


Course Outline	
COMP7139 Game Programming (4)	
Effective Date 01 September 2017	Study Program Computer Science Revision 1

1. Course Description

This course provides an introduction about programming games in Unity. The students will learn about fundamental component system underlying in Unity such as write and execute basic scripts, create the assets, developing graphics in 2D and 3D games, adding interactive devices and items within the game, and building the final app also deploy to other platform. The Game Design Course is the prerequisite for this course.

2. Graduate Competency

Each course in the study program contributes to the graduate competencies that are divided into employability and entrepreneurial skills and study program specific outcomes, in which students need to have demonstrated by the time they complete their course.

BINUS University employability and entrepreneurial skills consist of planning and organizing, problem solving and decision making, self management, team work, communication, and initiative and enterprise.

2.1. Employability and Entrepreneurial Skills

Aspect	Key Behaviour

2.2. Study Program Specific Outcomes

Study Program Specific Outcomes
Able to construct a solution by applying current technologies
Able to classify criteria and specifications appropriate to specific problems, plan strategies for their solution and construct software system development

3. Topics

- Introduction to Unity Programming
- 3D space
- Sound Effects and Music
- Graphics
- Design 2D GUI in a 3D Game
- Third Person 3D Game
- Memory Game
- Interactive Devices and items
- Workshop
- Enemies and Projectiles to the 3D Game
- Connect Game to the Internet
- Creative and Expressive Play
- Deploy to players' device
- Game Play
- Game Prototype

4. Learning Outcomes

On successful completion of this course, student will be able to:

- LO 1: Explain game development in Unity Programming
- LO 2: Apply techniques in 2D and 3D game programming
- LO 3: Design User Interface for Game Development
- LO 4: Deploy game application using Unity

5. Teaching And Learning Strategies

In this course, the lecturers might deploy several teaching learning strategies, including Demonstration, Project Work, Group Presentation, Lecture, and Individual Exercises.

6. Textbooks and Other Resources

6.1 Textbooks

1. Joseph Hocking. (2015). ***Unity in action : multiplatform game development in C#***. 01. Manning. Shelter Island. ISBN: 9781617292323.

The book in the first list is a must to have for each student.

6.2 Other Resources

1. Why You Need Game Engine
2. <http://lmscontent.binus.ac.id/digitalcontent/periode%201710/DC%20COMP7139%20-%20Cara%20Membuat%20Trees%20di%20Unity3D.zip>
3. [http://lmscontent.binus.ac.id/digitalcontent/periode 1710/DC COMP7139 - Game Programming_Cara Membuat Terrain di Unity3D.zip](http://lmscontent.binus.ac.id/digitalcontent/periode%201710/DC%20COMP7139%20-%20Cara%20Membuat%20Terrain%20di%20Unity3D.zip)
4. <http://unity3d.com/learn/tutorials/topics/scripting/interfaces>
5. <http://unity3d.com/learn/resources/finding-fun-prototyping>
6. <http://www.oecd.org/edu/ceri/39414829.pdf>
7. <http://www.raywenderlich.com/86040/creating-cross-platform-multiplayer-game-unity-part-1>
8. <http://www.raywenderlich.com/88078/creating-cross-platform-multiplayer-game-unity-part-3>
9. <http://www.raywenderlich.com/87042/creating-cross-platform-multi-player-game-unity-part-2>
10. <http://gamedevelopment.tutsplus.com/tutorials/how-to-save-and-load-your-players-progress-in-unity--cms-20934>
11. <http://unity3d.com/learn/tutorials/modules/intermediate/scripting/coding-practices>
12. <http://docs.unity3d.com/ScriptReference/WWW.html>
13. <http://docs.unity3d.com/Manual/UNetInternetServicesOverview.html>
14. <http://docs.unity3d.com/Manual/Example-CreatingaBillboardPlane.html>
15. <http://unity3d.com/learn/tutorials/projects/survival-shooter/more-enemies>
16. <http://addcomponent.com/lesson-4-shooting-stuff-with-unity-3d-raycasting/>
17. <http://www.gamedev.net/articles/game-design/game-design-and-theory/character-development-in-video-games-r3624>
18. <http://unity3d.com/learn/tutorials/projects/2d-roguelike-tutorial/writing-game-manager>
19. <http://unity3d.com/learn/tutorials/modules/beginner/live-training-archive/scriptable-objects>
20. <http://github.com/TogetherGames/Public-Unity-CSharp/wiki/Creating-a-Simple-Memory-Game-%5BTutorial%5D>
21. <http://unity3d.com/learn/tutorials/topics/2d-game-creation>
22. <http://gamedevacademy.org/unity-3d-first-and-third-person-view-tutorial/>
23. <http://unity3d.com/learn/tutorials/projects/stealth-tutorial-4x-only/player-animator-controller>
24. http://www.gamasutra.com/view/feature/131774/toward_programmer_interactivity_.php
25. <http://unity3d.com/learn/tutorials/modules/beginner/live-training-archive/creating-a-scene-menu>
26. <http://www.indiedb.com/tutorials/how-to-generate-sky-visuals-in-unity-5>
27. <http://docs.unity3d.com/Manual/class-TextureImporter.html>
28. <http://docs.unity3d.com/ScriptReference/AudioSource.Play.html>
29. <http://answers.unity3d.com/questions/781870/understanding-unitys-coordinate-system.html>
30. <http://www.informit.com/articles/article.aspx?p=2031153>
31. <http://unity3d.com/learn/tutorials/topics/scripting/coding-unity-absolute-beginner>

7. Schedule

Theory

Session/ Mode	Related LO	Topics	References
1 F2F	LO 1	Introduction to Unity Programming - Why is Unity - Use Unity - Code in Unity Programming	- Introduction to Unity Programming - Unity in action : multiplatform game development in C#, Chapter 1 - Why You Need Game Engine - Coding in Unity for the Absolute Beginner, http://unity3d.com/learn/tutorials/topics/scripting/coding-unity-absolute-beginner - Why You Should Be Using the Unity Game Engine, http://www.informit.com/articles/article.aspx?p=2031153
2 F2F	LO 1	3D space - Understanding 3D Coordinator space - Place object in the scene - Writing code - MouseLook - Keyboard input component : first-person controls	- 3D Space - Unity in action : multiplatform game development in C#, Chapter 2 - Unity - Game Development (3d Space - Trees), http://lmscontent.binus.ac.id/digitalcontent/periode%201710/DC%20COMP7139%20-%20Cara%20Membuat%20Trees%20di%20Unity3D.zip - Unity - Game Development (3d Space - Graphic & Terrain), http://lmscontent.binus.ac.id/digitalcontent/periode1710/DC COMP7139 - Game Programming_Cara Membuat Terrain di Unity3D.zip - Understanding Unity's coordinate system, http://answers.unity3d.com/questions/781870/understanding-unitys-coordinate-system.html
3 F2F	LO 3	Sound Effects and Music - Importing sound effects - Playing sound effects - Audio control interface - Background music	- Sound Effects and Music - Unity in action : multiplatform game development in C#, Chapter 10 - AudioSource.Play, http://docs.unity3d.com/ScriptReference/AudioSource.Play.html - Interface, http://unity3d.com/learn/tutorials/topics/scripting/interfaces
4 F2F	LO 3	Sound Effects and Music - Importing sound effects	- Sound Effects and Music - Unity in action : multiplatform

		<ul style="list-style-type: none"> - Playing sound effects - Audio control interface - Background music 	game development in C#, Chapter 10 - AudioSource.Play, http://docs.unity3d.com/ScriptReference/AudioSource.Play.html - Interface, http://unity3d.com/learn/tutorials/topics/scripting/interfaces
5 F2F	LO 2 LO 3	Graphics - Understanding art assets - Building basic 3D Scenery - Texture the scene with 2D Images - Generating Sky visuals - The Custom 3D Models - Effects using Particle Systems	- Graphics - Unity in action : multiplatform game development in C#, Chapter 4 - How to Generate Sky Visuals in Unity 5, http://www.indiedb.com/tutorials/how-to-generate-sky-visuals-in-unity-5 - 2D Textures, http://docs.unity3d.com/Manual/class-TextureImporter.html
6 F2F	LO 2 LO 3	Graphics - Understanding art assets - Building basic 3D Scenery - Texture the scene with 2D Images - Generating Sky visuals - The Custom 3D Models - Effects using Particle Systems	- Graphics - Unity in action : multiplatform game development in C#, Chapter 4 - How to Generate Sky Visuals in Unity 5, http://www.indiedb.com/tutorials/how-to-generate-sky-visuals-in-unity-5 - 2D Textures, http://docs.unity3d.com/Manual/class-TextureImporter.html
7 F2F	LO 2 LO 3	Design 2D GUI in a 3D Game - Setting up GUI Display - Programming interactivity - Integrating event system	- Design 2D GUI in a 3D Game - Unity in action : multiplatform game development in C#, Chapter 6 - Toward Programmer Interactivity: Writing Games In Modern Programming Languages, http://www.gamasutra.com/view/feature/131774/toward_programmer_interactivity_.php - Creating a scene selection menu, http://unity3d.com/learn/tutorials/modules/beginner/live-training-archive/creating-a-scene-menu
8 F2F	LO 2 LO 3	Design 2D GUI in a 3D Game - Setting up GUI Display - Programming interactivity - Integrating event system	- Design 2D GUI in a 3D Game - Unity in action : multiplatform game development in C#, Chapter 6 - Toward Programmer Interactivity: Writing Games

			<p>In Modern Programming Languages, http://www.gamasutra.com/view/feature/131774/toward_programmer_interactivity_.php - Creating a scene selection menu, http://unity3d.com/learn/tutorials/modules/beginner/live-training-archive/creating-a-scene-menu</p>
9 F2F	LO 2 LO 4	<p>Third Person 3D Game - Adjust Camera View - Programming Camera-relative movement controls - Jump action - Animation on player</p>	<ul style="list-style-type: none"> - Third Person 3D Game - Unity in action : multiplatform game development in C#, Chapter 7 - Unity 3D First and Third Person View Tutorial, http://gamedevacademy.org/unity-3d-first-and-third-person-view-tutorial/ - Player Animator Controller, http://unity3d.com/learn/tutorials/projects/stealth-tutorial-4x-only/player-animator-controller
10 F2F	LO 2 LO 4	<p>Third Person 3D Game - Adjust Camera View - Programming Camera-relative movement controls - Jump action - Animation on player</p>	<ul style="list-style-type: none"> - Third Person 3D Game - Unity in action : multiplatform game development in C#, Chapter 7 - Unity 3D First and Third Person View Tutorial, http://gamedevacademy.org/unity-3d-first-and-third-person-view-tutorial/ - Player Animator Controller, http://unity3d.com/learn/tutorials/projects/stealth-tutorial-4x-only/player-animator-controller
11 F2F	LO 2 LO 4	<p>Memory Game - Setting for 2D graphics - Build a card object - Displaying the various card images - Making and scoring matches</p>	<ul style="list-style-type: none"> - Memory Game - Unity in action : multiplatform game development in C#, Chapter 5 - Creating a Simple Memory Game [Tutorial], http://github.com/TogetherGames/Public-Unity-CSharp/wiki/Creating-a-Simple-Memory-Game-%5BTutorial%5D - 2D Game Creation, http://unity3d.com/learn/tutorials/topics/2d-game-creation
12 F2F	LO 2 LO 4	<p>Memory Game - Setting for 2D graphics - Build a card object - Displaying the various card images - Making and scoring matches</p>	<ul style="list-style-type: none"> - Memory Game - Unity in action : multiplatform game development in C#, Chapter 5 - Creating a Simple Memory Game [Tutorial], http://github.com/TogetherG

			<p>ames/Public-Unity-CSharp/wiki/Creating-a-Simple-Memory-Game-%5BTutorial%5D</p> <ul style="list-style-type: none"> - 2D Game Creation, http://unity3d.com/learn/tutorials/topics/2d-game-creation
13 F2F	LO 3	<p>Interactive Devices and items</p> <ul style="list-style-type: none"> - Creating doors and other devices - Interacting with objects - Managing inventory data and game state - Inventory UI for using and equipping items 	<ul style="list-style-type: none"> - Interactive Devices and Items - Unity in action : multiplatform game development in C#, Chapter 8 - Introduction to Scriptable Objects, http://unity3d.com/learn/tutorials/modules/beginner/live-training-archive/scriptable-objects - Writing the Game Manager, http://unity3d.com/learn/tutorials/projects/2d-roguelike-tutorial/writing-game-manager
14 F2F	LO 1 LO 2 LO 3 LO 4	<p>Workshop</p> <ul style="list-style-type: none"> - Create Game Design using GDD - Character Development 	<ul style="list-style-type: none"> - Workshop - Unity in action : multiplatform game development in C#, Chapter 1- 8 - Character development, http://www.gamedev.net/articles/game-design/game-design-and-theory/character-development-in-video-games-r3624
15 F2F	LO 2 LO 4	<p>Enemies and Projectiles to the 3D Game</p> <ul style="list-style-type: none"> - Shooting via raycasts - Scripting reactive targets - Basic AI - Spawning Enemy prefabs - Shooting via instantiating objects 	<ul style="list-style-type: none"> - Enemies and Projectiles to the 3D Game - Unity in action : multiplatform game development in C#, Chapter 3 - Lesson 4: Shooting with Unity 3d raycasting, http://addcomponent.com/lesson-4-shooting-stuff-with-unity-3d-raycasting/ - Spawning Enemies, http://unity3d.com/learn/tutorials/projects/survival-shooter/more-enemies
16 F2F	LO 2 LO 4	<p>Enemies and Projectiles to the 3D Game</p> <ul style="list-style-type: none"> - Shooting via raycasts - Scripting reactive targets - Basic AI - Spawning Enemy prefabs - Shooting via instantiating objects 	<ul style="list-style-type: none"> - Enemies and Projectiles to the 3D Game - Unity in action : multiplatform game development in C#, Chapter 3 - Lesson 4: Shooting with Unity 3d raycasting, http://addcomponent.com/lesson-4-shooting-stuff-with-unity-3d-raycasting/ - Spawning Enemies, http://unity3d.com/learn/tutorials/projects/survival-

			shooter/more-enemies
17 F2F	LO 4	Connect Game to the Internet - Creating an outdoor scene - Download data from an internet service - Adding a networked billboard - Posting data to a web server	- Connect Game to the Internet - Unity in action : multiplatform game development in C#, Chapter 9 - Simple access to web pages, http://docs.unity3d.com/ScriptReference/WWW.html - Internet Services, http://docs.unity3d.com/Manual/UNetInternetServicesOverview.html - Example - Creating a Billboard Plane, http://docs.unity3d.com/Manual/Example-CreatingaBillboardPlane.html
18 F2F	LO 4	Connect Game to the Internet - Creating an outdoor scene - Download data from an internet service - Adding a networked billboard - Posting data to a web server	- Connect Game to the Internet - Unity in action : multiplatform game development in C#, Chapter 9 - Simple access to web pages, http://docs.unity3d.com/ScriptReference/WWW.html - Internet Services, http://docs.unity3d.com/Manual/UNetInternetServicesOverview.html - Example - Creating a Billboard Plane, http://docs.unity3d.com/Manual/Example-CreatingaBillboardPlane.html
19 F2F	LO 2 LO 3 LO 4	Creative and Expressive Play - Assembling assets and code from multiple projects - Programming point-and-click controls - Replacing the old GUI with a new interface - Developing the overarching game structure - Handling the player's progression	- Creative and Expressive Play - Unity in action : multiplatform game development in C#, Chapter 11 - Good Coding Practices in Unity, http://unity3d.com/learn/tutorials/modules/intermediate/scripting/coding-practices - How to Save and Load Your Players' Progress in Unity, http://gamedevelopment.tutsplus.com/tutorials/how-to-save-and-load-your-players-progress-in-unity--cms-20934
20 F2F	LO 2 LO 3 LO 4	Creative and Expressive Play - Assembling assets and code from multiple projects - Programming point-and-click controls - Replacing the old GUI with a new interface - Developing the overarching game structure - Handling the player's progression	- Creative and Expressive Play - Unity in action : multiplatform game development in C#, Chapter 11 - Good Coding Practices in Unity, http://unity3d.com/learn/tutori

			<p>als/modules/intermediate/scripting/coding-practices</p> <ul style="list-style-type: none"> - How to Save and Load Your Players' Progress in Unity, http://gamedev.tutsplus.com/tutorials/how-to-save-and-load-your-players-progress-in-unity--cms-20934
21 F2F	LO 4	<p>Deploy to players' device</p> <ul style="list-style-type: none"> - Building for the desktop - Building for the web - Building for mobile apps 	<ul style="list-style-type: none"> - Deploy to player's device - Unity in action : multiplatform game development in C#, Chapter 12 - Creating a Cross-Platform Multi-Player Game in Unity — Part 3, http://www.raywenderlich.com/88078/creating-cross-platform-multiplayer-game-unity-part-3 - Creating a Cross-Platform Multiplayer Game in Unity — Part 1, http://www.raywenderlich.com/86040/creating-cross-platform-multiplayer-game-unity-part-1 - Creating a Cross-Platform Multi-Player Game in Unity — Part 2, http://www.raywenderlich.com/87042/creating-cross-platform-multi-player-game-unity-part-2
22 F2F	LO 4	<p>Deploy to players' device</p> <ul style="list-style-type: none"> - Building for the desktop - Building for the web - Building for mobile apps 	<ul style="list-style-type: none"> - Deploy to player's device - Unity in action : multiplatform game development in C#, Chapter 12 - Creating a Cross-Platform Multi-Player Game in Unity — Part 3, http://www.raywenderlich.com/88078/creating-cross-platform-multiplayer-game-unity-part-3 - Creating a Cross-Platform Multiplayer Game in Unity — Part 1, http://www.raywenderlich.com/86040/creating-cross-platform-multiplayer-game-unity-part-1 - Creating a Cross-Platform Multi-Player Game in Unity — Part 2, http://www.raywenderlich.com/87042/creating-cross-platform-multi-player-game-unity-part-2
23	LO 2	Game Play	<ul style="list-style-type: none"> - Game Play

F2F	LO 3 LO 4	- Review - Project Completion	- Unity in action : multiplatform game development in C#, Chapter 1 - 12 - Game Play and game Mechanic design : A key to quality in Videogames, http://www.oecd.org/edu/ceri/39414829.pdf
24 F2F	LO 2 LO 3 LO 4	Game Play - Review - Project Completion	- Game Play - Unity in action : multiplatform game development in C#, Chapter 1 - 12 - Game Play and game Mechanic design : A key to quality in Videogames, http://www.oecd.org/edu/ceri/39414829.pdf
25 F2F	LO 1 LO 2 LO 3 LO 4	Game Prototype - Presentation Project - Project Demo	- Game Prototype - Unity in action : multiplatform game development in C#, Chapter 1 - 12 - Finding the Fun in Prototyping, http://unity3d.com/learn/resources/finding-fun-prototyping
26 F2F	LO 1 LO 2 LO 3 LO 4	Game Prototype - Presentation Project - Project Demo	- Game Prototype - Unity in action : multiplatform game development in C#, Chapter 1 - 12 - Finding the Fun in Prototyping, http://unity3d.com/learn/resources/finding-fun-prototyping

8. Evaluation

Theory

Assessment Activity	Weight	Learning Outcomes			
		1	2	3	4
Assignment	40%	√	√	√	√
Final Exam	60%	√	√	√	√

Practicum





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Final Evaluation Score

Aspects	Weight
Theory	100%
Practicum	0%

9. A. Assessment Rubric (Study Program Specific Outcomes)

LO	Indicators	Proficiency Level			
		Excellent (85 – 100)	Good (75 – 84)	Average (65 – 74)	Poor (<= 64)
LO 1	1.1. Ability to explain the concept of the Unity Programming	Concepts are relevant and clearly stated	Concepts are competent	Concepts are incompetent	Concepts are inadequate
	1.2. Ability to explain the game development process	Concepts and process are relevant and clearly stated	Concepts and process Concepts and process	Concepts and process are incompetent	Concepts and process are inadequate
LO 2	2.1. Ability to use 2D techniques in Unity	The usage of 2D techniques is more than 80% correctly and effectively to solve problem	The usage of 2D techniques is more than 70% correctly to solve problem	The usage of 2D techniques is more than 50% correctly to solve problem	Only 30% the usage of 2D Techniques is correct to solve problem
	2.2. Ability to use 3D techniques in Unity	The usage of 3D techniques is more than 80% correctly and effectively to solve problem	The usage of 3D techniques is more than 70% correctly to solve problem	The usage of 3D techniques is more than 50% correctly to solve problem	Only 30% the usage of 3D Techniques is correct to solve problem
LO 3	3.1. Ability to design an appropriate user interface in game	The user interface in game is relevant	The user interface in game is competent	The user interface in game is incompetent	The user interface in game is inadequate
	3.2. Ability to adding interactive devices and items within the game	The interactive devices and items within the game is relevant	The interactive devices and items within the game is competent	The interactive devices and items within the game is incompetent	The interactive devices and items within the game is inadequate
LO 4	4.1. Ability to deploy game application using Unity	More than 80% game application can be deploy using Unity correctly and effectively	More than 70% game application can be deploy using Unity correctly but not effectively	More than 50% game application can be deploy using Unity	Only 30% game application can be deploy using Unity
	4.2. Ability to deploy game application in multiplatform	More than 80% game application can be deploy in multiplatform using Unity correctly and effectively	More than 70% game application can be deploy in multiplatform using Unity correctly but not effectively	More than 50% game application can be deploy in multiplatform using Unity	Only 30% game application can be deploy in multiplatform using Unity

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