CAPSTONE PROJECT

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1.A: OVERVIEW

Purpose

The purpose of the *Capstone Project* is to gain experience in taking an original game through the entire process: from concept to completion. Each learner will work on their *Capstone Project* through-out the year, culminating in a complete game design for their graduation portfolio. During the first week of class, learners should begin generating core ideas for games. Don't stress them, however! These do not need to be fully developed ideas, just "seeds" for their imagination. Later, each learner will choose one of these ideas as the basis for their *Capstone Project*. As the course progresses through the units of study, learners will begin to create the elements that will grow into their *Capstone Project*.

Learners should keep the following Big Three Questions in the front of your mind:

What do they want to accomplish with this game?

What do you need to accomplish to complete the *Capstone Project*?

When do they have to submit the completed project?

Learners may work in 1, 2, or 3 person teams to create their game. If they choose to work in a team, their project should be graded as a team. At the end of the year, the instructor should ask each learner how much each team member contributed, including themselves. Lack of participation will result in a lower grade for that team member. Great teams have great contributors, each contributing equally.

Learners should think carefully about their team members: Will it be possible for their team to meet on a regular basis? What skills do the different individuals bring to the team? (e.g. art, design, programming, testing, project management)

Learners should be encouraged to form a heterogeneous team made up of individuals with varying types of skills.

And lastly, there is one very important concept to covey:

An organized project = a happy game developer!
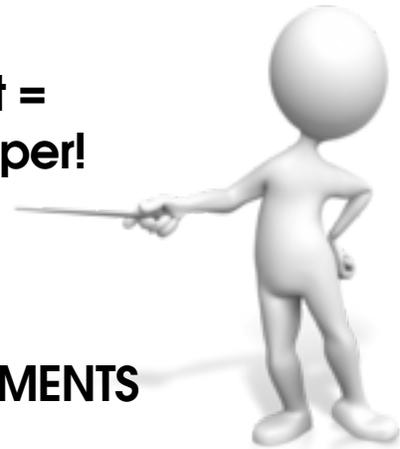
1.B: SUBMISSION REQUIREMENTS

Requirements for submission of the *Capstone Project* include:

- An instructor approved *Capstone Project* proposal.
- An intructor approved Milestone Sign-Off Form.
- An original interactive application or video game.
- Game must include story and characters.
- An opening screen that states the title and explains the rules and instructions for playing.
- Graphics in support of the story and the gameplay.
- Player progress tracking throughout the game (e.g. player score, health meter, time limit).
- Challenging, but not impossible gameplay.
- Level of difficulty increases as the game progresses (e.g. multiple levels, objects to collect, more enemies, challenge of enemies).
- Multiple, original pieces of artwork (e.g. images or drawings).
- Multiple, original sounds created by the learner; at least one music clip and one player activated sound.
- Three game levels.
- More than one kind of movement property.
- A separate win screen and lose screen (not just a message).

1.C: Milestones

Project Phases & Primary Deliverables

Listed below are the three project phases and their primary deliverables:

1 Project initiation: Creating the idea.
  ⇨ Primary Deliverable: *Game Pitch Proposal*

2 Pre-Production: Refinement of the game concept.
  ⇨ Primary Deliverable: *Game Design Document (GDD)* that includes:
  - Story creation
  - Character design and development
  - Game object design and development
  - Level design and layout
  - Rule development
  - User interface design
  - Sound design

3 Production.
  ⇨ Primary Deliverable: Game prototype (i.e. a working version of the game). The game may not have all the bells and whistles, but a user can play from start to finish.

Milestone Sign-Off Form

Utilize the form below to receive instructor sign-off on the milestones for your Capstone Project:

Milestones For Capstone Project	Suggested Unit Association	Sign-Off
Game Proposal Draft Outline	Unit 3	
Initial Project Charter	Unit 3	
Storyboard Draft	Unit 4	
Character/Lead Object development	Unit 4	
Work Breakdown Structure	Unit 4	
Final Project Proposal	Unit 5	
Game Design Matrix draft	Unit 6	
Unity Game Demo (draft)	Unit 8	
Capstone Versioning Record	Unit 8	
Level Design Draft (3 levels descriptive and sketched)	Unit 9	
Unity demonstration of levels (at least 2)	Unit 9	
Atmosphere description and mood board	Unit 10	
Project Control Plan Progress	Unit 10	
Sound Plan Draft	Unit 11	
User Interface draft (sketches)	Unit 12	
Test Plan draft	Unit 13	
Final Game Design Document, Working copy of your game, all project management documentation	Unit14	
15 minute Presentation	Unit 14	

1.D: FINAL DELIVERABLES

1 A *Game Pitch Proposal*: This is a 9+ page document that is a learner's statement of work, against which their *Capstone Project* will be graded.

2 A well-defined *Game Design Document (GDD)*: This will be a 15+ page document that each learner will complete for their game. Learners are expected to work on this document throughout the course as the instructor teaches different aspects of game development.

3 A set of printouts depicting models and levels; sufficient to show that the game design is functional. These documents should be included in the *Game Design Document (GDD)*.

1.E: DEPENDENCIES

This is where learners should note which of the milestones require the completion of other milestones in order to be successful. For example: developers need to know their storyline before designing their levels. Think about what game developers need to know and have accomplished in order to achieve each milestone.

1.F: TASK BREAKDOWNS

The *Task Breakdown* should include all tasks that a game team (i.e. group) can foresee in the creation of their game. Each task should have a detailed description of the task to be accomplished. Items that are likely to be listed include:

- Creating artwork
- Creating or finding the soundtrack
- Preliminary level design
- Writing code
- Regular group meetings (if working in a team)

- Submitting the functional prototype of a game
- Writing the progress report for a game
- Play-testing of a game
- Tuning the play of a game
- Writing the final documentation for a game

Examples of tasks with descriptions include:

- Create sprites/avatars: Use Google SketchUp to create the artwork for the game sprites, including the giant cockroaches and mutant mice.
- Create sound effects for battle scenes with giant cockroaches.

1.G: TIMELINE

Learners develop and manage their timeline by referencing the Milestones, the *Task Breakdowns*, and the units of study. Learners should pace themselves carefully. If they finish their work deliverables on an ongoing basis, they should be able to submit a complete *Capstone Project*. Be sure learners leave time in their schedule to resolve issues that surface during the development process.

1.H: STANDARDS ALIGNMENT GUIDE

The *Capstone Project* should align to the following standards initiatives:

1.H.1: NEXT GENERATION SCIENCE STANDARDS (NGSS)

⇨ HS-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

⇨ HS-ETS1-1: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

⇨ HS-ETS1-1: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

⇨ HS-ETS1-1: Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

1.I: ASSESSMENT RUBRICS

Assessment rubrics are provided for the following components of the Capstone Project:

1.I.1: Game Pitch Proposal

1.I.2: Game Requirements and Content

1.I.3: Game Design

1.I.4: Final Game Product Submission

1.1.1: Game Pitch Proposal – Assessment Rubric

	Distinguished	Proficient	Unsatisfactory
Executive Summary	Includes Game Name, Basic Idea, Audience, Target Market, Character, GamePlay and World Design, Team Members	Includes all the topics but some are incomplete.	Does not include all the required topics.
Sketches Drawings are critically important	Includes excellent primary sketches of level layouts, characters,menus, and world objects.	Includes sketches of level layouts and characters	Is missing either the level sketchesor character sketches or both.
Detailed game components	Includes thorough descriptions for The quest Main Characters Opponents Environment Menus Controls Sounds	Contains description of all the required items but with insufficient detail for some.	Missing more than of the required description categories and/or insufficient detail for 3 or more of the descriptions if provided.
Summary	Includes strong sales pitch that would entice all audiences to play the game.	Good sales pitch. Would entice the games target audience.	Basic description of game.

1.1.2: Game Requirements and Content – Assessment Rubric

	Distinguished	Proficient	Unsatisfactory
Creativity, Originality	Game is creative and original, and shows time spent.	Game shows evidence of creativity and originality.	Game is a copycat of some popular game.
Naming Conventions	Game items are named with prefixes and name reflects content. Prefixes include spr, snd, back, scr, font, obj, and room	Most game items are named correctly.	Game names are not specific or do not use prefixes.
Game Info Screen	Includes game name, your name, how to play, rules, scoring	Missing 1 item.	Missing 2 or more items.
Multimedia	Includes background image, background music and sound effects.	Missing 1 item.	Missing 2 or more items.

1.1.3: Game Design – Assessment Rubric

	Distinguished	Proficient	Unsatisfactory
Game Design	Overall game design is excellent with game world, characters and interactions.	Game design is good.	Game design is average.
Character Design	Characters are appropriate to game, and are high quality, and move correctly.	Characters may not be in scale to each other, medium quality sprites.	Stickmen characters or low quality sprites.
Game Play Interface	Game play interface is intuitive and easy to understand.	May need to read info screen to understand how to play the game.	Game play interface does not follow standard conventions.
Game Play	Characters interact correctly with world. Interactions and collisions work correctly and as expected with all game objects.	Characters work correctly except for the occasional glitch.	Characters don't work correctly either within the world, or with other game objects. Multiple problems with play.
Scoring	There is an obvious way to progress from level to level. It may be lives, points or achieving some level objective such as reaching the exit.	There is a way to progress from level to level, but it is not obvious by playing the game. You should understand by reading the Info screen.	There is no way to progress from level to level, or there is only one level.
Level Design	There are at least 3 different levels and they progress in difficulty but are still winnable.	There are at least 3 different levels but a player has difficulty winning a level.	There are only 1 or 2 levels in the game.

1.1.4: Final Game Product Submission – Assessment Rubric

Game Feature	Unsatisfactory	Basic	Proficient	Distinguished
Levels Students must create 3 levels for their application or game, complete with background, obstacles, collision artifacts, sound, etc. The 3 level requirement does not include start or splash screens, level summaries or over/end of game screen.	Game includes less than 3 levels. Rooms also do not include sound, collisions, obstacles, artifacts. Game does not include a start screen or an end screen	Game includes less than 3 levels, a start and end screen, however they do not include collisions, artifacts, obstacles or sounds.	Game includes 3 or more levels that include sounds, artifacts, obstacles and collisions. Game includes start and end screens.	Game includes 3 or more levels, a start and end screen. Levels include complex sounds, artifacts, obstacles, graphics and multiple collisions. Levels show progressively increasing complexity and/or difficulty.
Background Artwork The backgrounds must be completely created by the individual designer. The backgrounds cannot come from the web, a code pack or resource file. The backgrounds must be your own work designed in Photoshop, Illustrator, or Paint.	Game includes no author created backgrounds.	Game includes 1 author created background or 2 modified backgrounds from a code pack, game pack or from the web.	Game includes 3 basic backgrounds created by the author in Illustrator, Photoshop or Paint. Backgrounds are saved as an individual files separate from the project file.	Game includes 3 or more complex author created backgrounds. Backgrounds are saved as an individual file separate from the project file.
Start Screen The Start Screen must be completely created by the individual designer. The start screen cannot come from the web, a code pack or resource file. The start screen must be original work.	No start screen was created.	A basic start screen was created however buttons do not work or were not included in the start screen	Start screen includes functioning buttons such as INFO, Start Game, etc. Buttons take players out to additional screens	Start screen includes functioning buttons taking players to additional screens. In addition, complex info, start and end screens have been designed. Start screens includes animation.
Info Screen All games must contain a designer created info screen which describes the rules of the game and any game play moves (key presses, mouse clicks) unique to the game. This must be accessible from the game start screen.	No Info screen was created.	A basic info screen was created, however instructions did not help the player with questions about the game.	A basic info screen was created however, the instructions for the player were poorly written, and did not help the player understand how to play the game	A complex info screen was created, helping the player understand game play.

1.1.4: Final Game Product Submission – Assessment Rubric   **Game Required Elements**
Programming

	Unsatisfactory	Basic	Proficient	Distinguished
Collision Event Game has 1 or more collision events programmed on an object.	No collision event	Collision event programmed incorrectly	Collision event programmed correctly	Multiple collision events or triggers for other actions. Additional scripting to create a collision. Step or variable controlled collision event.
Jump/Gravity Event A jump or gravity event applied to a game object.	No Jump/Gravity Event	Jump/Gravity event programmed incorrectly	Jump/Gravity event programmed correctly	Multiple jump/gravity events or triggers for additional actions. Additional scripting added to create or control jump/gravity event. Step or variable controlled jump/gravity event
Key Press Event Event controlled by key press or keyboard command.	No Key Press or keyboard events	Key Press or keyboard event programmed incorrectly	Key Press or keyboard event programmed correctly.	Multiple Key Press or keyboard events or triggers for additional actions. Additional scripting added to create or control Key Press/Keyboard event.
Scoring/Health Event Health or Scoring occurs in the game.	No Health or Scoring event	Health or Scoring event programmed incorrectly	Health or Scoring event programmed correctly	Complex Health or Scoring events or triggers for additional actions. Additional scripting added to create or control Health/Scoring event.

1.1.4: Final Game Product Submission – Assessment Rubric   **Game Required Elements**
Game Play

	Unsatisfactory	Basic	Proficient	Distinguished
Game Play Game play takes into account how the game plays, if the rules are followed in the game play by the designer and how well the game plays out for a new player. Do problems with the code prevent the game play from proceeding, scoring, etc. How satisfied are new players with the game.	Game does not play well. Error Codes prevent game from opening.	Game has programming problems preventing smooth play	Game meets basic requirements for play. No code errors.	Game has good play, good action. No code errors. Consistent play throughout game.

1.1.4: Final Game Product Submission – Assessment Rubric

Game Required Elements
Game Craftsmanship

	Unsatisfactory	Basic	Proficient	Distinguished
Game Craftsmanship Game Craftsmanship looks at the game holistically; graphics, sprites, rooms and backgrounds, how well they work together and how they create the game play experience.	Game is poorly crafted. Game play is unexciting. Game has no educational value	Game has some interesting elements. Game play is slow and players soon lose interest in the game. Game has a basic educational value	Game has interesting and challenging elements. Game play is fun and players enjoy the game. Game has incorporated learning into game play.	Game has many interesting and challenging elements. Game play is exciting and players want to keep playing. The game has incorporated learning into game play and the outcome of the game is focused on education.

1.1.4: Final Game Product Submission – Assessment Rubric

Game Required Elements
Work Ethic and Presentation

	Unsatisfactory	Basic	Proficient	Distinguished
Work Ethic	Student rarely used class time to work on project. Student was continuously redirected to return to work on project. Student rarely brought materials they needed to class to complete project.	Student occasionally used class time to work on project. Student needed numerous prompts to return to work. Student was disorganized, did not bring files or flash drive on numerous days to complete project.	Student was organized, brought files to class and worked steadily and consistently on project. Student did not need prompting to remain on task.	Student was well organized and well prepared to work on project every class period. Student used class time to enhance their project and kept improving the project up to the deadline. Student was on task without prompting.
Presentation	Student did not present project to the class.	Student presented project, however, student was unprepared and did not guide the audience through the high points of the game. Student did not actively listen to other students as the presented. Student did not offer comments or offered inappropriate comments on other student's games.	Student developed an interesting presentation for their game. Student actively listened to other presentations. Student added appropriate comments on other student's games.	Student developed an interesting and compelling presentation. Student actively listened to other presentations Student added appropriate and substantive comments on other student's games.