GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering
Level: UG
Branch: Computer Engineering
Course / Subject Code : 3164904
CC Course / Subject Name : Game Design and Development

w. e. f. Academic Year:	2024-2025
Semester:	6th
Category of the Course:	Professional Elective Course

Prerequisite:	NA
Rationale:	Creating and developing interactive experiences, usually in the form of games, is what it means to be a game designer. This course is designed to introduce students to the elements and structure of game design and development. The areas of major emphasis in the course are game methodology, programming, game genres, game theory and 2D interactive experiences, and immersive environments..

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level*
01	Describe Game Essentials, Types of Games and Stages of Design process.	U
02	Comprehend how a concept turns into a game, and game world.	U
03	Illustrate the game development interface.	C
04	Apply the research in designing.	A
05	Get acquainted with UI/UX tools	A, E

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

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Course Content:

Sr. No.	Course Content	No. of Hours	% of Weightage
1	**Unit – 1: Introduction to Game** History of game, Video Games and Development, Conventional Games Versus Video Games, Games for Entertainment, Key Components of Video Games, The Structure of a Video Game, Stages of the Design Process, Game Design Team Roles, Game Design Documents, The Anatomy of a Game Designer, Programming Languages, Game Engines, Freeware and Commercial Game Engines 1.3 Introduction to Game designing tools cratch, Love 2d, Unity.	9	20%
2	**Unit – 2: Game Design Pipeline** The Major Genres: What Is a Genre? , Classic Game Genres, Understanding Your Player : Domains of Play, Demographic Categories, Gamer Dedication , Understanding Your Machine - The platforms where to publish the game: Home Game Consoles , Personal Computers , Portable Devices, Other Devices Game Concepts - Define the story : Getting an Idea, From Idea to Game Concept, Storyboards, Level Design : Key Design Principles, Layouts, The Level Design Process, Pitfalls of Level Design Gameplay mechanics - Making Games Fun, The Hierarchy of Challenges, Skill, Stress, and Absolute Difficulty, Commonly Used Challenges- Costs of the game , Making and maintenance, Create a game design document.	12	25%
3	**Unit 3 - Introduction to Unity Game Engine** Basics of Unity and it's installation The benefits and Advantages of using Unity Introduction to Tools & navigation, asset Unity's interface, Scene view, Game view Scenes - Creating, loading, and saving Scenes, Work with multiple scenes in Unity, Scene Templates GameObjects, Prefabs, input, transform, Lights and Camera in Unity Game publishing using Unity	9	20%
4	**Unit 4 - Introduction to C# programming in Unity** Setting Up Your Scripting Environment Scripting concepts - Constants and variables, Conditional and looping statements, Arrays, operators Object Oriented Programming Concepts - classes, namespace, inheritance, encapsulation Basics of function creation and Multithreading Create Scripts to handle gameobjects in Unity	10	20%
5	**Unit 5- Unity Game Engine for Developing 2D Games** Introduction to 2D Game system in unity Important Classes : GameObject, , MonoBehaviour, Transform, Vectors, ScriptableObject, Time, Mathf, Random Manage sprite , basics of sprite editor 2D Physics - overview of Rigidbody and Colliders 2D Game Project	8	15%
	Total		**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20	**35**	**25**	**10**	**05**	**05**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1.Fundamentals of Game Design Ernest adams Third edition, New Riders Publication, 2015. ISBN: 9780133435726

2. Game development Essentials Jeannie Novak third edition ,Delmar Cengage Learning , 2011, ISBN: 978- 1111307684

3.Unity 5 from Zero to Proficiency (beginner): A Step-by-step Guide to Coding Your First Game Patrick Felicia LPF Publishing; 3rd edition . 2015 ISBN: 9781091872028

4.Unity Game Development Cookbook by Paris Buttfield-Addison, Jon Manning, and Tim Nugent O'Reilly Media , 2019 ISBN : 978-1-491-99915-8

5.Learning C# by Developing Games with Unity 3D Beginner's Guide Terry Norton Packt Publishing Limited, 2013, ISBN: 978-1849696586

(b) Open source software and website:

List of e-Learning Resources:

Software – (1) Unity (2) C# (3) Scratch

1. https://docs.unity3d.com/Manual/UnityManual.html
2. Programming for Games (The Smart Way) (gamedesigning.org)
3. C# Unity Developer 2D Coding: Learn to Code Video Games | Udemy
4. Introduction to Game Design | Coursera
5. https://www.udemy.com/course/game-design-fundamentals/
6. https://www.udemy.com/course/unitycourse2
7. https://www.youtube.com/watch?v=Hs9PwitP-Ss

1. Cengage India Publication

Suggested Course Practical List: If any

1. Explore various games (any 5) and identify components of each game
2. Develop a fun game by using scratch..
3. Study game development by exploring major genres, player dynamics, platform considerations, game concepts, and the role of storyboards in shaping narratives.
4. Set-up of Unity development environment and basic introduction to tools, navigation and interface.

5. Develop a game scene which contains multiple game objects, apply transform on them and do lights and camera settings.
6. Create C# program that demonstrates the use of OOPS concept along with functions and multithreading.
7. Set up your scripting environment in Unity by creating a basic script and move object.
8. Use C# script with methods of Transform, Time, Mathf, and Random classes for dynamic and engaging game elements to develop a small game.
9. Develop a 2D game project in Unity that incorporates essential elements like scenes, game objects, lights , camera, basic 2D physics- Collider, and Rigidbody
10. Develop any 2D game by using various features of Unity game engine.

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