play a role in Unity

Notes:

Week 8

Subject: Graphic User Interfaces (GUI)

Goal: This module will introduce the students to developing all the standard user interface components

Learning Objective:

1. Know how to implement and use a sprite in unity
2. Know how to implement and use a canvas in unity
3. Know how to implement and use a panel in unity
4. Know how to implement and use a label in unity
5. Know how to implement and use a button in unity
6. Know how to implement and use a toggle switch in unity
7. Know how to implement and use an input field in unity
8. Know how to save toggles and input fields in PlayerPrefs

Notes:**Week 9****Subject:** Animation**Goal:** This module will introduce students to various types of animation and how to animate inside the Unity Game Engine.**Learning Objective:**

1. Know how to use machanim to animate using key-frames
2. Know how to add an imported MoCap animation to a standard rig.
3. Know how to translate, rotate, and scale using C# inside of Unity.

Notes:**Week 10****Subject:** Heads Up Displays (HUD)**Goal:** This module will introduce the students to developing HUDs that follow characters throughout a game.**Learning Objective:**

1. Know how to add a HUD and attach it to the camera
2. Know how to update game information in the HUD
3. Know how to accept mouse or touch input from the HUD to adjust items in the game scene

Notes:**Week 11**

Subject: Finite State Machines (FSM)

Goal: This module will introduce students to state machines and using a FSM in various components of a game.

Learning Objective:

1. Know how to design a state machine for a given problem.
2. Know how to implement a state machine in a game

Notes:

Week 12

Subject: Character Controllers

Goal: This module will introduce students to developing and using 2D and 3D Character controllers

Learning Objective:

1. Know how to implement and use Unity's built-in character controllers
2. Know how to implement from scratch a 2D character controller

Notes:

Week 13

Subject: Game Controllers

Goal: This module will introduce students to using a game controller for higher-level overall control of the game

Learning Objective:

1. Know how to use a FSM as a game controller
2. Understand when it is important to use a game controller
3. Know how to make the game controller persist between scenes

Notes:

Week 14

Subject: First Person Shooters

Goal: This module will introduce students to first person shooters and how to develop them in Unity

Learning Objective:

1. Understand how to control a character controller in a FPS
2. Understand how to implement the opposing Non Player Characters (NPCs)
3. Know how to implement projectiles

Notes:

Week 15

Subject: Navigation

Goal: This module will introduce student to Unity's Navigation system

Learning Objective:

1. Know how to build a map that an NPC can wonder around in, in Unity
2. Know how to implement the navigation agent to control an NPCs movements

Notes:

Textbook:

None required. This course will make extensive use of the Unity manual and online resources.

Teaching Methods

Assignments: Exercises will be periodically assigned to help support and supplement material found on the Unity Learning website. No make-ups are allowed, unless medical or extreme conditions are considered. Tests, assignments and final exam will be delivered through Blackboard with a date and time limit. No make-ups are allowed, unless medical or extreme conditions are considered.

Grading

Letter grades will be determined using a standard percentage point evaluation as outlined below.

A 90 - 100 points

B 80 - 89 points

C 70 – 79 points D 60 – 69 points

F Below 60 points The final grade will be computed on the following weights:

Tests:

Exam ==> 15%

Project 1 ==> 15%

Project 2 ==> 15%

Project 3 ==> 15%

Final ==> 20%

Assignments (individual/group) ==>15%

Participation ==> 5%

Attendance

Any student who accumulates 10 **unexcused** absences (MWF Classes) or 7 **unexcused** absences (MW classes) will be automatically dropped from this course.

Course Policies

Exams, quizzes and assignments: NO MAKE-UPS ARE ALLOWED, unless medical or extreme conditions are present.

Academic dishonesty

You are expected to do your own work on all assignments, exams, quizzes, and projects. Any dishonest work will be penalized with a grade of zero.

Need for assistance

Qualified students with disabilities needing academic or other accommodations to ensure full participation in the programs, services and activities at Sul Ross State University should contact the Disabilities Services Coordinator, in Counseling and Prevention Services, Ferguson Hall 112, Box C-117,Alpine, Texas 79832.

Posting of Grades

As soon as assignments, tests and final exam are graded, the grades will be posted in Blackboard.