ALAGAPPA UNIVERSITY

(Accredited with A+ Grade by NAAC (CGPA: 3.64) in the Third Cycle, Graded as Category-I University and granted autonomy by MHRD-UGC)

DIRECTORATE OF COLLABORATIVE PROGRAMMES

Bachelor of Science in Game Design and Development

Regulations and Syllabus

[For those who join the Course in July 2023 and after]

CHOICE BASED CREDIT SYSTEM

GENERAL INSTRUCTIONS AND REGULATIONS

B.Sc. Game Design & Development conducted by Alagappa University, Karaikudi, Tamil Nadu through its Collaborative Institution.

Applicable to all the candidates admitted from the academic year **2023** onwards.

1. **Eligibility:**

   A pass in the Higher Secondary Examination (HSC) conducted by the Government of Tamil Nadu, or an examination accepted as equivalent thereto by the Syndicate for admission to this programme.

2. **For the Degree:**

   The candidates shall have subsequently undergone the prescribed program of study in an institute for not less than three academic years, passed the examinations prescribed and fulfill such conditions as have been prescribed thereof.

3. **Admission:**

   Admission is based on the marks in the qualifying examination.

4. **Duration of the course:**

   The course shall extend over a period of **Three years** under Semester pattern.

5. **Standard of Passing and Award of Division:**
   a. Students shall have a minimum of 40% of total marks of the University examinations in each subject. The overall passing minimum is 40% both in aggregate of Continuous Internal Assessment and external in each subject.
   b. The minimum marks for passing in each theory / Lab course shall be 40% of the marks prescribed for the paper / lab.
   c. A candidate who secures 40% or more marks but less than 50% of the aggregate marks prescribed for three years taken together, shall be awarded **THIRD CLASS.**
   d. A candidate who secures 50% or more marks but less than 60% of the aggregate marks prescribed for three years taken together, shall be awarded **SECOND CLASS.**
   e. A candidate who secures 60% or more of the aggregate marks prescribed for three years taken together, shall be awarded **FIRST CLASS.**
   f. Only Part-III subjects will be considered for the University academic ranking purpose.
   g. The Practical / Project shall be assessed by the two examiners, by an internal examiner and an external examiner.

6. **Continuous internal Assessment:**
   a. Continuous Internal Assessment for each paper shall be by means of Written Tests, Assignments, Class tests and Seminars
   b. **25 marks** allotted for the Continuous Internal assessment is distributed for Written Test, Assignment, Class test and Seminars.
   c. Internal Assessment - Break-Up of Marks, suggested pattern (Faculty may change the pattern, according to the subject and need)
        a. Two Internal Tests (choose one best out of two) – 50%
        b. Model Test (One model test) – Nil – Should be conducted prior to the University examination. It is a mandate.
        c. Assignments – 25%
        d. Seminar / Case Study – 25%
   d. Conduct of the continuous internal assessment shall be the responsibility of the concerned faculty.
   e. The continuous internal assessment marks should be submitted to the University at the end of every semester, before the commencement of Semester Exams.
   f. The valued answer papers/assignments should be given to the students after the valuation is over and they should be asked to check up and satisfy themselves about the marks they have scored.
   g. All mark lists and other records connected with the continuous internal assessments should be in the safe custody of the institution for at least one year after the assessment.

7. **Attendance:**

Students must have earned 75% of attendance in each course for appearing for the examination.

Students who have earned 74% to 70% of attendance have to apply for condonation in the prescribed form with the prescribed fee.

Students who have earned 69% to 60% of attendance have to apply for condonation on Medical grounds in the prescribed form with the prescribed fee along with the medical certificate / relevant documents.

Students who have below 60% of attendance are not eligible to appear for the examination. They shall re-do the semester(s) after completion of the programme.

8. **Examination:**

Candidate must complete course duration to appear for the university examination. Examination will be conducted with concurrence of Controller of Examinations as per the Alagappa University regulations. **University may send the representatives as the observer during examinations.** University Examination will be held at the end of the each semester for duration of 3 hours for each subject. Certificate will be issued as per the AU regulations. **Hall ticket will be issued to the students at the end of every semester after submitting "No Dues" certificate to the exam cell, under the aegis of Controller of Examinations of the AU.**

9. **Question Paper pattern:**

Maximum: 75 Marks   Duration: 3Hours

Part A - Short answer questions with no choice   : 10 x 02=20

Part B –Brief answer with either or type   : 05 x 05=25

Part C- Essay – type questions of either / or type   : 03 x 10=30

10. **Miscellaneous**

   a. Every student should possess the prescribed text book for all the subjects, through-out the semester for their theory/lab classes.
   b. Every student would be issued an Identity card by the institute/university to identify his/her admission to the course.
   c. Every student shall access the library and internet (wi-fi) facilities provided for the self-development and career-development.
   d. Every student who successfully completes the course within the stipulated time period would be awarded the degree by the University.

11. **Fee structure**

Course fee shall be as prescribed by the University and 50% of the course fee should be disbursed to University. Special fees and other fees shall be as prescribed by the Institution and the fees structure must be intimated to the University. Course fees should be only by Demand draft / NEFT and AU has right to revise the fees accordingly.

Semester Pattern

Pattern	Course Fee payment deadline
Semester	Fee must be paid before 10th September of the academic year

12. **Other Regulations:**

Besides the above, the common regulation of the University shall also be applicable to this programme.

Sem.	Part	Courses	Course Code	Title of the Paper	T/P	Cr.	Hrs./Week	Max. Marks		
								Int.	Ext.	Total
I	I	T/OL	83411T/11H/ 11F	Tamil/ Other Languages-I	T	3	4	25	75	100
	II	E	83412	General English-I	T	3	4	25	75	100
	III	Core 1	83413	Professional Context Technology and Communication Methods	T	4	5	25	75	100
		Core 2	83414	Game Prototyping Practical	P	4	6	25	75	100
		Allied 1	83415	Visualization for Games	T	3	3	25	75	100
		Allied 2	83416	Visualization for Games Practical	P	2	4	25	75	100
	IV	SEC –I	83417	Value Education	T	2	2	25	75	100
				Library			2			
				Total		**21**	**30**	**175**	**525**	**700**
II	I	T/OL	83421T/H/F/ M/TU/A/S	Tamil/ Other Languages-II	T	3	4	25	75	100
	II	E	83422	General English-II	T	3	4	25	75	100
	III	Core 3	83423	Interactive Media Development	T	4	5	25	75	100
		Core 4	83424	Interactive Media Development Practical	P	4	6	25	75	100
		Allied 3	83425	2D Game Art	T	3	3	25	75	100
		Allied 4	83426	2D Game Art Practical	P	2	4	25	75	100
	IV	SEC –II	83427	Environmental Studies	T	2	2	25	75	100
				Library			2			
			83428A 83428B	Internship/ Mini Project	I/ PR	2	-	25	75	100
				Total		**23**	**30**	**200**	**600**	**800**
III	I	T/OL	83431T/H/F/ M/TU/A/S	Tamil/ Other Languages-III	T	3	4	25	75	100
	II	E	83432	General English-III	T	3	4	25	75	100
	III	Core 5	83433	Game Engine - I	T	3	3	25	75	100
	III	Core 6	83434	Game Engine – I Practical	P	3	5	25	75	100
		Core 7	83435	Web Game Development	T	3	3	25	75	100
		Allied 5	83436	Digital Modeling - I	T	3	3	25	75	100

SYLLABUS UNDER CBCS PATTERN w.e.f.2023-24)

B.Sc Game Design and Development

		Allied 6	83437	Digital Modeling -1 Practical	P	2	4	25	75	100
	IV	SEC-III	83438	Entrepreneurship	T	2	2	25	75	100
		NME	83439A 83439B 83439C	1.Adipadai Tamil	P	2	2	25	75	100
				2.Advance Tamil	T					
				3.IT Skills for Employment	T					
				4. MOOC'S	T					
				Total		24	30	225	675	900
IV	I	T/OL	83441T/H/F/ M/TU/A/S	Tamil/ Other Languages-IV	T	3	4	25	75	100
	II	E	83442	General English-IV	T	3	4	25	75	100
	III	Core 8	83443	Digital Modeling - II	T	4	4	25	75	100
		Core 9	83444	Game Networking Techniques	T	4	4	25	75	100
		Core 10	83445	Digital Modeling – II Practical	P	3	5	25	75	100
		Allied 7	83446	Mobile Game Development	T	3	3	25	75	100
		Allied 8	83447	Mobile Game Development - Practical	P	2	4	25	75	100
	IV	NME- II	83448A 83448B 83448C	1.Adipadai Tamil	P	2	2	25	75	100
				2.Advance Tamil	T					
				3. Small Business Management	T					
				4. MOOC'S	T					
			83449	Internship	I	2		25	75	100
				Total		26	30	225	675	900
V	III	Core 11	83451	Game Engine - II	T	4	4	25	75	100
		Core 12	83452	Game Engine – II - Practical	P	4	6	25	75	100
		DSE 1	83453A 83453B 83453C	1. Animation for Games - Practical 2. Game Engine Customization- Practical 3. Sound Engine for Games - Practical	P	4	6	25	75	100

		DSE 2	83454A 83454B 83454C	1. Artificial Intelligence for Games 2. Shader Programming 3. Cinematics in Games	T	4	4	25	75	100
		DSE 3	83455A 83455B 83455C	1. Emerging Trends 2. Level Design 3. Game Psychology	T	4	4	25	75	100

		Core 1	83456	Portfolio & Presentation- Practical	P	4	6	25	75	100
				Career Development/Employability Skills			-			
				Total		**24**	**30**	**150**	**450**	**600**
VI	III	CC	83461	Game Design Challenges	T	4	4	25	75	100
		CC	83462	Game Testing	T	4	4	25	75	100
		CC	83463	Game Testing Practical	P	4	6	25	75	100
		DSE	83464A 83464B 83464C	1. Advanced Game Programming 2. Advanced Game Design 3. Game Analysis and Monetization	T	4	4	25	75	100
			83465A 83465B	Project/ Dissertation	PR/ D	6	12	25	75	100
				Total		**22**	**30**	**125**	**375**	**500**
				Grand Total		**140**	**180**	**1100**	**3300**	**4400**

DSE – Student Choice and it may be conducted by parallel sections.
** NME –Students have to select courses offered by other (Faculty) departments.
*** SLC – Voluntary basis
T – Theory P – Practical

I – Semester						
Core	Course Code:: 83413	Professional Context Technology and Communication Methods	T	Credits: 4	Hours: 5	
Objectives	To grasp the basics and apply them for captivating gaming experiences. Explore the societal functions of games and their implications. To explore the fundamental elements that contribute to the success of virtual worlds. To investigate the intricate connection between games and player experience, delving into modeling, focus, empathy, imagination, motivation, and judgment as essential components.To develop learners' competence in incorporating ethical considerations into game design, covering ergodisc, code, legal implications, and recognizing instances of ethical complexities					
Unit I	**Introduction to communication:** Introduction to communication - Interactive and New Media - Human Computer Interaction Fundamentals - Ethics of New Media - Evolution of Games - Basic terminologies - Types of Games -Game Genres - Three Practical Approaches - Core Dynamics - MDA -Mechanics, Dynamics - Aesthetics - MDA at work - Tuning - Flow - Types of Fun -Types of Players - Skill vs Difficulty - Affordability - Orthogonality - Tension maps inGame Design - Circumspection					
Unit II	**Social function of Games:** Social function of Games - Dramatic Elements of Game - Structuring a Game -Linear Plot - Braided Plot - Branching Tree - Networks - Open Worlds - The Loop ofInteraction - Channels of Information Gameplay - Chance - Probability - Alea -Strategy - Skill - Adding and Subtracting Mechanics - Emergence and Progression Games - Integrating Emergence and Progression					
Unit III	**The Game World:** The Game World - Transmedia World - Properties - Common Elements of Successful Worlds - Nature of Game Characters - Spaces - Architecture - Organizing Game Space - Real vs. Virtual Architecture - Level Design - World Aesthetics - Value of Aesthetics - Audio of Environment - Letting Aesthetics Guide the Design - Balancing Art and Technology					
Unit IV	**Games and Experience:** Games and Experience - Player's Experience - Modeling - Focusing - Empathising - Imagination- Motivating - Judgement - Game Mechanics - Space - Objects, Attributes and States - Actions - Rules - Skill - Chance - Interest Curves - Patterns inside Patterns - Factors of Interest - Game Balancing Methodologies - Balancing Game Economics - Dynamic Game Balancing					
Unit V	**Taxonomy of Players:** Know your Players - Taxonomy of Players - Changing the Player Type Balance –Player. Interactions - Flow of Influence - Dynamics of Player Taxonomy -Demographics - Psychographics - Ethics in Game Design - Ergodisc, Code andOther Laws of Computer Game Design - Ethical Instances - Player Communities -Strong Communities					

Reference and Text Books

Andrew Rollings, Dave Morris, "Game Architecture and Design - A New Edition", New riders, 1st edition, 2003.

 Johannes Fromme, Alexander Unger, "Computer games and new media cultures: A handbook of digital games studies", Springer Science & Business Media, 2012.

Heather Maxwell Chandler, "The Game Production Handbook", Jones & Bartlett Publishers, 3rd edition, 2013.

 Johannes Fromme, Alexander Unger, "Computer Games and New Media Cultures: A Handbook of Digital Games Studies", Springer Science & Business Media, 2012

Raimund M Kovacevic, Georg Ch Pflug, Maria Teresa Vespucci, "Handbook of risk management in energy production and trading", New York: Springer, 2013

Online Resources
https://www.youtube.com/watch?v=G8AT01tuyrk
https://www.youtube.com/@Gdconf

Course Outcomes		Knowledge level
CO-1	Analyze mechanics, dynamics, and aesthetics (MDA) to enhance gameplay experiences through effective tuning, flow, and engagement strategies.	K1
CO-2	Proficiency in identifying and analyzing dramatic elements that contribute to immersive game experiences. The ability to distinguish and evaluate different game structures, from linear plots to open worlds	K3&K6
CO-3	A clear comprehension of game worlds and transmedia universes, including their defining properties and characteristics. The ability to identify and assess the crucial elements underpinning successful virtual worlds, discerning patterns of effectiveness.	K4
CO-4	Gain a deep understanding of the intricate relationship between games and player experience, encompassing elements like modeling, focus, empathy, imagination, motivation, and judgment.	K5
CO-5	Develop a nuanced understanding of player diversity and types through the exploration of taxonomy, and recognize the potential for dynamic shifts in player engagement	K2&K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)
CO2	L(1)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
W.AV	2.4	2.6	2.4	2.2	2.2	2	2.2	2.2	2.4	2

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	M(2)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
W.AV	2.4	2.6	2.6	2.2	2.4

S–Strong (3), M-Medium (2), L-Low (1)

I-Semester		
Course Code: 83414	**Game Prototyping - Practical**	**P** **Credits: 4** **Hours: 6**

Unit -I
Objectives	**Develop an algorithm for enemy behavior in a 2D platformer game prototype.**

Algorithm:
1. Initialize enemy attributes
2. Loop (Game Update)
   a. Update enemy state:
    b. Update enemy movement:
   c. Check for collisions:
   d. Update animations:
   e. Perform actions based on state:
   f. Check for player proximity:
   g. Check for attacks:
    h. Update AI decision-making:
 3. End Loop

Exercise:
Create a basic 2D platformer scene with a player character and an enemy. The enemy should patrol between two points horizontally. When the player comes within a certain distance, the enemy should start chasing the player.

Outcome	Upon completing the exercise, you will have developed a functional 2D platformer prototype where an enemy patrols between two points and starts chasing the player when they come within range. This exercise enhances your understanding of enemy behavior implementation and basic game mechanics in a platformer setting.	**K6**

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)
CO2	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
W.AV	2.4	2.6	2.4	2.2	2.2	2	2.2	2.2	2.4	2

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	M(2)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
W.AV	2.4	2.6	2.6	2.2	2.4

S–Strong (3), M-Medium (2), L-Low (1)

I – Semester					
Allied	**Course Code::**83415	**Visualization for Games**	T	Credits: 3	Hours: 3
Objectives	To introduce the concept of perspective views in art and design. To help learners understand the essential aspects of figure drawing, including proportion, gesture, and the simplification of body parts into 2D shapes To introduce learners to the core concepts and significance of design across creative disciplines. To introduce learners to the concept of textures in visual design and art, emphasizing their role in creating depth and visual interest To provide an introduction to the field of concept art, emphasizing its role in visual development and creative processes.				
Unit I	**Perspective views :** Perspective views – types of perspective views – linear perspectives vs. aerial perspective – perspective terminology – horizon line/eye level , station point , picture plane , vanishing point – linear perspective construction				
Unit II	**Figure drawing basics :** Figure drawing basics – Essentials of human figure drawing – Proportion and Gesture - Simplifying body parts in to 2D shapes – Relative proportion of various parts of the body - Constructing the front view using basic shapes - stick figure – line of action – balance – contour drawing(different poses) – Cylindrical forms (front and side				
Unit III	**Design fundamental:** Design fundamental - Characteristics of a good design - visual composition – Elements of design – Principles of Design - Gestalt principles - Visual Abstraction - Reducing Realism - Cognitive learning Model - Color theory - Attributes of Color - Color Wheel - Color Harmony - Color Schemes - Color Blending - Additive Model - Subtractive model - Color Contrast - Color Psychology -Typography - Classification - Type Families - Graphics - Types of Graphics				
Unit IV	**Introduction to textures:** Introduction to textures – Types of texture – Understanding the foreground, midground and background color in textures – Useful tips on creating a texture - Creating texture using live reference.- Understanding scale and proportion - Study of different environment – Understanding different materials and their applications – Application of texture and coloring in relation to the relevant subject.				
Unit V	**Concept Art:** Concept Art - Introduction - Revisiting the basics - Styles - Cartoony, Realism and Hybrid - Environments - World Building - Architecture - Silhouettes - Character Sketching - Environment Sketching - Props and Weapon Design - Vehicle Design - Storytelling - Introduction - Elements of Story - Scenes - Types of Scenes - Scene Constructions - Script writing - Script formatting - Storyboards - Introduction - Shots - Transitions - Views				

Reference and Text Books

Feifer RG, Tazbaz D, "Interface design principles for interactive multimedia", Telematics and Informatics, 1997. Fred T. Hofstetter, "Multimedia literacy", Tata McGraw-hill, 2001.
Mark Elsom Cook, "Principles of Interactive Multimedia", Tata McGraw-hill, 2001.
Moreno R, Mayer R. "Interactive multimodal learning environments", Educational psychology review, 2007.
Tay Vaughan, "Multimedia making it work", Tata McGraw-hill, Seventh Edition,

Online Resources
https://gameanalytics.com/blog/data-visualization-games/

Course Outcomes		Knowledge level
CO-1	Gain proficiency in perspective-related terminology, including horizon line/eye level, station point, picture plane, and vanishing point, enabling effective communication and implementation of perspective techniques.	**K1**
CO-2	Develop a strong foundation in human figure drawing, allowing participants to confidently represent the human form in various artistic and design contexts.	**K3&K6**
CO-3	Develop a strong foundation in design principles, enabling participants to create visually compelling and aesthetically pleasing compositions in various creative contexts	**K4**
CO-4	Develop a strong foundation in understanding and working with textures in visual design and art, enhancing participants' ability to create visually engaging compositions.	**K5**
CO-5	Develop a strong foundation in concept art, understanding its significance in visual development and creative processes	**K2&K6**

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	S(3)	M(2)	S(3)	S(3)	L(1)	L(1)	M(2)	L(1)	S(3))
CO2	L(1)	S(3)	M(2)	S(3)	S(3)	L(1)	L(1)	M(2)	M(2)	S(3)
CO3	L(1)	S(3)	L(1)	S(3)	M(2)	L(1)	L(1)	M(2)	M(2)	M(2)
CO4	L(1)	S(3)	M(2)	M(2)	S(3)	L(1)	L(1)	S(3)	L(1)	M(2)
CO5	L(1)	S(3)	L(1)	S(3)	M(2)	L(1)	L(1)	M(2)	L(1)	S(3)
W.AV	**1**	**3**	**1.6**	**2.8**	**2.6**	**1**	**1**	**2.2**	**1.4**	**2.6**

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	S(3)	S(3)	L(1)	L(1)
CO2	L(1)	S(3)	M(2)	M(2)	L(1)
CO3	M(2)	S(3)	M(2)	L(1)	L(1)
CO4	L(1)	S(3)	M(2)	M(2)	L(1)
CO5	L(1)	S(3)	M(2)	M(2)	L(1)
W.AV	**1.2**	**3**	**2.2**	**1.6**	**1**

S–Strong (3), M-Medium (2), L-Low (1)

		I-Semester				
Course Code: 83416		Visualization for Games Practical		P	Credits: 2	Hours: 4
		Unit -I				

Objectives	1. To introduce various art forms and styles, enabling students to appreciate the wide range of creative expressions. 2. To learn about human anatomy's significance in art, enhancing their ability to depict realistic and proportionate figures. 3. To teach students to break down complex body parts into simple 2D shapes, aiding them in structured figure drawing. 4. Through practical exercises, students apply anatomical knowledge to their artwork, honing their skills in portraying the human body. **5.** Students gain insights into how different cultures and time periods have influenced artistic representations of the human form, enriching their artistic perspective**.**

Exercise:

1. Create a face using images of fruits and vegetables.
2. Use a close up photo of you and enhance one half of your face.
3. Create a poster for the Movie / Game title specified by the tutor.
4. Redesign a popular logo.
5. Download photographs of two animals and create a new animal using features from the downloaded animals.
6. Create a Manga character using your photographs for reference.

Outcomes	To develop an understanding and enjoyment of art and design. Study formal aspects of diverse art movements. To learn how to use texturing and coloring effectively. To understand how texture and color relate to the subject. To enhance critical observation of artworks.	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	S(3)	M(2)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)
CO2	L(1)	S(3)	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	L(1)	S(3)	S(3)	S(3)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)
CO4	L(1)	M(2)	M(2)	S(3)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)
CO5	L(1)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
W.AV	1	2.5	2.4	3	2.2	2	2.2	2.2	2.4	2.6

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	S(3)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	S(3)	S(3)
CO3	L(1)	S(3)	S(3)	M(2)	M(2)
CO4	L(1)	M(2)	S(3)	S(3)	M(2)
CO5	M(2)	L(1)	S(3)	S(3)	S(3)
W.AV	1.6	2.2	3	2.6	2.4

S–Strong (3), M-Medium (2), L-Low (1)

		II – Semester-Core Course			
Core	**Course Code:: 83423**	**INTERACTIVE MEDIA DEVELOPMENT**	**T**	**Credits: 4**	**Hours: 5**
Objective		● **To develop in-depth knowledge in the fundamentals of computers.** ● **Students identify and apply the basics of C++ programming concepts and techniques.** ● **To educate students about the concepts of arrays and structures.** ● **Understanding the theory and practice of object oriented programming and learning how to implement constructor and overloading.** ● **Educate students to learn how to use data structures in C++.**			
UNIT-I		Fundamentals of Computers - Introduction – History of Computers - Generations of Computers-Classification of Computers - Basic Anatomy of a Computer System-Input Devices - Processor- Output Devices - Memory Management – Types of Software - Overview of Operating System- Programming Languages-Translator Programs - Problem Solving Techniques			
UNIT-II		Programming Basics - Programming Hello world - Data types - Variables - Constants - Operators- Conditional Statements – Looping - Functions - Understanding Functions - Pass values to functions – Inline function - Recursive functions			
UNIT-III		Key Concepts – Arrays - One Dimensional - Two Dimensional - Multidimensional - Dynamic Arrays - Pointers - Pointers Advantage & disadvantage - Variable pointers - Generating pointer to an array - Function Pointers - Array pointers - Pointers to Pointers - Functions - Passingpointers to functions - Returning pointers - Passing Arrays to functions - User DefinedDatatypes - Union & Enum - Structures			
UNIT-IV		Classes - Objects - Encapsulation - Constructors - Destructors – Polymorphism– Types Of polymorphism – Abstraction - Virtual Function - Function Overloading - Overriding-Inheritance - Exception Handling - Templates			
UNIT-V		Standard Template Library - Containers – Sequences – Vector – List – deque - ContainerAdaptors – Stack – Queue - Algorithms - Mutating Algorithms – Swap – Replace - Remove- Sorting - Binary Search – Merge - Function Object - Random Number Generator - Iterators- Forward - Random Access - Data Structures Types - Linear Data Structure - Array - Linked List-Stack- Queue- Sorting - Searching - Trees - Graphs - Shortest Path Algorithm.			

Reference and Text Books:
- Bjarene Stroustrup, 2008 , "Programming: Principles and practices using C++", Addison-WesleyProfessional.
- E. Balagurusamy,2008, "Computing Fundamentals & C Programming, Tata McGraw-Hill, 2ndEdition.
- Herbert Scheldt,2002, "The Complete Reference C++", Tata McGraw Hill.
- Scott Meyers, 2001. "Effective STL", Strangecat Publication.

Online Resources
https://www.programiz.com/cpp-programming
https://www.javatpoint.com/cpp-tutorial
- **https://www.mygreatlearning.com/blog/books-on-cpp/**
https://www.youtube.com/watch?v=ZzaPdXTrSb8

Course Outcome:

CO1	**Understand the concept of input and output devices of computers**	**K1**
CO2	**Understand and develop the fundamentals of programming in c++.**	**K3&K6**
CO3	**Classify the key concepts and work on functions, Array and Pointers.**	**K4**

CO4	Evaluate OOPs concept and how to control error with exception handling.	K5
CO5	Understanding of algorithms in the problem-solving process.	K2&K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	M(2)	L(1)	M(2)	M(2)	M(2)	L(1)	M(2)	L(1)	M(2)
CO2	S(3)	S(3)	L(1)	L(1)	M(2)	L(1)	L(1)	M(2)	L(1)	M(2)
CO3	M(2)	M(2)	M(2)	M(3)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)
CO4	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)	L(1)
CO5	S(3)	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	2.6	2.4	1.4	2.2	2	2	2	2.2	2	2

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	L(1)	S(3)	L(1)	L(1)
CO2	M(2)	L(1)	S(3)	L(1)	L(1)
CO3	M(2)	L(1)	M(2)	M(2)	L(1)
CO4	M(2)	L(1)	S(3)	L(1)	M(2)
CO5	M(2)	L(1)	S(3)	L(1)	M(2)
W.AV	2	1	2.8	1.2	1.4

S–Strong (3), M-Medium (2), L-Low (1)

II – Semester-Core Course					
Core	**Course Code:**83424	**INTERACTIVE MEDIA DEVELOPMENT PRACTICAL**	**P**	**Credits:** 4	**Hours:** 6
Objectives	➢ **Design programs with user input, calculations, and interactive responses.** ➢ **Employ conditional statements and branching logic for interactive game creation.** ➢ **Utilize loop structures proficiently to manage repetition and control program flow.** ➢ **Develop programs to read, process, and write data for specific outcomes.** ➢ **Design and implement class hierarchies and inheritance for modeling complex systems.**				

1. Program to calculate the area and perimeter of different shapes based on user input.
2. Write a program to rock-paper-scissors game: Implement a game where the player chooses rock, paper, or scissors and plays against the computer.
3. Create a program to guess the number game: a program where the computer generates a random number and the player has to guess it, with hints if the guess is too high or too low.
4. Create a program to countdown timer: create a countdown timer game where the player has to stop the timer at a specific value using loops.
5. RPG character stats: define functions to calculate and display stats for a role-playing game character.
6. Hangman game: Implement a simple hangman game where the player guesses letters to complete a word from an array of words.
7. Write a program for player class: design a class that represents a player in a game, encapsulating attributes like name, score, and health.
8. Create a program for Zoo simulation: model a zoo using classes with inheritance, like base Animal class and derived classes for specific animal types.
9. Write a program that reads data from a file, processes it, and writes the results back to another file.
10. Student Database: Design a program to manage a student database with features like adding, deleting, and displaying student records.

Outcomes	➢ **Craft user-friendly interfaces, incorporate input effectively, perform accurate calculations, and present results coherently.** ➢ **Cultivate dynamic decision-making skills, implement effective conditional logic, and construct engaging gameplay experiences.** ➢ **Attain deep comprehension of loop mechanisms, create optimized algorithms for repetitive tasks, and confidently manage loop behavior.** ➢ **Excel in data handling from files, implement processing algorithms, and derive insightful conclusions through data manipulation.** ➢ **Internalize object-oriented principles, construct modular class structures, and adeptly employ abstraction for real-world modeling.**

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	S(3)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	L(1)
CO2	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	S(3)
CO3	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	M(2)
CO4	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	M(2)
CO5	S(3)	S(3)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	S(3)
W.AV	3	3	2.2	2	3	1	1.4	2	2.4	2

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	S(3)	S(3)	S(3)	M(2)	M(2)
CO3	S(3)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	S(3)	M(2)	S(3)	M(2)
CO5	S(3)	S(3)	M(2)	M(2)	M(2)
W.AV	3	3	2.6	2.2	2

S–Strong (3), M-Medium (2), L-Low (1)

II – Semester-Allied					
Allied	**Course Code:83425**	**2D GAME ART**	**T**	**Credits:**	**Hours:**
				3	**3**
Objective		**To introduce learners to different types of graphics, focusing on vector graphics and raster graphics.** **To Provide an introduction to image editing software, highlighting their role in creative design and visual manipulation.** **To introduce the concept of layers in image editing applications, highlighting their significance in non-destructive editing and creative manipulation.** **To teach the effective use of Illustrator's tools for creating, editing, and manipulating vector-based artwork.** **To introduce the role and significance of game art in creating immersive and visually appealing game experiences.**			
UNIT-I		Importance of graphics: Graphics – importance of graphics – types of graphics – vector graphics , raster graphics – image manipulation – format conversion – crop and scale – silhouetting – color manipulation – edge and transparency – assembling images – filtering – envelope/containers			
UNIT-II		Introduction to Image : Introduction to Image editing applications - Exploring the Interface - Exploring the basic Tools - The menu bar - move tool - hand tool - marquee selection tool - Magic wand selection tool - type tool - Healing brush - gradient - smudge - sharpen and blur tools - zoom tool - eyedropper tool -lasso selection tool - crop tool - stamp tool - Eraser tool - paint bucket tool - shape - Dodge and burn tool - foreground and background color tool			
UNIT-III		Layers: Layers - Merge and group layers - blending modes - manage layers - blending options in layers - masking - clip masking - smart objects - adjustment layers - free transform - scale - rotate - skew - distort - perspective - warp - Brightness - levels - curves - exposure - vibration - hue/saturation - color balance - black and white - photo filter - channel mixer - color lookup - invert-posterize - threshold - gradient map - selective color - Liquify - artistic filter - blur filter - brush strokes - distort - noises - pixelated - render - sharpen - sketch - stylized - texture - video - other filters - custom brushes - texture brushes - dual brushes - mixer brushes			
UNIT-IV		Adobe Illustrator: Adobe Illustrator – using the Illustrator tools –working with panels – customizing the workspace– changing the view of artwork – logo designing – qualities of a good logo – transforming objects – using the pathfinder feature – positioning objects precisely – using the attributes panel –digital illustration – using the pencil tool –Creating symbols – painting with mesh – using a clipping mask			
UNIT-V		Digital Painting : Game Art - Introduction - Digital Painting - Background Illustrations - Matte Painting - Character Design and Sketching - Creating Sprites - Sprite Sheets for Animation - Pixel art - Pixel Art -Animation - GUI for Games - Creating Asset Pack for Games			

Reference and Text Books:
- Adobe creative Team, "Adobe Photoshop CS5 Classroom in a Book", Adobe Press, 2010.
- Evan Skolnick, "Video Game Storytelling: What Every Developer Needs to Know about
- Narrative Techniques", 2014.
- Martin Evening, "Adobe Photoshop CS5 for Photographers", Focal Press, 2010
- Solarski, C, "Drawing Basics and Video Game Art", New York, 2012.
- Souvik Mukherjee, "Video Games and Storytelling: Reading Games and Playing Books", 2015. 2D Game Art – Practical

Online Resources
https://opengameart.org/
https://www.gamedevmarket.net/
https://pixelprospector.com/

Course Outcome:		
CO1	Develop a solid understanding of the importance of graphics in visual communication and creative design across various contexts.	**K1**
CO2	Develop a strong familiarity with image editing applications, understanding their fundamental role in creative design and visual enhancement.	**K3&K6**
CO3	Develop a thorough understanding of layers in image editing applications, enabling participants to effectively manage and manipulate various elements within their projects.	**K4**
CO4	Develop a strong familiarity with Adobe Illustrator, its tools, and its role in graphic design and illustration.	**K5**
CO5	Develop a strong understanding of the role and importance of game art in creating visually captivating and immersive gaming experiences.	**K2&K6**

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)
CO2	L(1)	S(3)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	L(1)	S(3)
CO3	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	L(1)	M(2)	M(2)	S(3)
CO4	L(1)	M(2)	L(1)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	S(3)
CO5	L(1)	S(3)	M(2)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	S(3)
W.AV	**1**	**2.5**	**1.4**	**2.5**	**1.8**	**1.6**	**1.8**	**2.4**	**1.6**	**3**

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	L(1)	S(3)	M(2)	M(2)
CO2	L(1)	M(2)	S(3)	S(3)	S(3)
CO3	L(1)	L(1)	S(3)	M(2)	M(2)
CO4	L(1)	M(2)	S(3)	S(3)	M(2)
CO5	L(1)	L(1)	M(2)	M(2)	S(3)
W.AV	**1**	**1.4**	**2.8**	**2.4**	**2.4**

S–Strong (3), M-Medium (2), L-Low (1)

II-Semester - Allied					
Allied	**Course Code:83426**	**2D GAME ART - PRACTICAL**	**P**	**Credits: 2**	**Hours: 4**

	Unit -I
Objectives	The objectives of 2D game art are to visually enhance games, convey gameplay information, establish a unique identity, support mechanics, maintain consistency, evoke emotions, guide attention, reflect narrative, and ensure collaboration, all while delivering a satisfying and immersive player experience.

1. Design a visually appealing background scene for a 2D platformer game. The scene should include a sky, ground, and various environmental elements.
2. Creating pixel art characters, objects, and backgrounds.
3. Creating color theory, color harmonies, and contrast.
4. Techniques for optimizing artwork for different screen resolutions and aspect ratios.
5. Building isometric environments for strategy or simulation games.

Outcomes	Upon completing the practical exercise of creating a background scene for a 2D platformer, students will have achieved the following outcomes: ● **Visual Design Skills** ● **Depth Perception Techniques** ● **Aesthetic Considerations** ● **Thematic Cohesion** ● **Application of Feedback** ● **Integration into Game Context** ● **Critical Reflection**	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	S(3)	M(2)	M(2)	L(1)	M(2)	L(1)	M(2)	M(2)	S(3)
CO2	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	L(1)	M(2)	L(1)	S(3)
CO3	L(1)	S(3)	L(1)	S(3)	L(1)	M(2)	M(2)	L(1)	M(2)	S(3)
CO4	L(1)	S(3)	M(2)	S(3)	L(1)	L(1)	L(1)	L(1)	M(2)	M(2)
CO5	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	S(3)
W.AV	1	3	1.4	2.8	1.5	1.8	1.5	1.6	1.6	2.8

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	M(2)	S(3)	M(2)	M(2)
CO2	L(1)	M(2)	S(3)	M(2)	S(3)
CO3	L(1)	L(1)	S(3)	M(2)	M(2)
CO4	L(1)	M(2)	M(2)	S(3)	M(2)
CO5	L(1)	M(2)	M(2)	M(2)	S(3)
W.AV	1	1.8	1.6	2.2	2.4

S–Strong (3), M-Medium (2), L-Low (1)

III – Semester-Core					
Core	**Course Code:** 83433	**GAME ENGINE- 1**	**T**	**Credits:** 3	**Hours:** 3
Objective		● **The module aims to introduce 3D game development, covering 2D vs. 3D concepts, 2D level design, transitioning to 3D, terrain design, and environment setup. Students will also learn about Profiler, Input Settings, prefabs, and tags, fostering skills for effective 3D game creation.** ● **The objective is to equip students with essential 3D game scripting skills, including collision detection, event handling, optimization, raycasting, animation control, physics, and joint types, enabling them to create dynamic and interactive 3D game environments effectively.** ● **To enable students to proficiently handle camera properties, GUI, and cinematic effects like rendering to texture, particle effects, and global illumination.** ● **The objective is to equip students with the skills to design effective game UI, create layouts, incorporate information sharing through HUD, manage sound and music, understand networking concepts, prepare games for various platforms, and ensure code cleanliness for streamlined development.** ● **The objective is to empower students with advanced gameplay programming skills, including event-driven systems, 2D game mechanics, basic AI mechanics, pathfinding, particle effects, audio integration, and dialog handling, while honing efficient build methods for comprehensive game development.**			
UNIT-I		Introduction to 3D Game Development - Concepts of 2D vs 3D Game - 2D Level Design - Understanding the 3D Game World: screen dimensions - Convert screen positions to world positions - Terrain Design - Designing Level Maps - Setting up the Game Environment - Profiler Window: Input Settings, Console - Prefabs and Tags			
UNIT-II		Scripting: Basic 3D Methods - Collision Detection - Triggers - Controlling Game Objects Behavior: Rendering Mesh, Mesh filter - Event Handling: Mouse, Keyboard, Touch - Handling Frame Rate and performance - Namespaces, List Collections - Generic Functions - Coroutines and Exceptions - Raycasting - Navigation and Pathfinding - Working with Animation - Controlling Animation - 3D Physics - Joints - Types of Joints - Exploring different Colliders			
UNIT-III		Camera: Camera Properties, Lens Flare - GUI - Cinematics: Rendering to Texture - Particle Effects - Global Illumination - Rendering sky - Implementing render passes - Lighting, Shading - Occlusion Culling - Optimize event management - Check for memory leaks - Memory Optimization			
UNIT-IV		Designing Game UI - Basic UI Layout - Designing Game UI - Information sharing to HUD - Sound and Music - Networking Concepts: server, host,spawn, Instantiate - Building for Different Platforms - Clean up code			
UNIT-V		Advanced Game play programming - Events and Actions - 2D Game Mechanics - Basic AI mechanics in games - Path finding - Particle Effects - Audio and Dialog handing - Build Methods			

Reference and Text Books:
- Alan Thorn, "UDK Game Development", Course technology, 2012.
- Aung Sithu Kyaw, Clifford Peters, Thet Naing Sw, Unity 4.x, 2013.
- Deborah Todd, "Game Design: From Blue Sky to Green Light", 2007.
- Lee Zhi Eng, "Building a Game with Unity and Blender", 2015.
- Michelle Menard, "Game Development with Unity", Course technology, 2012.

Online Resources
https://docs.unity3d.com/Manual/index.html
https://forum.unity.com/
https://assetstore.unity.com/

Course Outcome:		
CO1	Students will acquire the ability to differentiate between 2D and 3D game concepts, design 2D levels and transition to 3D environments, while also becoming skilled in tools like the Profiler and prefabs for proficient 3D game development.	**K1&K2**
CO2	Master scripting techniques for 3D game development, including collision detection, event handling, raycasting, animation control, and 3D physics. Apply optimized frame rates, handle exceptions, utilize list collections, and navigate complex game environments using pathfinding and joint types.	**K2**
CO3	Utilizing camera properties, GUI, cinematic rendering, and global illumination, enhancing their ability to create visually compelling scenes. Implementing advanced rendering techniques, optimizing memory usage, and effectively managing events, resulting in improved performance and immersive 3D game experiences.	**K4**
CO4	Designing functional game UI, implementing HUD for information sharing, managing sound, and comprehending networking concepts for interactive and platform-ready game development.	**K5**
CO5	Proficiency in advanced gameplay programming, including event-driven systems, 2D game mechanics, basic AI mechanics, and pathfinding.	**K6**

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)	L(1)	M(2)
CO2	L(1)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)
CO3	M(2)	L(1)	S(3)	M(2)	S(3)	M(2)	S(3)	M(2)	M(2)	S(3)
CO4	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	2	1	2.8	2.4	2.6	2.2	2.4	1.8	2.4	2.8

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	M(2)	L(1)	M(2)
CO2	S(3)	M(2)	S(3)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	2.8	2.6	2.8	2.4	2.8

S–Strong (3), M-Medium (2), L-Low (1)

	III-Semester - Core				
Core	**Course Code** 83434	**GAME ENGINE - 1 PRACTICAL**	**P**	**Credits: 3**	**Hours: 5**
Objectives	Develop a game from start to finish, covering various game development aspects.Apply level design principles, environmental elements, and player interactions.				

Exercise:
1. The students are expected to complete the following exercise and submit the record work
2. Create a terrain using game engine
3. Create a First Person Shooter level
4. Import custom models from a design tool to game engine
5. Import animated character and use it in your level
6. Create a new GUI and HUD for your game and import it in game engine
7. Create a 2D character for a 2D casual game
8. Import 2D character to use it inside your game
9. Make a side scrolling game

Outcomes	● **Crafted immersive FPS gameplay with dynamic terrains, custom assets, and animations, enhanced by a new GUI/HUD.** ● **Designed captivating 2D characters and side-scrolling mechanics, resulting in engaging games with distinct visuals and interactions**	**K4**

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)	L(1)	M(2)
CO2	L(1)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)
CO3	M(2)	L(1)	S(3)	M(2)	S(3)	M(2)	S(3)	M(2)	M(2)	S(3)
CO4	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	**2**	**1**	**2.8**	**2.4**	**2.6**	**2.2**	**2.4**	**1.8**	**2.4**	**2.8**

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	M(2)	L(1)	M(2)
CO2	S(3)	M(2)	S(3)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	**2.8**	**2.6**	**2.8**	**2.4**	**2.8**

S–Strong (3), M-Medium (2), L-Low (1)

III – Semester-Core					
Core	**Course Code: 83435**	**Web Game Development**	**T**	**Credits:** **3**	**Hours:** **3**
Objective		● **To develop in-depth knowledge in basics of HTML tags and introduction to canvas** ● **To inculcate knowledge about development methods of web programming** ● **To educate students about web frameworks and data handling.** ● **Discuss about gaming layout and event handling.** ● **To educate students the native development methods for developing games that can be playable on the web.**			
UNIT-I		HTML 5 Introduction - Difference between HTML 4 & HTML 5 - Semantic Tags - Header & Footer - Nav tag - Section - Article - Content - Aside - Media Tags - Audio tag - Properties - Video Tag - Properties - Canvas-Introduction-SVG VS Canvas-Application of canvas-Canvas DOM- Hello World in Canvas			
UNIT-II		Advanced Java Script - Document Object Model - Introduction - Arrays - One Dimensional Array- Two Dimensional Array - Callback Functions - Form Handling - Get/Post Method- FormValidation - Accessing form Data - Password Validation - Number Validation - HTML Events- Predefined Events -Object Oriented Programming with JavaScript - Class - Inheritance			
UNIT-III		Web Development Frameworks - Java script Frameworks - Introduction - ExploringWebFramework API Building Interactivity in web pages- Scrolling effects - Image Sliders andImageManipulation - File Handling Import and Export Data - XML Parsing - JSON Parsing - MaintainingScore Information			
UNIT-IV		Canvas Game Development - JavaScript for Canvas - Drawing Basic Shapes - DrawingText - Drawing Sprites - Sprite Sheets - Sprite Animations - Keyboard Event Handling - Gameplay Programming - Player Movement - Background Scrolling - Implementing Jump - CollisionDetection - Circle Collision Detection - Square Collision Detection.			
UNIT-V		Designing Game UI - Implementing Interactions - Keyboard Event - Mouse Event - Listeners- Implement System Controlled Game Elements - Implementing Timer - Managing Lives andHealth - Asynchronous web page updates - Introduction - Application - Request and Response.			

Reference and Text Books:
- Alexis Goldstein- Louis Lazaris- Estelle Weyl, 2011.“HTML5 & CSS3 For The Real World”, SitePoint Pty.
- David Sawyer McFarland, 2011. “JavaScript &JQuery: The Missing Manual”, Pogue Press, 2ndEdition.
- Douglas Crockford,2008. “JavaScript: The Good Parts”, O'Reilly Media.
- Joe Burns,, 2001. “Web site design goodies”, Que Corp.
- Makzan, 2011. “HTML5 Game Development by Example”, Packt Publishing.

Online Resources
https://www.oreilly.com/library/view/html5-canvas/9781449308032/ch01.html
https://www.amazon.in/HTML5-Canvas-Jeff-Fulton/dp/9351101282
https://www.youtube.com/watch?v=Yvz_axxWG4Y

Course Outcome:

CO1	Student will define and classify the web page contents	K1&K2
CO2	Understanding of client side scripting for data handling and validations.	K2

CO3	Analyze the web frameworks and manipulate the data.	K4
CO4	Evaluate web page construction with different combo of contents.	K5
CO5	Develop user interaction for game play in a web environment.	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M(2)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)
CO2	M(2)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)	M(2)	M(2)
CO3	M(2)	M(2)	M(2)	L(1)	M(2)	M(2)	L(1)	L(1)	M(2)	M(2)
CO4	M(2)	M(2)	M(2)	L(1)	M(2)	M(2)	M(2)	L(1)	M(2)	M(2)
CO5	M(2)	M(2)	M(2)	L(1)	M(2)	M(2)	M(2)	M(2)	S(3)	M(2)
W.AV	2	1.6	1.6	1	1.6	1.6	1.4	1.2	2	1.8

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	L(1)	L(1)	M(2)	L(1)
CO2	L(1)	L(1)	L(1)	M(2)	L(1)
CO3	L(1)	M(2)	M(2)	M(2)	M(2)
CO4	M(2)	M(2)	M(2)	M(2)	M(2)
CO5	M(2)	M(2)	M(2)	M(2)	S(3)
W.AV	1.4	1.6	1.6	2	1.8

S–Strong (3), M-Medium (2), L-Low (1)

III – Semester-Allied					
Allied	**Course Code: 83436**	**Digital Modeling - 1**	**T**	**Credits:**	**Hours:**
				3	**3**
Objective		● **To gain a comprehensive knowledge on 3D digital modeling and the tools that help artists to create 3D artifacts for games. Also, the module aims to deliver students the various theories** ● **Learn Autodesk Maya - create and manipulate 3D objects, use advanced techniques, and master essential skills.**			
UNIT-I		Introduction to user interface – working in 3D – views –the maya workspace - creating manipulating and moving objects – perspective and orthographic windows –Curve Tools- Duplicate Surface Curves- Add points Tools- Attach- Detach- Edit Curve tool- Move Seam- Open/Close curve- Extend- Insert Knot - Offset Curve- Cut Curve- Project Tangent- Rebuild Curve- Reverse Direction.			
UNIT-II		NURBS Primitives- Loft- Planar- Revolve- Birail 1, 2 & 3- Extrude- Bevel- Bevel Plus- Duplicate NURBs patch- Attach- Detach- Move Seam- Open/ Close Surface- Intersect- Project Curve on Surface - Trim tool- Untrim- Extend- Insert Isoparms- Stitch- Surface Fillet- Booleans- Rebuild Surface- Reverse Direction.			
UNIT-III		UV Unwrapping - Normal map - Vehicle- UV Texturing and Lighting (Image based lighting) -			
UNIT-IV		Basic Prop modeling- Weapon Design (dagger, sword, gun etc.). Understanding the structure of weapons- aligning the image for modeling in photoshop- Modeling the weapon - Vehicle Design (using Curves and P polygon)- EP curve tool- Attach Detach Curve- Rebuild curve- Add points tool- Move seam- Open/Close curve- Insert knot- Extend curve.			
UNIT-V		Game environment modeling - Set Design for games & video- Understanding the requirements for the set design & its genre of the game- Creating assets & characters layout as per the requirement- Visor & Sculpt Polygon Tool new features. References:			

Reference and Text Books:
- Chris Maraffi, "Maya Character Creation: Modeling and Animation Controls", New Riders, 2003
- Guy L. Curry, Richard M. Feldman, "Manufacturing Systems Modeling and Analysis",edition, Springer, 2009.
- Mario Russo, "Polygonal Modeling: Basic and Advanced Techniques", Jones & Bartlett Publishers, 2010.
- " Michael Ingrassia, "Maya for Games: Modeling and Texturing Techniques with Maya and Mudbox", illustrated, Focal Press/Elsevier, 2008.
- William Vaughan, "Digital Modeling", New Riders, 2011.

Online Resources
- **https://www.amazon.in/Game-Makers-Apprentice-Development-Technology/dp/1590596153**

Course Outcome:		
CO1	This module teaches 3D modeling in Maya, with a focus on object manipulation and curve modeling for creating accurate and high-quality 3D models.	K1
CO2	The NURBS modeling module teaches students how to create complex surfaces using advanced techniques in Autodesk Maya.	K3&K6
CO3	This module in Autodesk Maya teaches UV mapping, normal mapping, UV texturing, and image-based lighting skills to create visually appealing 3D models, particularly for vehicle design.	K4
CO4	The module covers Basic Prop Modeling and Weapon Design in Autodesk Maya. Students learn prop modeling, focusing on weapons. They will use Maya tools for precise and effective prop and weapon design. The aim is to equip students with necessary skills for creating realistic weapon models.	K5
CO5	Maya module for Game Environment Modeling and Set Design covers set design requirements for different gaming genres. Students will learn to create tailored assets, use advanced tools, and contribute effectively to game development.	K2&K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)	M(2)
CO2	L(1)	M(2)	M(2)	M(2)	S(3)	S(3)	L(1)	L(1)	L(1)	M(2)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)
CO4	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	S(3)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)	S(3)	S(3)
W.AV	1.6	2.6	2.6	2.2	2.2	2.2	2	2	1.6	2.4

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	L(1)	S(3)	M(2)	L(1)
CO2	L(1)	L(1)	S(3)	M(2)	M(2)
CO3	M(2)	M(2)	S(3)	M(2)	M(2)
CO4	M(2)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
W.AV	1.6	1.8	2.6	2.2	2

S–Strong (3), M-Medium (2), L-Low (1)

III-Semester – Allied					
Allied	**Course Code:83437**	**Digital Modeling - 1 PRACTICAL**	**P**	**Credits: 2**	**Hours: 4**

	Unit –I
Objectives	The objectives of Digital modeling Students will learn to create immersive interior environments for games, craft realistic trees and plants, acquire high to low poly baking techniques, design unique weapons, and excel in exterior environment creation. These objectives aim to provide a well-rounded skill set for students to succeed in 3D game design and asset creation.

Exercise:
1. Create the interior environment for the game.
2. Create a tree/plants using alpha .
3. High poly to low poly baking techniques (Ex-gun).
4. Create a weapon inspired from any game
5. Create an exterior with the proper textures.

Outcomes	Students will learn 3D modeling and game asset creation skills including interior environments, realistic trees and plants, high to low poly baking techniques, weapon modeling, exterior environment creation, and texture application. These skills prepare students for success in the competitive realm of 3D game design.	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	S(3)	M(2)	M(2)	L(1)	M(2)	L(1)	M(2)	M(2)	S(3)
CO2	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	L(1)	M(2)	L(1)	S(3)
CO3	L(1)	S(3)	L(1)	S(3)	L(1)	M(2)	M(2)	L(1)	M(2)	S(3)
CO4	L(1)	S(3)	M(2)	S(3)	L(1)	L(1)	L(1)	L(1)	M(2)	M(2)
CO5	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	S(3)
W.AV	1	3	1.4	2.8	1.5	1.8	1.5	1.6	1.6	2.8

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	M(2)	S(3)	M(2)	M(2)
CO2	L(1)	M(2)	S(3)	M(2)	S(3)
CO3	L(1)	L(1)	S(3)	M(2)	M(2)
CO4	L(1)	M(2)	M(2)	S(3)	M(2)
CO5	L(1)	M(2)	M(2)	M(2)	S(3)
W.AV	1	1.8	1.6	2.2	2.4

S–Strong (3), M-Medium (2), L-Low (1)

IV – Semester-Core					
Core	Course Code: 83443	Digital Modeling - II	T	Credits: 4	Hours: 4
Objective	● **To present students the various advanced concepts of digital modeling such as texturing and lighting.**				
UNIT-I	Learning about Textures - Color in Textures - Roughness in Textures - Translucency in Textures - Reflectivity in Textures -Surface Luminance in Textures -Creating Textures - Painting Textures -Using Photographs for Textures - Tiling Textures - Creating a Door Texture - Image Compression - Lossless Compression - Lossy Compression - Essential Graphic File Formats -Important Graphic File Formats - Modular Design				
UNIT-II	Understanding Materials and textures - Creating basic texture maps - Normal map - Ambient maps - texturing methods - Texturing the Props and character - Texturing elements and objects - Texturing - UV Texture Editor - Material Nodes ,Texture Nodes – Shading and Texturing Surfaces – Unwrapping a Character model - Reflection and Environment				
UNIT-III	Lighting – Direct Light Sources – Maya light attributes - Shadows generation and troubleshooting - Colour theory - 3 point lighting – Interior / Exterior Lighting - Rendering - Introduction to Rendering and Types – Render Global - Batch Render - Setting up render layers and passes - Compositing in Photoshop - Baking maps - Base paint material, creating rust, Smart materials - Layer instancing - Brush Instance				
UNIT-IV	Vehicle creation for games - Vehicle modeling basics – proportion and layout – topology –body mesh – assigning basic color maps – baking detail to low poly- unwrapping –texturing and material allocation Primitive rig - Rigid Rigging– Skinning for each model - animation cycles for engines -Animated meshes.				
UNIT-V	Character creation for games,character modeling basics – proportion and layout – character topology – building character body mesh – creating hands and feet – building a profile of the character shape – handling hair and face mesh – assigning basic color maps – baking detail to low poly - unwrapping, texturing and material allocation.				

Reference and Text Books:
- Chris Totten, "Game Character Creation with Blender and Unity", 1 Edition. Sybex, 2012.
- Dennis Summers, "Texturing: Concepts and Techniques (Charles River Media Graphics)", 1 Edition. Charles River Media, 2004.
- Dollner J, Baumann K, Hinrichs K, "Texturing techniques for terrain visualization", Visualization, 2000.
- Michael McKinley, "Maya Studio Projects: Game Environments and Props", 1 Edition. Sybex, 2010
- Peter Parr, "Sketching for Animation: Developing Ideas, Characters and Layouts in Your Sketchbook". Edition. Fairchild Books, 2016.

Online Resources
https://www.amazon.in/Advanced-Maya-Texturing-Lighting-Lanier-ebook/dp/B00VYNMYUQ

Course Outcome:		
CO1	In the Learning about Textures module, students will learn to create and apply textures in digital design for realistic 3D models. The module equips them with diverse texture design skills for visually appealing digital creations.	K1&K2
CO2	The module on Understanding Materials and Textures teaches students how to create and apply textures to digital designs, using various tools and techniques. They will also learn how to enhance the visual appeal and realism of digital creations.	K2
CO3	Maya Lighting module teaches 3D modeling lighting aspects, lighting sources, color theory, 3-point lighting, rendering, post-processing, and advanced material creation. It equips students with necessary skills to create visually compelling and realistic 3D scenes.	K4
CO4	In this Unit, students learn to create optimized vehicle assets for games. They gain skills in mesh creation, texturing, rigging, skinning, and animation.	K5
CO5	In the Character Creation for Games module, students will learn to model characters, including body meshes, character profiles, and hair and face meshes. They will be prepared for game development.	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)	L(1)	M(2)
CO2	L(1)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)
CO3	M(2)	L(1)	S(3)	M(2)	S(3)	M(2)	S(3)	M(2)	M(2)	S(3)
CO4	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	2	1	2.8	2.4	2.6	2.2	2.4	1.8	2.4	2.8

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	M(2)	L(1)	M(2)
CO2	S(3)	M(2)	S(3)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	2.8	2.6	2.8	2.4	2.8

S–Strong (3), M-Medium (2), L-Low (1)

IV – Semester-Core					
Core	Course Code: 83444	GAME NETWORKING TECHNIQUES	T	Credits: 4	Hours: 4
Objective		● Familiarize with essential computer network components and principles for effective communication. ● Acquire knowledge of OSI layers, protocols, and network protection. ● Gain insight into network multiplayer game structures and concepts for effective game design and development. ● Learn to establish effective multiplayer project setups by understanding network behavior and implementing essential components. ● Understand and apply network communication principles for multiplayer game development, encompassing callbacks, scene synchronization, lobby setup, and host migration.			
UNIT-I		**Introduction to Computer networks:** Network Topology - IEEE Standards - Hub - Switch - Router- Modem - Network Card - Bridges - Routing Algorithms - Protocols - Encoding and Decoding- Multiplexing/De-Multiplexing -Data Security - Encryption/Decryption – Authentication			
UNIT-II		**OSI Layers:** Bluetooth Network - Wireless Network - Mobile Network - TCP - UDP - Bit Stream- Error Detection and Correction - Network security and firewalls - WEP - WPA - WPA2 - PublicandPrivate key encryption			
UNIT-III		**Types of Network Multiplayer Games:** Popular Network Multiplayer Games - Network System Concepts - Client Server - Hosting - Local Client and Remote Client - Player Object - CommandandAuthority - Non Player Characters/Objects and Authority - Network Context			
UNIT-IV		**Multiplayer Project setup:** Network Behavior - Setting up a Network Player - Game State Management - Spawning - Scene Management - Matchmaking - Customizing - SpawningwithAuthority - Remote Actions - Commands - Client RPC [Remote Procedure Call] - Arguments of RPC			
UNIT-V		**Network Communication:** Network Manager Callbacks - Network Behavior Callbacks - NetworkMessages - Discovering Local Players - Scene Object - Multiplayer Lobby - Network Clients andServers - Host migration - Migration Manager Callbacks			

Reference and Text Books:
- Andrew S. Tanenbaum, "Computer Networks", Prentice Hall, 4th Edition, 2002. · Behrus A. Forouzan et al, "Data Communication and Networking", 2nd Edition, TataMcGraw-Hill, 2000.
- Brian Schwab, "Fundamentals of Network Game Development", Cengage Learning, 2008. · Doug Lowe, "Networking All-in-One For Dummies", For Dummies, 5th Edition, 2012.
- Rabin S, editor, "Introduction to game development", Boston: Charles River Media, 2005

Online Resources
- https://docs-multiplayer.unity3d.com/

Course Outcome:		Knowledge level
CO1	Understand network components, security measures, and device functions, including protocols, encryption, and authentication.	K2
CO2	Identify Bluetooth, wireless, and mobile networks across OSI layers, explain TCP, UDP, error handling, and discuss security tools like WPA2, firewalls, and encryption methods.	K3
CO3	Differentiate game types, understand client-server, player objects, and non-player characters.	K4
CO4	Build network players, manage states, handle spawning and scenes, employ matchmaking, and execute remote actions, including spawning with authority, commands, and client RPCs with arguments.	K6
CO5	Proficiently design and implement multiplayer features including network behavior callbacks, local player discovery, lobby creation, and migration management, showcasing practical multiplayer game development skills.	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	L(1)	L(1)	S(3)	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)
CO2	S(3)	L(1)	L(1)	S(3)	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)
CO3	S(3)	L(1)	L(1)	S(3)	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)
CO4	S(3)	M(2)	S(3)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	M(2)
CO5	S(3)	M(2)	S(3)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	M(2)
W.AV	3	1.4	1.8	2.6	1.8	1.6	1.4	2	1.8	2

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	L(1)	M(2)	L(1)	L(1)
CO2	L(1)	L(1)	M(2)	L(1)	L(1)
CO3	L(1)	L(1)	M(2)	L(1)	M(2)
CO4	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	S(3)	M(2)	S(3)	S(3)
W.AV	1.8	1.8	2	1.8	2

S–Strong (3), M-Medium (2), L-Low (1)

IV-Semester – Core						
Core	**Course Code: 83445**	**Digital Modeling - II PRACTICAL**		**P**	**Credits: 3**	**Hours: 5**
Objectives	The objectives of Digital Modeling - II Students will learn 3D modeling and animation skills, including facial modeling, creating a mobile robot, cartoonistic character modeling, lighting techniques, UV unwrapping, and texturing.					

Exercise:

1. Model the face of the Character given by your tutor.
2. Create a Mobile Robot with Wheel rotation animation.
3. Model the Cartoon Style Game asset provided by your tutor in class.
4. Light up the 3D scene using the lights available in Maya
5. Texturing a 3D Hand model after UV unwrapping. Mobile Game Development

Outcomes	**Students will demonstrate proficiency in 3D modeling, animation, and game development through tasks such as creating a mobile robot and a cartoon game asset while showcasing their mastery of lighting techniques and practical texturing skills.**	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	S(3)	M(2)	M(2)	L(1)	M(2)	L(1)	M(2)	M(2)	S(3)
CO2	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	L(1)	M(2)	L(1)	S(3)
CO3	L(1)	S(3)	L(1)	S(3)	L(1)	M(2)	M(2)	L(1)	M(2)	S(3)
CO4	L(1)	S(3)	M(2)	S(3)	L(1)	L(1)	L(1)	L(1)	M(2)	M(2)
CO5	L(1)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	S(3)
W.AV	**1**	**3**	**1.4**	**2.8**	**1.5**	**1.8**	**1.5**	**1.6**	**1.6**	**2.8**

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	M(2)	S(3)	M(2)	M(2)
CO2	L(1)	M(2)	S(3)	M(2)	S(3)
CO3	L(1)	L(1)	S(3)	M(2)	M(2)
CO4	L(1)	M(2)	M(2)	S(3)	M(2)
CO5	L(1)	M(2)	M(2)	M(2)	S(3)
W.AV	**1**	**1.8**	**1.6**	**2.2**	**2.4**

S–Strong (3), M-Medium (2), L-Low (1)

IV – Semester-Allied					
Allied	**Course Code: 83446**	**MOBILE GAME DEVELOPMENT**	**T**	**Credits:** **3**	**Hours:** **3**
Objective		● To study the Java programming concepts and language components ● To develop proficiency in inheritance and multithreading concepts ● Gain proficiency in mobile platform concepts and app development fundamentals. ● Acquire foundational knowledge of game development and graphics libraries. ● Develop proficiency in screen transitions, sensor handling, and game physics.			
UNIT-I		**Introduction to Java:** OOPS Concept - Data Abstraction and Encapsulation - Inheritance, Polymorphism, Dynamic binding. **Tokens of Java:** Identifiers, Operators, Data Types, Primitives- Control statements - Conditional statements - Arrays - Introduction and Implementation, Types of Arrays - Working with Arrays - Wrapper Class and Type Casting - Math and String Class- Constructors-Static Members, this keyword.			
UNIT-II		**Inheritance:** Examples, Types of Inheritance with example- Method Overloading and Overriding- Abstract and Final Classes-Collections and Generic classes-Array List, Vectors-Enumeration. **Threading and MultiThreading:** Thread class and Runnable Interface - Multi threadingusingThread class - Multithreading using Runnable Interface-Synchronization-Exception Handling			
UNIT-III		**Introduction to Mobile Platforms:** Role and Benefits of Mobile Platforms - Elements of a Mobile OS-Activity, Service-UI - Views - Introduction to Development Environment - Understanding the IDE Interface - Understanding Build System - Introduction to build tools - Emulator - Running Application with emulators - Working with Views - Working with Layouts - Activity, Service Input-Implementation - Parsing of external files.			
UNIT-IV		**Introduction to Game Development:** Basics of Graphics Libraries - Introduction to Game Development Framework - Creating a Project - Importing into IDE - Importing Assets - Game Class- Game Life Cycle - Spritebatch - Sprite - Rendering Text - Camera - Setting up the Camera - Screen Interface - Implementation - Viewports - Texture Atlas - Texture Region - Sprite Animation - Handling Input - Touch Input - Input Processor - Gesture Listener			
UNIT-V		**Screen Transition and Handling Sensors:** Particle Effects - Implementation - Parallax Scrolling- Designing Levels - Event Handling - Programming GamePlay - Basic Interactions - IntegratingPhysics Engine - Adding Gravity and other Physics Elements - Working with Physics Bodies- Developing a Complete Game.			

Reference and Text Books:
- Andrew Davison, "Killer Game Programming in Java: Java Gaming & Graphics Programming", O'Reilly Media Inc, 2005.
- David Brackeen, Bret Barker, Laurence Vanhelsuwé, "Developing Games in Java", NewRiders, 2004.
- Davison A, "Vision-based User Interface Programming in Java", Amazon Digital Services, Inc. 2013.
- Patrick Hoey, "Mastering LibGDX Game Development", Packt Publishing Ltd, 2015. 5. Posch M, "Mastering And Engine Game Development", Packt Publishing Ltd, 2015.

Online Resources
- https://developer.android.com/games/guides/basics

Course Outcome:		
CO1	Students will acquire the ability to differentiate between 2D and 3D game concepts, design 2D levels and transition to 3D environments, while also becoming skilled in tools like the Profiler and prefabs for proficient 3D game development.	K1&K2
CO2	Master scripting techniques for 3D game development, including collision detection, event handling, raycasting, animation control, and 3D physics. Apply optimized frame rates, handle exceptions, utilize list collections, and navigate complex game environments using pathfinding and joint types.	K2
CO3	Utilizing camera properties, GUI, cinematic rendering, and global illumination, enhancing their ability to create visually compelling scenes. Implementing advanced rendering techniques, optimizing memory usage, and effectively managing events, resulting in improved performance and immersive 3D game experiences.	K4
CO4	Designing functional game UI, implementing HUD for information sharing, managing sound, and comprehending networking concepts for interactive and platform-ready game development.	K5
CO5	Proficiency in advanced gameplay programming, including event-driven systems, 2D game mechanics, basic AI mechanics, and pathfinding.	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	M(2)	L(1)	M(2)	S(3)	L(1)	L(1)	M(2)	L(1)	S(3)
CO2	S(3)	M(2)	L(1)	M(2)	S(3)	L(1)	L(1)	M(2)	L(1)	S(3)
CO3	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	L(1)	M(2)	M(2)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
W.AV	3	2.4	2	2.4	3	2	1.4	2.4	2	3

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	L(1)	M(2)	L(1)	M(2)
CO2	L(1)	L(1)	M(2)	L(1)	M(2)
CO3	M(2)	M(2)	M(2)	M(2)	M(2)
CO4	S(3)	S(3)	M(2)	S(3)	M(2)
CO5	S(3)	S(3)	M(2)	S(3)	M(2)
W.AV	2	2	2	2	2

S–Strong (3), M-Medium (2), L-Low (1)

IV-Semester – Allied					
Allied	**Course Code:83447**	**MOBILE GAME DEVELOPMENT - PRACTICAL**	**P**	**Credits: 2**	**Hours: 4**
Unit –I					
Objectives	➢ **Acquire hands-on experience in mobile game development through practical projects.** ➢ **Enhance web game development skills by creating interactive and engaging games.** ➢ **Develop a strong understanding of fundamental game mechanics and their implementation.** ➢ **Explore various game design principles and techniques to create enjoyable gaming experiences.** ➢ **Build a solid foundation in programming and problem-solving by creating diverse types of games.**				

1. Develop a clone of the popular Flappy Bird game where the player controls a character by tapping the screen to make it jump and navigate through obstacles.
2. Build a memory matching game where the player flips over cards to find matching pairs within a grid.
3. Create a sliding puzzle game where the player rearranges pieces of an image to complete it.
4. Develop a classic brick-breaking game where the player controls a paddle to bounce a ball and break bricks.
5. Design an endless runner game where the player's character automatically moves forward, and the player must swipe to avoid obstacles and collect items.

Outcomes	● **Attain proficiency in developing mobile and web games, showcasing practical skills in game design and programming.** ● **Exhibit creativity by designing diverse game concepts, fostering imaginative game mechanics and experiences.** ● **Strengthen problem-solving abilities through tackling challenges in game development, fostering critical thinking and analytical skills.** ● **Create engaging and interactive game environments, demonstrating an understanding of user experience and interface design.** ● **Generate a comprehensive portfolio of varied game projects, illustrating competence and versatility in game development to potential employers or educational pursuits.**	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	S(3)	M(2)	S(3)	M(2)	M(2)	M(2)	S(3)	S(3)
CO2	S(3)	S(3)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	S(3)	S(3)
CO4	M(2)	M(2)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	S(3)
CO5	M(2)	M(2)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	S(3)
W.AV	2.6	2.6	2.6	1.6	3	1.6	2	2	3	3

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	M(2)	S(3)
CO2	S(3)	S(3)	M(2)	M(2)	S(3)
CO3	S(3)	S(3)	M(2)	M(2)	S(3)
CO4	M(2)	M(2)	M(2)	S(3)	S(3)
CO5	M(2)	M(2)	M(2)	S(3)	S(3)
W.AV	2.6	2.6	2	2.4	3

S–Strong (3), M-Medium (2), L-Low (1)

		V – Semester-Core			
Core	Course Code: 83451	**GAME ENGINE - II**	T	**Credits:** 4	**Hours:** 4
Objective		● **To understand the essential concepts and tools of game engine usage, including installation, asset creation, and basic scene manipulation.** ● **To learn advanced game development techniques: terrain creation, visual effects, cinematic production, audio integration, and optimization.** ● **Gain expertise in blueprint scripting for game mechanics, AI, and UI design, along with packaging and exporting games.** ● **Attain proficiency in VFX, mechanics, abilities, UI, and level design within game development.** ● **Attain proficiency in game development through the creation of enemy AI, level design, interactive elements, UI, and lighting.**			
UNIT-I		**Introduction to Game Engine:** Installation Process - Project Creation - User Interface Overview-Transform tools - Primitive Geometry - Geometry Editing - Introduction to content browser - BSPSurface - Static Mesh. **Introduction to lighting:** Importing custom static mesh - Creating Material - Diffuse Texture - Landscape Editing Basics.			
UNIT-II		**Importing and Using Height maps:** Terrain Material, Using The Foliage Editor - Normal Maps - emissive Maps - Decals and Opacity masks - Vertex painting, Using Video Texture. **Introduction to sound:** Destruction Meshes - Matinee - Introduction-Creating Cinematic and cut scene - Using Particle Systems - Matinee soundtracks - Matinee Skeletal Mesh Animation - Fade Director Tracks - Audio Master Tracks - Volume Introduction - Post Processing - Level Streaming Quick Start - Creating Prefab-Creating Water with Swimming Feature.			
UNIT-III		**Introduction to blueprint:** Blueprint classes - Blueprint input key binding - Blueprint VariableTypes and Math Functions - How To Create AI And Enemy Basics - Setting Up AI Roaming and Destinations- Health System. **Introduction To UI Widgets:** Creating A HUD - Creating HUD Bindings - Basic UM GUI Animation - Floating UI Widget Component - Loading Screens - Main Menu - Styling MainMenu- Adding Main Menu Functionality - Gamepad Inputs - Showing Game Mouse Cursor - PauseMenuFunctionality - Styling Pause Menu - Packaging and Export – Settings			
UNIT-IV		**Cascade VFX:** Spark Emitter - Cascade GPU Sprites - Cascade Mesh Emitters - Save/Load Game - SaveGame Data - Check Point System - Teleporting Players - Side Scroller Game - Basic Mechanics and Health - Working on The Fuel System - The Health bar - The Fuel Bar - Pickup Items. **Game Countdown Timer**: Speed Boost Ability - Gravity Boost Ability - Slow Motion Ability - Level CompleteScreen - Time Up Screen -Death Animation and Function - Exploding Obstacle - Damaging Player WithFire - Low Health Vignette Effect - Opening Door With Key - Coin Pickup and Counter - MainMenu - Level Selection - Ability Cool Down System - Animated Cool Down Timer			
UNIT-V		**Creating Basic Enemy Bot AI:** Regenerating Health System - Blocking Out The Level - Creating a moving Platform - Crushing Pillar - Using Structural Meshes - Decorating Our Level - Ability Popup Messages - Animated Popup Messages - Death / Game Over Screen - Lighting Our Level - Creating the Flashlight - Adding The Battery - Cleaning Up Our Blueprints.			

Reference and Text Books:
- Alan Thorn, "UDK Game Development", Course technology, 2012.
- Lee, J, "Learning Unreal Engine Game Development", Packt Publishing Ltd, 2016.
- Plowman, J, "3D game design with Unreal Engine 4 and Blender", PacktPub, 2016.
- Satheesh, P. V, "Unreal Engine 4 Game Development Essentials", Packt Publishing Ltd, 2016.
- Thomas Mooney, "Unreal Development Kit Game Design Cookbook", Packt PublishingLtd, 2012

Online Resources
- https://www.unrealengine.com/en-US/learn

Course Outcome:

CO1	Able to navigate the game engine interface, create and modify basic game assets, and explain the significance of different components within a game development environment.	K3
CO2	Showcase proficiency in height maps, material creation, visual enhancements, cinematic sequencing, audio integration, ParticleSystems, level optimization, and water mechanics for game development.	K3 to K5
CO3	Students will proficiently create blueprints, design AI behaviors, craft UI elements, and package/export functional game projects using blueprint scripting.	K5
CO4	To design VFX using Cascade, implement game mechanics like abilities and pickups, create engaging UI elements including timers and counters, and construct well-structured levels with interactive features.	K4
CO5	Implement basic enemy AI, design interactive levels with moving platforms and hazards, integrate UI elements like ability and popup messages, apply dynamic lighting, and manage blueprint organization.	K5

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	M(2)	S(3)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO2	S(3)	M(2)	S(3)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	S(3)	M(2)	S(3)	M(2)	S(3)	S(3)	L(1)	M(2)	S(3)	S(3)
CO4	S(3)	M(2)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
W.AV	3	2.2	3	2.4	3	3	1.8	2	3	3

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	S(3)	S(3)
CO2	S(3)	S(3)	M(2)	S(3)	S(3)
CO3	S(3)	S(3)	L(1)	S(3)	S(3)
CO4	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	S(3)	M(2)	S(3)	S(3)
W.AV	3	3	1.8	3	3

S–Strong (3), M-Medium (2), L-Low (1)

V-Semester – Core						
Core	Course Code:83452	**GAME ENGINE II- PRACTICAL**		P	Credits: 4	Hours: 6
Objectives	➢ **Create intricate environments demonstrating advanced level design principles.** ➢ **Experiment with lighting configurations to evoke varying emotional responses in the game environment.** ➢ **Build comprehensive character blueprints that include movement, interactions, animations, and sound integration.** ➢ **Design interactive objects, employing Blueprints for seamless character interaction and providing visual and audio feedback.** ➢ **Construct functional HUD/UI elements, such as health and ammo indicators, utilizing for player convenience.**						

1. **Level Design and Lighting in Unreal Engine:**
   a. Create a small environment with detailed level design.
   b. Experiment with different lighting setups to evoke different moods.
2. **Character Blueprint in Unreal Engine:**
   a. Develop a character blueprint with basic movement and interactions.
   b. Implement animations and sounds for character actions.
3. **Interactive Objects in Unreal Engine:**
   a. Design objects that the character can pick up or interact with.
   b. Use Blueprints to handle object interaction and feedback.
4. **User Interface (UI) Design in Unreal Engine:**
   a. Design and implement a HUD/UI with health, ammo, and other essential indicators.
   b. Use UMG to create functional UI elements.
5. **AI Enemy Behavior in Unreal Engine:**
   a. Create AI enemies with simple behaviors like patrolling or following.
   b. Integrate AI perception to detect the player and react accordingly.
6. **Physics and Destruction in Unreal Engine:**
   Set up physics-based interactions, like breakable objects or moving platforms.

Outcomes	● **Generate a well-detailed environment exhibiting a profound understanding of level design techniques.** ● **Display expertise in employing diverse lighting setups to manipulate ambiance and emotion within the game world.** ● **Develop character blueprints, incorporating movement, interaction, animation, and sound elements for immersive gameplay.** ● **Create interactive objects within the game, utilizing Blueprints for smooth interaction mechanics and delivering player feedback.** ● **Implement a functional HUD/UI with essential indicators, skillfully utilizing UMG to enhance the player's experience.**	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	M(2)	S(3)	M(2)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
CO2	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	M(2)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	3	2.6	3	2.4	3	3	2.4	3	3	3

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	S(3)	M(2)
CO2	S(3)	S(3)	M(2)	S(3)	M(2)
CO3	S(3)	S(3)	M(2)	S(3)	S(3)
CO4	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	S(3)	M(2)	S(3)	S(3)
W.AV	3	3	2	3	2.6

S–Strong (3), M-Medium (2), L-Low (1)

		V-Semester - Elective – I			
DSE	**Course Code: 83453A**	**1. ANIMATION FOR GAMES-PRACTICAL**	**P**	**Credits: 4**	**Hours: 6**
Objectives		➢ **Understand the fundamental principles of animation, including concepts like timing, spacing, and keyframes.** ➢ **Explain the significance of animation principles such as stretch and squash in creating dynamic and visually appealing character movements.** ➢ **Apply animation techniques to develop idle, attack, and movement sequences for the assigned character in a game environment.** ➢ **Evaluate the character's traits and style to design a heavy attack animation that aligns with their personality and the gameplay mechanics of a 2.5D fighting game.** ➢ **Combine multiple animation principles to create a cohesive animation set for the provided ball, demonstrating a deep understanding of how different principles interact to enhance motion realism.**			

Exercise:
1. **Create game Ready Animation** for all of the 3 given movements. a. Idleb. Attack c. Forward walk
2. **Create an acrobatic action Animation** of 5 seconds for a parkour game
3. **Create an animation** using only the 2 principles stretch and squash . for the given Rigged Ball
4. **Create an heavy attack animation** for a 2.5D Fighting Game
5. **Animate the given rigged Ball** using multiple principles of animation example . anticipation, stretch and squash , follow through etc .

Outcomes	● **Produce animations for idle, attack, and movement that exhibit proficiency in using animation software and tools.** ● **Develop a short acrobatic action animation that effectively showcases the character's abilities and captivates the audience within a limited 5-second timeframe.** ● **Implement the stretch and squash technique to the pillow's jumping animation, resulting in a dynamic and visually convincing depiction of elasticity and physics.** ● **Design a heavy attack animation that not only emphasizes power but also reflects the character's personality and fits seamlessly into the context of a 2.5D fighting game.** ● **Produce a comprehensive animation set for the ball, integrating principles like anticipation, follow-through, and secondary motion to simulate realism and enhance engagement in the game environment.**	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)
CO2	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
W.AV	2.4	2.6	2.4	2.2	2.2	2	2.2	2.2	2.4	2

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	M(2)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
W.AV	2.4	2.6	2.6	2.2	2.4

S–Strong (3), M-Medium (2), L-Low (1)

V-Semester - Elective – I						
DSE	Course Code: 83453B	2. GAME ENGINE CUSTOMIZATION- PRACTICAL	P	Credits: 4	Hours: 6
Objectives	● **Understand the role and components of game engines in game development.** ● **Develop skills in customizing graphics rendering within game engines.** ● **Gain proficiency in customizing physics simulations for interactive gameplay.** ● **Learn how to integrate and customize audio and animations for immersive experiences.** ● **Acquire scripting skills to implement and enhance gameplay mechanics.**					

Exercise:

1. How would you improve visual quality in a game by customizing the engine's graphics settings?
2. Describe the steps to allow players to remap controls in a game engine.
3. Explain how you'd add multiplayer functionality to a game engine that doesn't have it.
4. How do you customize a game engine for multilingual support?
5. Discuss implementing custom shaders for a unique visual effect.
6. What adjustments might you make to achieve specific physics behaviors in a game?
7. How do you implement a dynamic lighting system in a game engine?
8. Give an example of customizing the UI in a game where the default doesn't meet requirements.
9. Describe strategies for optimizing loading times and resource management in a game engine.
10. Explain steps for customizing a game engine to ensure compatibility across different devices.

Outcomes	● **Able to explain the purpose of game engines and identify their key components.** ● **To create and integrate custom shaders to achieve specific visual effects in games.** ● **To modify physics behaviors to create dynamic interactions and engaging game mechanics.** ● **To integrate interactive audio elements and apply customized animations to enhance game aesthetics.** ● **Develop functional scripts to create dynamic gameplay systems and interactions.**	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)
CO2	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)	M(2)	S(3)	M(2)	S(3)
W.AV	3	3	3	2.2	3	2.4	2	2.6	2.4	2.8

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	L(1)	L(1)
CO2	S(3)	S(3)	M(2)	L(1)	M(2)
CO3	S(3)	L(1)	M(2)	L(1)	M(2)
CO4	S(3)	S(3)	M(2)	L(1)	S(3)
CO5	S(3)	S(3)	M(2)	M(2)	S(3)
W.AV	3	2.6	2	1.2	2.2

S–Strong (3), M-Medium (2), L-Low (1)

		V-Semester - Elective – I			
DSE	**Course Code: 83453C**	**3. SOUND ENGINE FOR GAMES-PRACTICAL**	**P**	**Credits: 4**	**Hours: 6**
Objectives		• **Understand the significance of sound design in gaming and its impact on player experience.** • **Develop skills in recording and editing sound to create polished audio assets.** • **Learn how to create dynamic and interactive audio experiences using scripting.** • **Gain proficiency in integrating spatial audio techniques for realistic in-game soundscapes.** • **Understand how sound can convey emotions and contribute to storytelling in games**			

Exercise:

1. Explain how you would use the sound engine to create realistic environmental audio. Consider factors like echo in caves, wind in open spaces, and rustling leaves in a forest.
2. Describe the implementation of dynamic weather-related sounds. How would you customize the sound engine to seamlessly transition between different weather conditions, such as rain, thunder, and wind?
3. Discuss how you would use the sound engine to enhance character interactions. For example, footsteps, combat sounds, and voice lines. How can you make these sound effects responsive to in-game events?
4. Explain the concept of spatial audio and how you would implement it in the sound engine to enhance the player's sense of direction and immersion within the game world.
5. How would you customize the sound engine to incorporate audio feedback for user interface interactions? Consider elements like button clicks, menu navigation sounds, and notifications.
6. Discuss strategies for optimizing the performance of the sound engine. How can you ensure that the game runs smoothly while delivering high-quality audio?

Outcomes	• **Able to articulate the importance of sound in games and describe its role in enhancing player immersion.** • **Able to record and edit sound using digital audio workstations (DAWs) to produce high-quality audio assets for games.** • **Implement interactive audio elements in games using scripting languages to enhance gameplay immersion.** • **Integrate spatial audio into game environments, creating a sense of depth and directionality in sound.** • **Design soundscapes that evoke emotions and enhance narrative elements, showcasing the storytelling potential of sound.**	**K6**

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	S(3)	L(1)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)
CO2	S(3)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)
CO3	S(3)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	M(2)	M(2)	S(3)	M(2)	S(3)	M(2)	S(3)
W.AV	3	2.6	2.4	2.2	2.4	2.4	2	2.6	2.4	2.8

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	L(1)	L(1)
CO2	S(3)	L(1)	M(2)	M(2)	M(2)
CO3	S(3)	L(1)	M(2)	L(1)	M(2)
CO4	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	S(3)	M(2)	S(3)	S(3)
W.AV	3	2.2	2	2	2.2

S–Strong (3), M-Medium (2), L-Low (1)

		V – Semester-Elective –II			
DSE	**Course Code:83454A**	**1. ARTIFICIAL INTELLIGENCE FOR GAMES**	**T**	**Credits: 4**	**Hours: 4**
Objective		● To learn the fundamental concepts of problem-solving in artificial intelligence, including problem spaces, search techniques, and production system characteristics. ● To educate the intricacies of implementing diverse AI strategies in game development, encompassing roaming, patterned behavior, chasing, evading, backtracking, and strategic decision-making. ● To acquire a solid grasp of various advanced AI methods used in games, spanning pathfinding, rule-based systems, fuzzy logic, genetic algorithms, and neural networks. ● Gain proficiency in diverse knowledge representation methods, including production and frame-based systems, fuzzy reasoning, Bayesian networks, and advanced plan generation techniques. ● Comprehend expert systems' architecture, knowledge acquisition, meta knowledge, and the integration of AI techniques for intelligent agents in games.			
UNIT-I		**Introduction to Artificial Intelligence:** The AI Problems - AI Technique - The Level of the Model - Criteria for success - Problems, Problem Spaces and Search : Defining the problem as a StateSpaceSearch - Production System Characteristics - Issues in the Design of Search Programs.			
UNIT-II		**Game Artificial Intelligence:** Types of AI - Roaming AI - Patterned Roaming , Chasing Evading- Backtracking - Creating Grid Based Canvas - Behavioral AI - State change - Strategically AI - HowtoCreate Strategically AI in Games - The importance of good Game AI. The differences between Game AI and AI and their relative advantages and disadvantages			
UNIT-III		**Deterministic and Non deterministic:** consideration for Game AI & AI systems Pathfinding - A* and its derivatives - Flocking and Steering AI - Rule Based Systems - Finite State Machines - Patterning and Way point - Chasing and Evading - Fuzzy Logic and Fuzzy State Machines - Genetic Algorithms- Artificial Neural Networks - Rule based AI			
UNIT-IV		**Knowledge representation:** Production based system - Frame based system - Inference – Backward chaining - Forward chaining - Rule value approach - Fuzzy reasoning – Certainty factors - Bayesian Theory - Bayesian Network-Dempster – Shafer theory - Basic plan generation systems – Strips- Advanced plan generation systems – K strips			
UNIT-V		**Expert systems:** Architecture of expert systems - Roles of expert systems – Knowledge Acquisition – Meta knowledge - Heuristics. - Applied AI : Combining AI techniques to produce Intelligent Agents - Strategic AI : The Future for AI in games			

Reference and Text Books:
- Copeland J, "Artificial intelligence: A philosophical introduction", John Wiley & Sons, 2015.
- David L. Poole, Alan K. Mackworth, "Artificial Intelligence: Foundations of Computational Agents", Cambridge University Press, 2010.
- Elaine Rich, Kevin Knight, Shivashankar B Nair, "Artificial Intelligence", Tata McGraw-Hill publishing, 2009.
- Rich, "Artificial Intelligence 3E (Sie)", Tata McGraw-Hill Education, 2004.
- Russell SJ, Norvig P, "Artificial intelligence: a modern approach", Pearson EducationLimited, 2016.

Online Resources
- Artificial Intelligence

Course Outcome:		Knowledge level
CO1	Deconstruct problems into state space models, employ diverse search methods, and construct rudimentary production systems, demonstrating an awareness of search program design challenges.	K3
CO2	To apply AI techniques in games, create behavioral patterns, and recognize the significance of effective Game AI, while understanding differences and trade-offs between Game AI and general AI.	K4
CO3	To implement a range of advanced AI strategies, enhancing games through efficient pathfinding, complex behaviors, adaptive decision-making, evolutionary optimization, and learning-based actions.	K5
CO4	To apply these techniques to represent knowledge, utilize reasoning mechanisms, and design effective plans in AI systems.	K5
CO5	To create expert systems, gather knowledge, use meta knowledge, combine AI techniques for intelligent agents, and recognize the significance of strategic AI for the gaming future.	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	S(3)	L(1)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)
CO2	M(2)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	M(2)	M(2)	S(3)
CO3	M(2)	M(2)	M(2)	L(1)	S(3)	M(2)	M(2)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	M(2)	M(2)	S(3)	M(2)	M(2)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)
W.AV	2.6	2.6	2.4	1.8	2	2	2	2.6	2.4	2.8

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	L(1)	L(1)
CO2	S(3)	L(1)	M(2)	M(2)	M(2)
CO3	S(3)	L(1)	M(2)	L(1)	M(2)
CO4	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	S(3)	M(2)	S(3)	S(3)
W.AV	3	2.2	2	2	2.2

S–Strong (3), M-Medium (2), L-Low (1)

		V – Semester-Elective -II			
DSE	**Course Code: 83454B**	**2. SHADER PROGRAMMING**	**T**	**Credits:** **4**	**Hours:** **4**

Objective	- Understand the role of shaders in graphics programming, shading languages, and different types of shaders. - Explore uniforms, built-in variables, functions, and the process of creating, compiling, and running shader programs. - To educate lighting principles, surface normals, different types of lights, and effects like cartoon shading and fog. - Familiarize texture mapping techniques, different types of textures, and image-based lighting. - Understand image manipulation operations, filters, and various shader effects.
UNIT-I	**Shaders:** Introduction - Applications - Shading Languages - GLSL - Introduction - Types of Shaders- Vertex Shaders - Geometry Shaders - Fragment Shaders - Tessellation Shaders - Primitive Shaders- Vertex Data - Vertex Attributes - Vertex Arrays - Fragment Data.
UNIT-II	**Uniforms:** Built in variables - Build in Functions - Creating Shader Program - Running the Shader-Shader Compilation & Linking - Algorithmic Drawing - Matrices - Shapes - Colors - Transformations- Translations - Animation - Depth Buffering
UNIT-III	**Lighting:** Lighting Principles - Surface Normals - Light Normals - Light Material - MultiplePositional Lights - Directional Light - Spot Light - Cartoon Shading Effect - Fog Effects
UNIT-IV	**Textures:** Image Operations - Texture Mapping - Texture Objects - Multiple Textures - Alpha Maps- Normal Maps - Cube Maps - Image based Lighting - Mipmap - Projected Texture
UNIT-V	**Image Operations:** Filters - Edge Detection Filter - Gaussian Blur Effect - Bloom Effect - GammaCorrections - Anti aliasing - Mesh Shader - Smoothing - Silhouette Effects - Reflection Map- BumpMap

Reference and Text Books:
- "OpenGL Shading Language" by Randi J. Rost -UNIT-I
- "OpenGL SuperBible: Comprehensive Tutorial and Reference" by Graham Sellers, Richard S. Wright Jr., and Nicholas Haemel- UNIT-II
- "Real-Time Rendering, Fourth Edition" by Tomas Akenine-Möller, Eric Haines, Naty Hoffman- UNIT-III
- "OpenGL Programming Guide: The Official Guide to Learning OpenGL, Version 4.5" by Dave Shreiner, Graham Sellers, John M. Kessenich, Bill M. Licea-Kane - UNIT-IV
- "OpenGL Insights" edited by Patrick Cozzi and Christophe Riccio - UNIT-V

Online Resources
- Shader Programming

Course Outcome:		Knowledge level
CO1	Able to differentiate between vertex, geometry, fragment, tessellation, and primitive shaders, and grasp the concept of vertex attributes and arrays for rendering graphics.	K2
CO2	To apply uniforms, use built-in variables and functions, create and run shader programs, and understand how matrices, shapes, colors, transformations, translations, and animations are applied in shader-based rendering.	K3
CO3	To apply lighting concepts, calculate normals, implement multiple lights including directional and spot lights, and create special effects like cartoon shading and fog in graphics scenes.	K3
CO4	Able to use textures, implement techniques like texture mapping, alpha maps, normal maps, and cube maps, and understand the concept of image-based lighting and mipmap generation.	K3
CO5	To apply filters, create shader effects, and understand advanced graphics techniques.	K5

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	S(3)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)
CO2	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)	M(2)	S(3)	M(2)	S(3)
W.AV	3	3	3	2.2	3	2.4	2	2.6	2.4	2.8

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	L(1)	L(1)
CO2	S(3)	S(3)	M(2)	M(2)	M(2)
CO3	S(3)	L(1)	M(2)	M(2)	M(2)
CO4	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	S(3)	M(2)	S(3)	S(3)
W.AV	3	2.6	2	2.2	2.2

S–Strong (3), M-Medium (2), L-Low (1)

V – Semester-Elective -II					
DSE	**Course Code: 83454C**	**3. CINEMATICS IN GAMES**	**T**	**Credits:**	**Hours:**
				4	**4**
Objective		● **Cinematics in games tell the story, evoke emotions, and visually enhance the gaming experience. They provide narrative depth, showcase characters, and create a more immersive and exciting gameplay journey. Ultimately, cinematics aim to engage players by combining storytelling, emotion, and visual appeal within the gaming environment.**			
UNIT-I		**Introduction to Digital Media** Overview of Digital Media Production - Historical context and evolution of digital media - Basic principles of visual and auditory elements - Introduction to digital media tools and software			
UNIT-II		**Video Editing Fundamentals** Basics of video editing software - Cutting, trimming, and assembling video clips - Adding transitions and effects - Understanding timelines and layers			
UNIT-III		**Audio Editing and Enhancement** Introduction to audio editing tools - Cleaning and enhancing audio recordings - Adjusting volume, pitch, and other audio elements - Adding background music and sound effects			
UNIT-IV		**Graphics and Animation** Basics of graphic design for digital media - Introduction to animation principles - Creating and incorporating graphics and animations in videos - Exploring graphic design software			
UNIT-V		**Final Project and Advanced Topics** Planning and executing a digital media project - Advanced video and audio editing techniques - Incorporating graphics, animation, and sound in a final project - Presentations and peer reviews			

Reference and Text Books:
Textbook: "Digital Media Production Handbook"
Author: John A. Author

Online Resources
Film Riot

Course Outcome:		
CO1	Cinematics add depth to a game's narrative, conveying plot intricacies and character developments through visually engaging scenes.	**K2**
CO2	Through cinematic elements, games can evoke a range of emotions, enhancing the player's connection to the characters and the overall gaming experience.	**K3**
CO3	Cinematics contribute to the game's visual appeal, showcasing environments, effects, and characters in a more cinematic and impactful manner.	**K2**
CO4	When done well, cinematics seamlessly integrate with gameplay, ensuring a smooth transition that maintains player immersion.	**K5**
CO5	Cinematics control the pacing of the game, influencing the overall atmosphere by introducing moments of tension, excitement, or reflection.	**K6**

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)	L(1)	M(2)
CO2	L(1)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)
CO3	M(2)	L(1)	S(3)	M(2)	S(3)	M(2)	S(3)	M(2)	M(2)	S(3)
CO4	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	2	1	2.8	2.4	2.6	2.2	2.4	1.8	2.4	2.8

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	M(2)	L(1)	M(2)
CO2	S(3)	M(2)	S(3)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	2.8	2.6	2.8	2.4	2.8

S–Strong (3), M-Medium (2), L-Low (1)

		V – Semester-Elective –III			
DSE	**Course Code: 83455A**	**1. EMERGING TRENDS**	**T**	**Credits: 4**	**Hours: 4**
Objective		● Understand VR goals, definitions, hardware, sensation and perception, geometric modeling, and transformation concepts. ● To learn axis-angle representations, quaternions, homogeneous transformations, and viewing transforms. ● Explore light interpretation, refraction, depth perception, motion perception, orientation tracking, and correction techniques. ● To educate AR classification, image acquisition, feature extraction, matching, and verification techniques. ● Understand IoT concepts, sensing, actuation, networking, communication protocols, and data handling.			
UNIT-I		**Introduction to VR:** Goals and VR Definitions - Birds-eye view - Birds-eye view Software - Bird's-eyeviewHardware - Birds-eye view Sensation and Perception - Geometric modeling - Transformation- Matrices and rotation - Pitch Yaw and Roll			
UNIT-II		**Axis-Angle Representations:** Quaternions - Converting and Multiplying Rotations - HomogeneousTransformations - Viewing Transforms - Eye Transforms - Canonical View Transform- ViewportTransformation			
UNIT-III		**Three interpretations of light:** Refraction - Lens aberrations - Light intensity - Eye movement - Depth perception - Motion perception - Orientation tracking - Tilt Drift Correction - YawDriftCorrection - Tracking with Camera - Perspective n-point Problem - Filtering			
UNIT-IV		**Introduction to AR:** Classification based on Sensor, Vision and Hybrid Tracking - Image Acquisition- Feature extraction - Feature Matching - Geometric Verification - Associated Information Retrieval - Feature Extraction Techniques - SIFT - SURF			
UNIT-V		**Introduction to IoT:** Sensing - Actuation - Networking - Communication Protocols - SensorNetworks - Machine-to-Machine Communication - BCI - Neuro Gaming - Data HandlingandAnalytics - Sensor Cloud - Smart Grid			

Reference and Text Books:
- K. S. Hale and K. M. Stanney, "Handbook on Virtual Environments", 2nd edition,CRC Press, 2015.
- Mayer R, Mayer RE, "The Cambridge handbook of multimedia learning", Cambridge university press; 2005.
- Sadowski W, Stanney K, "Presence in virtual environments", 2002.
- Weinersmith, K. and Weiner, Z. "Soonish: Ten Emerging Technologies That'll Improve And/orRuin Everything", 2017.
- Weiss J, Nolan J, Hunsinger J, Trifonas P, "The international handbook of virtual learning environments", Dordrecht, Netherlands Springer, 2006.

Online Resources
- <u>EMERGING TRENDS</u>   <u>Virtual Reality</u>   <u>Virtual reality</u>

Course Outcome:		Knowledge level
CO1	Able to differentiate VR components, describe sensation and perception in VR, and apply geometric transformations and matrices for creating immersive experiences.	K2
CO2	To use axis-angle and quaternion representations for rotations, perform transformations, and apply viewing transforms for VR scenes.	K3
CO3	Able understand light interactions, depth perception mechanisms, motion perception cues, and implement orientation tracking while considering correction methods for VR experiences.	K2
CO4	To classify AR tracking methods, extract features from images, match and verify features, and retrieve associated information in augmented reality contexts.	K5
CO5	Explore IoT components, design sensing systems, analyze protocols, handle IoT data, and grasp IoT's impact on networks and data.	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	S(3)	L(1)	S(3)	M(2)	M(2)	S(3)	M(2)	S(3)
CO2	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	L(1)	S(3)	M(2)	S(3)
CO4	S(3)	S(3)	S(3)	M(2)	S(3)	M(2)	M(2)	S(3)	M(2)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	M(2)	S(3)	M(2)	S(3)
W.AV	3	3	3	2.4	3	2	1.8	2.8	2	3

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	L(1)	L(1)
CO2	S(3)	S(3)	S(3)	L(1)	M(2)
CO3	S(3)	S(3)	S(3)	L(1)	M(2)
CO4	S(3)	S(3)	S(3)	L(1)	S(3)
CO5	S(3)	S(3)	S(3)	M(2)	S(3)
W.AV	3	3	3	1.2	2.2

S–Strong (3), M-Medium (2), L-Low (1)

		V – Semester-Elective -III			
DSE	**Course Code: 83455B**	**2. LEVEL DESIGN**	**T**	**Credits:**	**Hours:**
				4	**4**
Objective		**Gain a foundational understanding of game level design principles, the role of level designers, and the analysis of successful game levels.** **Develop skills in spatial design, creating balanced gameplay spaces, and applying structural storytelling techniques.** **Learn to infuse narrative elements into environments, evoke mood and emotion through design, and prioritize player-centered engagement.** **Acquire proficiency in designing challenges, pacing, interactive elements, and feedback systems for dynamic gameplay experiences.** **Master rapid prototyping, iterative playtesting, level optimization for performance, and the creation of a compelling level design portfolio.**			
UNIT-I		**Fundamentals of Game Level Designing:** Importance of Game Levels - Gameplay and Level Design - Evolution of Level Design - Player-Centric Design - Flow and Pacing - Spatial Design and Layout - Environmental Storytelling - Navigation and Wayfinding - Balancing Challenges and Progression - Difficulty Curves and Dynamic Adjustments - Reward Structures and Motivation			
UNIT-II		**Level Layout and Flow:** Balance, contrast, scale, and rhythm - Integrating real-world design concepts - World Building - Lighting - Color Schemes - Narrative Integration - Spatial Design - Flow, Variety - "Three-Act Structure" - Story, Pacing			
UNIT-III		**Environmental Storytelling and Engagement:** Storytelling - Narrative Elements - Props, Hidden - Mood and Emotion - Atmosphere - Player-Centric Design - Experience, Balance			
UNIT-IV		**Gameplay Mechanics and Interactivity:** Mechanics - Challenges - Balancing, Pacing - Interactivity - Feedback, Rewards			
UNIT-V		**Level Prototyping, Optimization, and Portfolio:** Rapid Prototyping - Playtesting, Iteration - Performance Optimization - Efficiency - Portfolio and Career - Showcasing, Paths			

Reference and Text Books:
- "The Art of Game Design: A Book of Lenses" by Jesse Schell
- "The Design of Everyday Things" by Don Norman
- "Designing with Pixar: 45 Activities to Create Your Own Characters, Worlds, and Stories" by John Lasseter
- "The Art of Game Design: A Deck of Lenses" by Jesse Schell
- "Level Up! The Guide to Great Video Game Design" by Scott Rogers

Online Resources
- Extra Credits (YouTube channel on game design concepts)
- "Flow in Games" by Jenova Chen (TED Talk)
- GDC Vault (Website with conference presentations on game development)
- "Understanding Gameplay" by Mark Brown (YouTube series)
- "The GameDev Business Handbook" by Mike Rose

Course Outcome:		
CO1	Understand the foundational principles of game level design, recognize the role of a level designer, and evaluate successful game levels.	K2&K3
CO2	Develop the ability to create well-balanced gameplay spaces, implement the "Three-Act Structure" effectively, and understand the importance of spatial design.	K3
CO3	Gain skills in integrating narrative elements into environments, evoking emotions through level design, and prioritizing player immersion.	K4
CO4	Acquire expertise in designing engaging challenges, optimizing pacing, implementing interactive elements, and creating effective feedback systems.	K4
CO5	Master the art of rapid prototyping, conduct iterative playtesting, optimize levels for performance, and compile a compelling level design portfolio for professional advancement.	K5

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)
CO2	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
W.AV	2.4	2.6	2.4	2.2	2.2	2	2.2	2.2	2.4	2

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	M(2)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
W.AV	2.4	2.6	2.6	2.2	2.4

S–Strong (3), M-Medium (2), L-Low (1)

V – Semester-Elective -III					
DSE	**Course Code: 83455C**	**3. GAME PSYCHOLOGY**	**T**	**Credits:** **4**	**Hours:** **4**
Objective		**The objective of game psychology is to create captivating and emotionally resonant gaming experiences.** **It seeks to understand and leverage psychological principles to engage players, elicit emotions, and motivate sustained enjoyment.** **By fostering immersion, social connections, and positive player experiences, game psychology aims to enhance player satisfaction, motivation, and overall well-being within the gaming environment.**			
UNIT-I		**Overview and Importance:** Introduction to Game Psychology - Historical Perspectives on Game Design - Impact of Psychology on Player Engagement - Case Studies: Successful Games and Psychological Principles **Player Behavior Analysis:** Understanding Player Motivations - Player Types and Profiles - The Role of Game Mechanics in Behavior - Class Activity: Analyzing Player Behavior in Popular Games			
UNIT-II		**Intrinsic vs. Extrinsic Motivation:** Motivational Theories Applied to Games - Gamification Principles - Designing for Intrinsic Motivation - Project: Gamification Design Exercise **Player Progression and Rewards:** Progression Systems in Games - Reward Structures and Incentives - Case Studies: Successful Implementation of Rewards			
UNIT-III		**Emotion and Player Experience:** Impact of Storytelling on Emotions - Emotional Design Elements: Graphics, Sound, and Narrative - Analyzing Emotional Moments in Games - Designing Emotionally Engaging Game Scenes **Player Immersion and Presence:** Creating Immersive Environments - Virtual Reality and Immersion - Project: Designing an Immersive Game Environment - Final Project Proposal			
UNIT-IV		**Multiplayer Dynamics:** Social Aspects of Online Gaming - Player Collaboration and Competition - Analyzing Social Features in Successful Games - Group Project: Designing a Multiplayer Game Concept **Online Communities and Social Gaming:** Building and Managing Gaming Communities - Ethical Considerations in Social Gaming - Class Discussion: Online Gaming Communities - Final Project Work			
UNIT-V		**Player Well-being and Ethics:** Balancing Engagement and Well-being - Ethical Challenges in Game Design - Case Studies: Ethical Dilemmas in Game Development - Debate: Ethical Considerations in Game Design **Emerging Technologies and Future Trends:** The Role of Artificial Intelligence in Games - Virtual and Augmented Reality Trends - Final Project Presentation and Evaluation - Course Reflections			

Reference and Text Books:
- "Rules of Play: Game Design Fundamentals" by Katie Salen and Eric Zimmerman
- "The Psychology of Video Games" by Jamie Madigan
- "Game Feel: A Game Designer's Guide to Virtual Sensation" by Steve Swink
- "Cognition in the Wild" by Edwin Hutchins

Online Resources
https://www.psychologyofgames.com/

Course Outcome:		
CO1	Grasp the psychological factors influencing player motivations, preferences, and decisions in video games.	**K1&K2**
CO2	Apply psychological principles to design games that engage players effectively, considering elements like narrative, rewards, and challenges.	**K2**
CO3	Critically analyze existing games, identifying psychological elements contributing to success or areas for improvement.	**K4**
CO4	Recognize ethical considerations in game design, understanding the impact of games on player well-being and societal perceptions.	**K5**
CO5	Apply theoretical knowledge to practical situations, creating gamified systems, designing emotionally engaging scenes, and implementing motivational features.	**K6**

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)	L(1)	M(2)
CO2	L(1)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)
CO3	M(2)	L(1)	S(3)	M(2)	S(3)	M(2)	S(3)	M(2)	M(2)	S(3)
CO4	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	**2**	**1**	**2.8**	**2.4**	**2.6**	**2.2**	**2.4**	**1.8**	**2.4**	**2.8**

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	M(2)	L(1)	M(2)
CO2	S(3)	M(2)	S(3)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	**2.8**	**2.6**	**2.8**	**2.4**	**2.8**

S–Strong (3), M-Medium (2), L-Low (1)

V-Semester - Core					
Core	Course Code: 83456	Portfolio & Presentation - Practical	P	Credits: 4	Hours: 6
Objectives	➢ **Curate a portfolio showcasing a range of multimedia projects, demonstrating versatility and expertise** ➢ **Incorporate consistent branding elements to establish a recognizable and professional personal identity.** ➢ **Highlight key achievements and successful projects to demonstrate skills, experience, and impact** ➢ **Include interactive elements, such as clickable links and engaging content, to captivate and impress viewers.** ➢ **Feature endorsements and recommendations to build credibility and showcase positive professional relationships.**				
1. Curate a portfolio showcasing a range of multimedia projects, demonstrating versatility and expertise 2. Incorporate consistent branding elements to establish a recognizable and professional personal identity. 3. Highlight key achievements and successful projects to demonstrate skills, experience, and impact 4. Include interactive elements, such as clickable links and engaging content, to captivate and impress viewers. 5. Feature endorsements and recommendations to build credibility and showcase positive professional relationships.					
Outcomes	➢ **Produce a portfolio that, demonstrates understanding and articulation, through** ➢ **drawings, concepts sketches, design documents and presentation an understanding of** ➢ **the design elements of the medium of their specialization.** ➢ **Develop Game that, will demonstrate the critical aspects of development as a media** ➢ **professional in the medium of specialization.** ➢ **Respond effectively to questions following oral presentation.**				

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M(2)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)	M(2)	L(1)
CO2	S(3)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)
CO5	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
W.AV	2.4	2.6	2.4	2	2.2	2.2	2	2.6	2.4	2

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	M(2)	S(3)	S(3)	M(2)
CO2	M(2)	M(2)	S(3)	S(3)	S(3)
CO3	M(2)	M(2)	S(3)	S(3)	S(3)
CO4	S(3)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	M(2)	M(2)	M(2)	S(3)
W.AV	2.4	2	2.6	2.8	2.6

S–Strong (3), M-Medium (2), L-Low (1)

		VI – Semester-Core			
Core	Course Code: 83461	GAME DESIGN CHALLENGES	T	Credits:	Hours :
				4	4
Objective	● To present in-depth knowledge on game design and facilitate creation of solid game concepts. ● To get knowledge about mechanics and strategy of the game. ● To educate students about types of intellectual property and setting character for the game ● To explain to students about multiplayer game design and social network games. ● To educate students about how to create a user interface and gaming tools.				
UNIT-I	Game design and Types of Design - Core of Game design - Common Terms - Approaches - Iterative Design - Constraints - Game Design Atoms - The Game State and Views -Players, Avatars and Game Bits - Mechanics, Dynamics, Goals and Theme - Puzzle Design - Types of Puzzles - Level Design and Puzzle Design				
UNIT-II	Elements of Chance - The Role - Mechanics - Elements of Strategic Skill - The Role - Types of Decisions - Frequency of Decisions - Strategy and Tactics - Mechanics of Skill - Evaluation- Elements of Twitch Skill - Challenge - Tuning - Twitch Mechanics - Balancing Chance and Skill				
UNIT-III	Intellectual Property - Types of IP - Sequels - Types of Sequels - Targeting a Market - Learning about the Target Market - Focus Groups - The Mass Market - Learning Unfamiliar Genre - Games to Tell stories - Story Arcs - Types of Stories in Games - Storytelling methods - Setting and Character - Working Backward				
UNIT-IV	Adding Mechanics - Removing Mechanics - Making it a Multiplayer - Multiplayer - Multiplatform- Multipurpose - Types of Multiplayer Games - Issues in Multiplayer Game Design - Social Networks and Games - Propagation Mechanics in Social Network Games - Slowing the Speed- Leader boards - Future of Social Networks and Games				
UNIT-V	Creating a User Interface - Goals of UI - Feedback - Process of UI Design - Bad UI - Games as Art - Beyond the Visual - Beyond Fun - Games as a Teaching Tool - Designing and Modifying Games For Students - Serious Games - Types of Serious Games - The Focus Test - Casual Games - Reduced Complexity - Casual Conflicts				

Reference and Text Books:

● M. Mahajan 2018 Production Planning And Control.New Delhi, DhanpatRai& Co
● Rob Thompson 2014. Manufacturing Processes for Textile and Fashion Design Professionals. London, Thames & Hudson
● Cooklin, G., Hayes, S. & McLoughlin. (2006). Introduction to Clothing Manufacture. UK, Oxford: Blackwell Publishing.
● David J. Tyler. (2008). Harold Carr & Barbara Latham's - The Technology of Clothing Manufacture.UK Oxford: Blackwell Publishing
● MartandTelsang, (2008). Industrial Engineering and Production Management. New Delhi: S. Chand & Company Limited.
● Chuter, A.J. (2004). Introduction to Clothing Production Management. UK, Oxford: BlackwellScience.

Online Resources

● **https://www.onlineclothingstudy.com/2017/05/production-planning-control-in-apparel.html**
● **https://www.amazon.in/Apparel-Manufacturing-Technology-T-Karthik-ebook/dp/B08NTT7ZG8**
● **https://www.youtube.com/watch?v=BRk5WDWCyYM**
● **https://www.onlineclothingstudy.com/2021/09/managing-apparel-production-using.html**

Course Outcome:		
CO1	Memorize the key terminologies and concepts involved in game design.	K1
CO2	Evaluate and construct the role and mechanics of the game..	K3&K6
CO3	Learning about the target market and genre of the game.	K4
CO4	Capable of deconstructing games , identifying and understanding the various elements of games.	K5
CO5	Creating and improvising game concepts with various dimensions.	K2&K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)
CO2	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
W.AV	2.4	2.6	2.4	2.2	2.2	2	2.2	2.2	2.4	2

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	M(2)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
W.AV	2.4	2.6	2.6	2.2	2.4

S–Strong (3), M-Medium (2), L-Low (1)

VI – Semester-Core					
Core	**Course Code: 83462**	**GAME TESTING**	**T**	**Credits:** **4**	**Hours:** **4**
Objective		The objective of game testing is to systematically evaluate and validate a video game's functionality, performance, and user experience to identify and rectify bugs, glitches, and design flaws. This process ensures the delivery of a polished and enjoyable gaming experience while meeting quality standards and specifications set by developers and stakeholders.			
UNIT-I		**Introduction to Game Testing:** Overview of Game Development Life Cycle (GDLC) - Role of Game Testers in the Development Process - Types of Game Testing: Functional, Non-functional, Compatibility, Performance, etc. - Testing Fundamentals: Test cases, test plans, test scripts - Bug Reporting: How to effectively document and communicate issues - Regression Testing: Ensuring new changes don't break existing functionality			
UNIT-II		**Introduction to Game Testing Tools:** Overview of commonly used game testing tools - Introduction to scripting for game testing automation - Console, PC, Mobile, Virtual Reality, Augmented Reality - Adapting testing approaches for different platforms			
UNIT-III		**Mobile and VR/AR Game Testing:** Special considerations for testing mobile games - Testing virtual reality and augmented reality experiences - Importance of Usability Testing in Games - Player Experience and Feedback			
UNIT-IV		**Performance and Load Testing for Games:** Performance Testing Concepts - Load Testing for Multiplayer Games - Overview of Game Security Concerns - Testing for Game Security Vulnerabilities			
UNIT-V		**Emerging Trends in Game Testing:** Cloud Gaming Testing - AI in Game Testing - Building a Game Testing Portfolio - Networking and Professional Development			

Reference and Text Books:
- "Effective Software Test Automation" by Kanglin Li:
- "Game Testing All in One" by Charles P. Schultz, Robert Bryant, and Tim Langdell:
- "Explore It!: Reduce Risk and Increase Confidence with Exploratory Testing" by Elisabeth Hendrickson:
- "Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation" by Jez Humble and David Farley:
- "Quality Code: Software Testing Principles, Practices, and Patterns" by Stephen Vance

Online Resources
Game Testing subreddit

Course Outcome:		
CO1	Game testing is crucial for identifying and documenting software bugs, glitches, and inconsistencies that could impact the game's functionality and user experience.	**K1&K2**
CO2	Through systematic testing, game developers ensure that the product meets quality standards and specifications, enhancing overall game quality and reducing the likelihood of post-release issues.	**K2**
CO3	Effective game testing contributes to a polished and enjoyable gaming experience, promoting player satisfaction and fostering positive reviews and feedback within the gaming community.	**K4**
CO4	Thorough testing instills confidence in the game's release by minimizing the risk of critical issues, improving reliability, and ensuring that the final product aligns with the developer's vision.	**K5**
CO5	Game testing helps ensure that the game complies with industry standards and regulations, establishing credibility for the development team and building trust among players and stakeholders.	**K6**

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)	L(1)	M(2)
CO2	L(1)	L(1)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)
CO3	M(2)	L(1)	S(3)	M(2)	S(3)	M(2)	S(3)	M(2)	M(2)	S(3)
CO4	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	L(1)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	**2**	**1**	**2.8**	**2.4**	**2.6**	**2.2**	**2.4**	**1.8**	**2.4**	**2.8**

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	M(2)	L(1)	M(2)
CO2	S(3)	M(2)	S(3)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	**2.8**	**2.6**	**2.8**	**2.4**	**2.8**

S–Strong (3), M-Medium (2), L-Low (1)

VI-Semester - Core					
Core	**Course Code: 83463**	**GAME TESTING - PRACTICAL**	**P**	**Credits: 4**	**Hours: 6**
Objective s	➢ **Develop a solid understanding of key performance metrics such as frame rate, input lag, memory usage, and loading times, and their impact on gameplay experience.** ➢ **Learn various profiling techniques to identify performance bottlenecks, memory leaks, and inefficient code segments within game projects.** ➢ **Acquire knowledge of different testing strategies, including manual testing, automated testing, and simulation of real-world scenarios, to ensure the reliability and stability of game systems.** ➢ **Develop skills to optimize code, shaders, and resource usage, improving the overall performance and responsiveness of the game.** ➢ **Enhance problem-solving skills by diagnosing and addressing issues related to performance, collisions, input response, network latency, and other gameplay aspects.**				

Exercise:

1. **Frame Rate Counter:** Develop a program that measures and displays the frame rate of a game in real-time. This is a fundamental metric for assessing game performance.
2. **Input Lag Tester:** Create a tool to measure and visualize the input lag between user actions (keyboard/mouse/controller) and the corresponding in-game response. Input lag can greatly affect gameplay experience.
3. **Memory Profiler:** Build a memory profiling tool that monitors the memory usage of your game in various scenarios. This can help identify memory leaks and inefficient memory usage patterns.
4. **Load Time Analyzer:** Design a program that measures and analyzes the loading times of different game scenes. This can help identify bottlenecks and optimize loading processes.
5. **Collision Tester:** Develop a tool that visualizes collision detection and physics interactions in your game. This can aid in identifying collision-related bugs and performance issues.

Outcomes	● **To generate detailed performance analysis reports that highlight critical metrics, areas for improvement, and actionable recommendations to enhance game performance.** ● **Demonstrate the ability to identify and document bugs related to performance, collisions, and gameplay responsiveness, along with providing steps to reproduce these issues.** ● **Optimized code to game projects, showcasing their proficiency in addressing performance bottlenecks and implementing efficient algorithms.** ● **Develop an automated testing suite that can simulate user interactions and verify expected outcomes, streamlining the testing process and improving game stability.** ● **Implement profiling and optimization strategies in real game projects, resulting in noticeable improvements in frame rates, loading times, and overall player experience.**	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)
CO2	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
W.AV	2.4	2.6	2.4	2.2	2.2	2	2.2	2.2	2.4	2

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	M(2)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	M(2)	S(3)	S(3)	M(2)
CO5	S(3)	S(3)	S(3)	M(2)	S(3)
W.AV	2.6	2.6	3	2.2	2.4

S–Strong (3), M-Medium (2), L-Low (1)

VI – Semester-Elective					
DSE	**Course Code: 83464A**	**1. ADVANCED GAME PROGRAMMING**	**T**	**Credits:**	**Hours:**
				4	**4**
Objective		● To understand the history, types, selection, and application of design patterns, and revisit core OOP concepts. ● To learn various creational, structural, and behavioral design patterns, and comprehend their uses and implementations. ● Apply design patterns to game development, specifically focusing on builder, factory method, prototype, singleton, and various other patterns. ● To educate sequencing and decoupling patterns, including double buffer, game loop, component-based design, and various optimization techniques. ● Apply design patterns to specific game components like brick systems, power-ups, paddle mechanics, enemy behaviors, and collision control.			
UNIT-I		**Introduction to Design Patterns:** Design Pattern History - Types of Design Patterns - Problem Solving using Design Patterns - Selecting Design Pattern - Using Design Pattern - Revisiting OOPS-Abstraction - Inheritance - Polymorphism - Encapsulation			
UNIT-II		**Creational Design Patterns:** Abstract Factory - Builder - Factory Method - Object Pool - Prototype-Singleton - Structural Design Pattern: Adapter - Bridge - Composite - Decorator - Facade - Flyweight- Private Class Data - Proxy Behavioral Design Pattern: Chain of Responsibility - Command- Interpreter - Iterator - Mediator - Memento - Null Object - Observer - State - Strategy - Template method - Visitor			
UNIT-III		**Design Patterns in Games with Examples:** Builder - Factory Method - Prototype – Singleton- Adapter - Composite - Facade - Flyweight - Proxy Chain of Responsibility - Command - Mediator- Observer - State - Strategy - Template Method			
UNIT-IV		**Sequencing Patterns:** Double Buffer - Game Loop - Update Method - Behavioural Patterns- Bytecode - Subclass Sandbox - Type Object - Decoupling Patterns - Component – Event Queue - Service Locator - Optimization Process - Data Locality - Dirty Flag - Object Pool - Spatial Partition- Entity Component System			
UNIT-V		**Design Patterns in Breakout**: Bricks System - Power Up Management - Simple Paddle - Paddlewith Special Power - Managing Game Mechanics - Collision Control – Space Invaders: - EnemySystem - Upgrade system - Weapon system - Power Up Management - Enemy Movement Pattern- Identifying the Common Factors in Breakout and Space Invaders			

Reference and Text Books:
● "Game Programming Patterns", Robert Nystrom, Genever Benning, 2014

References:
● Ahnert, K., & Mulansky, M "Odeint–solving ordinary differential equations in C++", InAIPConference Proceedings, AIP, 2011.
● Andrei Alexandrescu, "Modern C++ Design: Generic Programming and DesignPatternsApplied", illustrated, reprint, Addison-Wesley Professional, 2011.
● Bangerth, W, "Using Modern Features of C++ for Adaptive Finite Element Methods" Dimension-Independent Programming in dealwII, 2000.
● Gamma, E, "Design patterns: elements of reusable object-oriented software" PearsonEducation India, 1995.
● M. S. Joshi, "C++ Design Patterns and Derivatives Pricing", Cambridge University Press 2011.

Course Outcome:		Knowledge level
CO1	Able to identify appropriate design patterns for problem-solving, apply them effectively, and demonstrate a strong grasp of OOP principles including abstraction, inheritance, polymorphism, and encapsulation.	K3
CO2	Employ creational and structural design patterns such as abstract factory, builder, adapter, composite, decorator, and more, enabling them to create well-structured and modular software designs.	K4
CO3	Integrate design patterns into game development, using examples of builder, factory method, prototype, and singleton patterns to enhance the architecture of games.	K3
CO4	Implement sequencing patterns like game loops, apply decoupling techniques to improve code flexibility, and use optimization methods to enhance game performance.	K5
CO5	Implement design patterns within game development, specifically focusing on applying patterns to various components and mechanics in breakout-style and space invaders-style games.	K5

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	S(3)	L(1)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)
CO2	S(3)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	M(2)	M(2)	S(3)
CO3	S(3)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	M(2)	M(2)	S(3)	M(2)	M(2)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)
W.AV	3	2.6	2.4	2.2	2	2	2	2.6	2.4	2.8

S–Strong (3), M-Medium (2), L-Low (1)
Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	L(1)	L(1)
CO2	S(3)	L(1)	M(2)	M(2)	M(2)
CO3	S(3)	L(1)	M(2)	L(1)	M(2)
CO4	S(3)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	S(3)	M(2)	S(3)	S(3)
W.AV	3	2.2	2	2	2.2

S–Strong (3), M-Medium (2), L-Low (1)

		VI – Semester-Elective			
DSE	**Course Code: 83464B**	**2. ADVANCED GAME DESIGN**	**T**	**Credits:** **4**	**Hours:** **4**
Objective		● **Developing the ability to create diverse and captivating characters for games.** ● **Explore various art styles and their impact on game assets.** ● **Able to redesign major assets of an existing game, transforming its visual style while retaining functionality.** ● **Master the creation of sprite sheets for character animations.** ● **Learn to design user interfaces for games** ● **Apply game design principles to create functional prototypes.**			
UNIT-I		Conceptualizing character traits, backstories, and appearances.Sketching and ideation.3D modeling or 2D character design based on concept			
UNIT-II		Analyzing an existing game's art style., Modifying assets while maintaining gameplay compatibility. Applying new visual styles to characters, objects, or environments.			
UNIT-III		Walk and run cycle animation techniques. Creating sprite sheets with character animations. Exporting sprite sheets in suitable formats			
UNIT-IV		Principles of UI/UX design. Creating game menus and level selection screens. Implementing interactive buttons and elements			
UNIT-V		Using game engines or development tools for prototyping.Playtesting, gathering feedback, and iterating on game designs.Developing a playable game prototype based on a prompt.			

Reference and Text Books:
- Watkins, A. (2011). *Creating Games with Unity and Maya*. Focal Press.
- Habgood, J., & Overmars, M. (2006). *The Game Maker's Apprentice*. Apress.
- Zimmerman, E., & Salen, K. (2003). *Rules of Play: Game Design Fundamentals*. MIT Press.
- Romero, B., & Schreiber, I. (2009). *Challenges for Game Designers*.
- Fullerton, T. (2014). *Game Design Workshop: A Play-Centric Approach*.
- Crusie, J. (2012). *Adobe Photoshop CS6 Digital Classroom*. Willey.

Online Resources
https://www.amazon.in/Game-Makers-Apprentice-Development-Technology/dp/1590596153
https://www.sciencedirect.com/book/9780240818818/creating-games-with-unity-and-maya

Course Outcome:		
CO1	Able to produce three distinct character designs, each with unique traits and aesthetics.	**K3**
CO2	Able to redesign major assets of an existing game, transforming its visual style while retaining functionality.	**K1,K3**
CO3	Able to produce sprite sheets for character walk and run cycles.	**K3**
CO4	Develop and design menu screens and level chooser windows for a game.	**K1, K3**
CO5	Able to develop a game prototype based on a provided prompt, showcasing both design aesthetics and gameplay mechanics.	**K1,K2,K3**

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)
CO2	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
W.AV	2.4	2.6	2.4	2.2	2.2	2	2.2	2.2	2.4	2

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	M(2)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
W.AV	2.4	2.6	2.6	2.2	2.4

S–Strong (3), M-Medium (2), L-Low (1)

VI – Semester-Elective					
DSE	**Course Code: 83464C**	**3. GAME ANALYSIS AND MONETIZATION**	**T**	**Credits:** **4**	**Hours:** **4**
Objective		● **Understand the importance of market analysis and various monetization models in the game industry.** ● **Develop skills in conducting effective market research and analyzing player behavior.** ● **Gain proficiency in designing and selecting appropriate monetization strategies.** ● **Understand the mechanics of in-game advertising and in-app purchases.** ● **Learn how to measure game success and optimize monetization strategies.**			
UNIT-I		**Introduction to Game Market Analysis and Monetization:** Overview of the game industry landscape: platforms, genres, trends - Importance of market analysis and monetization strategies - Understanding target audience, demographics, and player behavior - Introduction to different monetization models: freemium, premium, ads, in-app purchases - Case studies of successful games with different monetization approaches.			
UNIT-II		**Market Research and Player Insights:** Conducting market research: data collection, surveys, analytics - Analyzing player behavior and preferences using player data - Defining player personas and understanding player motivations - Identifying trends, demands, and gaps in the market - Hands-on: Analyzing player data and identifying potential opportunities.			
UNIT-III		**Monetization Strategies and Business Models:** In-depth exploration of various monetization models -Pros and cons of each model in different game genres -Creating a sustainable revenue stream: pricing strategies and value propositions -Developing a business plan: budgeting, forecasting, and revenue projections -Hands-on: Designing a monetization strategy for a hypothetical game.			
UNIT-IV		**Advertising and In-Game Purchases:** Understanding the mechanics of in-game ads and their impact on player experience -Integrating ads effectively: rewarded videos, interstitials, banners -Designing in-app purchases: virtual goods, cosmetic items, power-ups - Ethical considerations in monetization and player engagement - Hands-on: Implementing ads and in-game purchases in a sample game.			
UNIT-V		**Metrics, Analytics, and Optimization:** Key performance indicators (KPIs) for measuring success - Using analytics tools to monitor player engagement and revenue - A/B testing and optimizing monetization strategies - Responding to player feedback and adapting monetization approaches - Hands-on: Analyzing metrics and optimizing monetization in a live game.			

Reference and Text Books:
- "The Business of Game Design: A Guide to Creating & Marketing Games" by Brian Robbins and Larry C. Medsker

References:
- "The Art of Game Design: A Book of Lenses" by Jesse Schell
- "Game Analytics: Maximizing the Value of Player Data" by Magy Seif El-Nasr, Anders Drachen, Alessandro Canossa
- "Monetization in Video Games" by David Wesley
- "Free-to-Play: Making Money From Games You Give Away" by Will Luton
- "Game Data Analysis – Tools and Methods" by Sander Dieleman, Benjamin Schrauwen

Online Resources
- GAME MARKET ANALYSIS AND MONETIZATION

Course Outcome:		Knowledge level
CO1	Able to explain the significance of market analysis and describe different monetization approaches used in games.	K3
CO2	To gather player data, analyze trends, and define player personas to inform game development decisions.	K4
CO3	Develop the ability to create a sustainable revenue stream by choosing suitable monetization models and pricing strategies.	K2
CO4	To integrate ads and design in-game purchases while considering player experience and ethical considerations.	K5
CO5	Able to interpret key performance indicators (KPIs), use analytics tools, and optimize monetization approaches based on data analysis.	K6

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M(2)	M(2)	M(2)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)
CO2	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)
CO3	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)
CO4	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	M(2)	S(3)	M(2)	S(3)
CO5	M(2)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	M(2)	S(3)
W.AV	2	2	2	2.4	1.6	2	2	2.6	2	3

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	M(2)	L(1)	L(1)
CO2	M(2)	M(2)	M(2)	L(1)	M(2)
CO3	M(2)	M(2)	M(2)	L(1)	M(2)
CO4	M(2)	M(2)	M(2)	L(1)	S(3)
CO5	M(2)	M(2)	M(2)	M(2)	S(3)
W.AV	2	2	2	1.2	2.2

S–Strong (3), M-Medium (2), L-Low (1)

VI-Semester- Core					
Core	**Course Code: 83465A/ 83465B**	**83465A - PROJECT/ 83465B - DISSERTATION**	**PR/ D**	**Credits: 6**	**Hours: 12**
Objectives		➢ **Develop a comprehensive and functional game prototype that demonstrates mastery of chosen programming languages and tools.** ➢ **Apply theoretical knowledge to address practical challenges within game development, showcasing problem-solving abilities.** ➢ **Demonstrate creativity and innovation in designing gameplay mechanics or features that exhibit a deep understanding of gaming concepts.** ➢ **Create a cohesive documentation outlining the development process, decision-making rationale, and technical aspects of the project.** ➢ **Present and defend the project's technical aspects and design choices through a well-structured dissertation or presentation.**			
Outcomes		➢ **Students will demonstrate a high level of proficiency in game development, showcasing skills in programming, game design, and implementation.** ➢ **Acquiring the ability to analyze complex problems within game development and devise effective solutions, displaying critical thinking and problem-solving capabilities.** ➢ **Demonstrating creativity in applying theoretical knowledge to create innovative gameplay mechanics, features, or visual elements.** ➢ **Producing comprehensive documentation that details the project's development process, methodologies used, challenges faced, and solutions implemented.** ➢ **Improved abilities to communicate technical concepts effectively, both in writing (documentation) and orally (presentations), fostering clearer articulation of ideas and technical decisions.** ➢ **Developing skills in project management, including time management, task prioritization, and resource allocation to successfully complete a substantial project within a specified timeline.** ➢ **Gaining familiarity with industry standards and best practices in game development, preparing students for potential careers in the field.** ➢ **Instilling confidence in their abilities to independently conceptualize, plan, execute, and present a significant project within the realm of game programming.**			

AIM OF THE PROJECT WORK

1. The aim of the project work is to acquire practical knowledge on the implementation of the programming concepts studied.
2. Each student should carry out individually one project work and it may be a work using the software packages that they have learned or the implementation of concepts from the papers studied or implementation of any innovative idea focusing on application oriented concepts.
3. The project work should be compulsorily done in the college only under the supervision of the department staff concerned.

VivaVoce

1. Viva-Voce will be conducted at the end of the year by both Internal (Respective Guides) and External Examiners, after duly verifying the Annexure Report available in the College, for a

total of 100 marks at the last day of the practical session.

2. Out of 100 marks, 25 marks for CIA and 75 for CEE (50 evaluation of project report + 25 Viva Voce).

Project Report Format

PROJECT WORK
TITLE OF THE DISSERTATION
Bonafide Work Done by
STUDENT NAME
REG. NO.
GUIDE NAME
Dissertation submitted in partial fulfillment of the requirements for the award of
<Name of the Degree>
ICAT Design and Media College, Chennai.
College Logo

Signature of the Guide   Signature of the HOD

Submitted for the Viva-Voce Examination held on_____

Internal Examiner   External Examiner
Month – Year
University Logo

CONTENTS

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)
CO2	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
W.AV	2.4	2.6	2.4	2.2	2.2	2	2.2	2.2	2.4	2

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	M(2)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	M(2)
CO4	S(3)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	S(3)	M(2)	M(2)	S(3)
W.AV	2.4	2.6	2.6	2.2	2.4

S–Strong (3), M-Medium (2), L-Low (1)

UG Programme

Passing minimum

➢ A candidate shall be declared to have passed in each course if he/she secures not less than 40% marks in the End Semester Examinations and 40% marks in the Internal Assessment and not less than 40% in the aggregate, taking Continuous assessment and End Semester Examinations marks together.

➢ The passing minimum for CIA shall be 40% out of 25 marks (i.e.10 marks) in Theory/ Practical Examinations.

➢ The passing minimum for University Examinations shall be 40% out of 75 marks (i.e. 30 marks) for Theory /Practical papers.

➢ The candidates not obtain 40% in the Internal Assessment are permitted to improve their Internal Assessment marks in the subsequent semesters (2 chances will be given) by writing the CIA tests or by submitting assignments.

➢ Candidates, who have secured the pass marks in the End-Semester Examination and in the CIA but failed to secure the aggregate minimum pass mark (E.S.E + C I.A), are permitted to improve their Internal Assessment mark in the following semester and/or in University examinations.

➢ A candidate shall be declared to have passed in the Dissertation/Project report/Internship report if he/she gets not less than 40% marks in the Internal Assessment and End Semester Examinations and not less than 40% in the aggregate, taking Continuous assessment and End Semester Examinations marks together.

➢ A candidate who gets less than 40% in the Dissertation / Internship/ Project Report must resubmit the thesis. Such candidates need to take again the Viva-Voce on the resubmitted report/thesis.

18.2 Grading of the Courses

The following table gives the marks, Grade points, Letter Grades, and classifications meant to indicate the overall academic performance of the candidate.

Conversion of Marks to Grade Points and Letter Grade (Performance in Course / Paper)

RANGE OF MARKS	GRADE POINTS	LETTER GRADE	SCRIPTION
- 100	9.0 – 10.0	O	tstanding
- 89	8.0 – 8.9	D+	cellent
- 79	7.5 – 7.9	D	tinction
- 74	7.0 – 7.4	A+	y Good
- 69	6.0 – 6.9	A	od
- 59	5.0 – 5.9	B	erage
- 49	4.0 – 4.9	C	isfactory

- 39	0.0	U	appear
SENT	0.0	AAA	SENT

a)   Successful candidates passing the examinations and earning a GPA between 9.0 and 10.0 and marks from 90 – 100 shall be declared to have Outstanding (O).

b)   Successful candidates passing the examinations and earning GPA between 8.0 and 8.9 and marks from 80 - 89 shall be declared to have Excellent (D+).

c)   Successful candidates passing the examinations and earning GPA between 7.5 – 7.9 and marks from 75 - 79 shall be declared to have Distinction (D).

d)   Successful candidates passing the examinations and earning GPA between 7.0 – 7.4 and marks from 70 - 74 shall be declared to have Very Good (A+).

e)   Successful candidates passing the examinations and earning GPA between 6.0 – 6.9 and marks from 60 - 69 shall be declared to have Good (A).

f)   Successful candidates passing the examinations and earning GPA between 5.0 – 5.9 and marks from 50 - 59 shall be declared to have Average (B).

g)   Successful candidates passing the examinations and earning GPA between 4.0 – 4.9 and marks from 40 - 49 shall be declared to have Satisfactory (C).

h)   Candidates earning GPA between 0.0 and marks from 00 - 39 shall be declared to have Re-appear (U).

i)   Absence from an examination shall not be taken as an attempt.

From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated respectively **by** Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA).

These two are calculated by the following formulate

GRADE POINT AVERAGE (GPA) = $\Sigma_i\, C_i\; G_i\, / \Sigma_i\, C_i$

GPA = <u>Sum of the multiplication of grade points by the credits of the courses</u>

Sum of the credits of the courses in a Semester

18.3 Classification of the final result

The final result of the candidate shall be based only on the CGPA earned by the candidate.

a) Successful candidates passing the examinations and earning CGPA between 9.5 and 10.0 shall be given Letter Grade (O+) and those who earned CGPA between 9.0 and 9.4 shall be given Letter Grade (O) and declared to have First Class –Exemplary*.

b) Successful candidates passing the examinations and earning CGPA between 7.5 and 7.9 shall be given Letter Grade (D), those who earned CGPA between 8.0 and 8.4 shall be given Letter Grade (D+) and those who earned CGPA between 8.5 and 8.9 shall be given Letter Grade (D++) and declared to have First Class with Distinction*.

c) Successful candidates passing the examinations and earning CGPA between 6.0 and 6.4 shall be given Letter Grade (A), those who earned CGPA between 6.5 and 6.9 shall be given Letter Grade (A+), and those who earned CGPA between 7.0 and 7.4 shall be given Letter Grade (A++) and declared to have First Class.

d) Successful candidates passing the examinations and earning CGPA between 5.0 and 5.4 shall be given Letter Grade (B) and those who earned CGPA between 5.5 and 5.9 shall be given Letter Grade (B+) and declared to have passed in the Second Class.

e) Successful candidates passing the examinations and earning CGPA between 4.0 and 4.4 shall be given Letter Grade (C) and those who earned CGPA between 4.5 and 4.9 shall be given Letter Grade (C+) and declared to have passed in the Third Class.

f)   Absence from an examination shall not be taken as an attempt.

Final Result

CGPA	Grade	Classification of Final Result
9.5 – 10.0	O+	First Class – Exemplary*
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	First Class with Distinction*
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	First Class
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
4.5 and above but below 5.0	C+	Third Class
4.0 and above but below 4.5	C	
0.0 and above but below 4.0	U	Re-appear

CUMULATIVE GRADE POINT AVERAGE (CGPA) = $\Sigma_n \Sigma_i C_{ni}\ G_{ni} / \Sigma_n \Sigma_i C_{ni}$

CGPA = <u>Sum of the multiplication of grade points by the credits of the entire programme</u>

        Sum of the credits of the course for the entire Programme

Where '**Ci**' is the Credit earned for Course i in any semester; '**Gi**' is the Grade Point obtained by the student for Course <u>i and 'n' refers to the semester</u> in which such courses were credited.

CGPA (Cumulative Grade Point Average) = Average Grade Point of all the Courses passed starting from the first semester to the current semester.

Note: * The candidates who have passed in the first appearance and within the prescribed Semesters of the UG Programme (Major, Allied, and Elective courses alone) are eligible for this classification.