

**MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WB**

**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
(Effective for Students Admitted in Academic Session 2019-20)**

**COURSE STRUCTURE**

**1<sup>ST</sup> YEAR**

Sl No	Code	Paper	Contact Periods per week			Total Contact Hours	Credits
			L	T	P		
<b>SEMESTER I</b>							
<b>Theory</b>							
1	BGD – 101	Introduction to Game Design and Production	1	2	2	5	
2	BGD – 102	Game Production Basics	-	2	3	5	
3	BGD – 103	2D Game Production Details	-	2	3	5	
4	BGD – 104	2D Game Production Advanced	-	2	3	5	
5	BGD – 105	Logic and Physics & Making UI & UX	-	2	3	5	
6	BGD – 106	Introduction to C# code in game	-	1	4	5	
<b>Total</b>			<b>30</b>				
<b>SEMESTER II</b>							
<b>Theory</b>							
1	BGD – 201	Making Game Codes	-	1	4	5	
2	BGD – 202	Making FPS Game	-	1	4	5	
3	BGD – 203	AI in Game	-	2	3	5	
4	BGD – 204	Database in Game	-	1	4	5	
5	BGD – 205	3D Character Development Introduction	-	1	4	5	
6	BGD – 206	Internship & Lab Making Casual 2D Game	-	-	5	5	
<b>Total</b>			<b>30</b>				

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**2<sup>ND</sup> YEAR**

Sl No	Code	Paper	Contact Periods per week			Total Contact Hours	Credits
			L	T	P		
<b>SEMESTER III</b>							
<b>Theory</b>							
1	BGD – 301	3D Character Development & Rigging	2	-	3	5	
2	BGD – 302	3D Animation	1	1	3	5	
3	BGD – 303	Defining Game with Animation	-	2	3	5	
4	BGD – 304	Game Design	1	1	3	5	
5	BGD – 305	Advanced AI, Sound and Physics in Game Design	1	1	3	5	
6	BGD – 306	HTML 5 Game	1	1	3	5	
7	BGD – 307	Internship & Lab Making	-	-	5	5	
<b>Total</b>						<b>35</b>	
<b>SEMESTER IV</b>							
<b>Theory</b>							
1	BGD – 401	Introduction to 3D Play Station Game Programming	-	3	1	4	
2	BGD – 402	Networking in Game Development	-	3	1	4	
3	BGD – 403	Introduction to RPG Game	-	2	3	5	
4	BGD – 404	Introduction Helper Systems	-	2	2	4	
5	BGD – 405	Hardware in Game Programming	-	3	1	4	
6	BGD – 406	Project and Team in Game Development	-	3	1	4	
7	BGD – 407	Internship & Lab Making	-	-	5	5	
<b>Total</b>						<b>30</b>	

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**3<sup>RD</sup> YEAR**

Sl No	Code	Paper	Contact Periods per week			Total Contact Hours	Credits
			L	T	P		
<b>SEMESTER V</b>							
<b>Theory</b>							
1	BGD – 501	Android Game Development	-	1	4	5	
2	BGD – 502	iOS Game Development	-	2	4	6	
3	BGD – 503	Apple Game Development Framework	-	2	4	6	
4	BGD – 504	SDK	-	3	2	5	
5	BGD – 505	Internship & Lab Making	-	-	5	5	
<b>Total</b>						<b>27</b>	
<b>SEMESTER VI</b>							
<b>Theory</b>							
1	BGD – 601	Introduction to VR	-	2	4	6	
2	BGD – 602	Introduction to AR	-	4	1	5	
3	BGD – 603	AR Game Development	-	2	4	6	
4	BGD – 604	XR Game Development	1	1	3	5	
5	BGD – 605	Business and Legal Issues for Video Game Developers	-	5	1	6	
<b>Total</b>						<b>28</b>	

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**Detailed Syllabus**

**SEMESTER-I**

**Paper: Introduction to Game Design and Production**

**Code: BGD – 101**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	What is game development, Different type of game and use cases (FPS, RPG, Racing, Fighting, Casual, Money spinner, Casino, Massively Multiplayer Online (MMO) These games are played over a LAN (local area network) or via the Internet. Simulations. Adventure. Real-Time Strategy (RTS) .Puzzle. Action. Stealth Shooter. Combat) Revert Settings, Launching Your First Project, Importing a Project, Switching Between Projects, Customizing The UI
Unit 2	How to do Navigation, Manipulating Objects ( Taking different type of objects, How to create invisible object that hides objects behind it, How to position Game Objects, How to place Light Probes)
<b>Suggested Readings:</b>	
<ol style="list-style-type: none"><li>1. <a href="https://www.udemy.com/unitycourse">https://www.udemy.com/unitycourse</a></li><li>2. Fundamentals of Game Design, 3e Paperback – 2015 by Adams (Author)</li><li>3. Drawing Basics and Video Game Art: Classic to Cutting-Edge Art Techniques for Winning Video Game Design by Chris Solarski</li></ol>	

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**Paper: Game Production Basics**

**Code: BGD – 102**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Unity production basics: Lighting, materials, effects, etc. What are game levels, why do you need to design game levels, different game levels for different type of games.
Unit 2	How to make 2D environment (Form and Shape, Anatomy and Proportions, Perspective, Breaking Down Color, Lighting and Shading) Unity 3D Level Design (Primitives, Textures, Creating Trees, Adding Lights , Adjusting Lighting, Particles, Game Controller, Building A Game C# in game development)
<b>Suggested Readings:</b>	
<ol style="list-style-type: none"><li>1. <a href="https://www.udemy.com/unitycourse">https://www.udemy.com/unitycourse</a></li><li>2. Fundamentals of Game Design, 3e Paperback – 2015 by Adams (Author)</li><li>3. <a href="https://www.youtube.com/watch?v=EitYC95uew4">https://www.youtube.com/watch?v=EitYC95uew4</a></li><li>4. <a href="https://www.gamedev.net/articles/visual-arts/the-total-eginner%E2%80%99s-guide-to-better-2d-game-art-r2959/">https://www.gamedev.net/articles/visual-arts/the-total-eginner%E2%80%99s-guide-to-better-2d-game-art-r2959/</a></li></ol>	

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**Paper: 2D Game Production Details**

**Code: BGD – 103**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Working with 2D ( How to make 2D characters, characters from different countries and style, Asian character vs Western character) Making sprites, Working with vector graphics
Unit 2	How to make 2D background (Form and Shape, Anatomy and Proportions, Perspective, Breaking Down Color,,Lighting and Shading) 2D Character Design (Primitives, Textures, Creating face,, expressions, anatomy, body parts, cartoon making)
<b>Suggested Readings:</b>  1. <a href="https://www.udemy.com/unitycourse">https://www.udemy.com/unitycourse</a> 2. <a href="#">Fundamentals of Game Design, 3e Paperback – 2015 by Adams (Author)</a> 3. <a href="https://www.youtube.com/watch?v=EitYC95uew4">https://www.youtube.com/watch?v=EitYC95uew4</a> 4. <a href="https://www.gamedev.net/articles/visual-arts/the-total-beginner%E2%80%99s-guide-to-better-2d-game-art-r2959/">https://www.gamedev.net/articles/visual-arts/the-total-beginner%E2%80%99s-guide-to-better-2d-game-art-r2959/</a>	

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**Paper: 2D Game Produced Advanced**

**Code: BGD – 104**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	2D game design pipeline (The market. The audience. The platforms where to publish the game. The competitor, Define te story. Create timelines.Storyboards.Create a paper prototipe of your game. Level Design. Game play mechanics. Costs of the game (making and maintenance).Create a game design document.) .
Unit 2	Game physics (How does game physics work? What is physics simulation? Do you need physics for game design? How does video game code work? What is an engine in a game?) Game mechanics - rules and challenges, 2D Platformer Controller. Concept Art, Coloring, Animation.
<b>Suggested Readings:</b>	
<ol style="list-style-type: none"><li>1. <a href="https://www.gamedesigning.org/learn/game-physics/">https://www.gamedesigning.org/learn/game-physics/</a></li><li>2. <a href="#">Fundamentals of Game Design, 3e Paperback – 2015 by Adams (Author)</a></li><li>3. <a href="https://assetstore.unity.com/packages/templates/2d-platformer-controller-69772">https://assetstore.unity.com/packages/templates/2d-platformer-controller-69772</a></li><li>4. <a href="https://www.gamedev.net/articles/visual-arts/the-total-beginner%E2%80%99s-guide-to-better-2d-game-art-r2959/">https://www.gamedev.net/articles/visual-arts/the-total-beginner%E2%80%99s-guide-to-better-2d-game-art-r2959/</a></li><li>5. <a href="https://ostindiegames.wordpress.com/2015/01/16/2d-art-pipeline/">https://ostindiegames.wordpress.com/2015/01/16/2d-art-pipeline/</a></li></ol>	

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**Paper: Logic and Physics in Game Production & Making UI & UX**

**Code: BGD – 105**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Vector Math in game development (How does game physics work? What is physics simulation? Do you need physics for game design? How does video game code work? What is an engine in a game? what can a vector be useful, How is a vector defined in the game engine, Scalar vector, Use vector to represent a point in space, Orientation of vectors-- Left-hand system vs right-hand system, Multiplications by a scalar, Addition and subtraction, Normal vector, Normalized vector, Cross product, LINEAR INTERPOLATION (LERP)) Use vectors to describe objects and interactions in the game world.(Model space, World coordinate, View space, Coordinate space hierarchy) Play testing, balancing and level design
Unit 2	UI – different UI patterns, Introduction, What Are UI and UX?What Does a Good UI Do? - case study. Games With Poor UIs- bad and good case. Success rates and compilation. Oblivion- case study. Far Cry 3 - case study. Mortal Kombat X- Case Study, Fight of the legends - case study. 2D Platformer – Build with assets.
<b>Suggested Readings:</b>  1. <a href="https://gamedevelopertips.com/vector-in-game-development/">https://gamedevelopertips.com/vector-in-game-development/</a> 2. <a href="https://gamedevelopment.tutsplus.com/tutorials/game-ui-by-example-a-crash-course-in-the-good-and-the-bad--gamedev-3943">https://gamedevelopment.tutsplus.com/tutorials/game-ui-by-example-a-crash-course-in-the-good-and-the-bad--gamedev-3943</a> 3. <a href="https://assetstore.unity.com/packages/templates/2d-platformer-controller-69772">https://assetstore.unity.com/packages/templates/2d-platformer-controller-69772</a> 4. <a href="https://www.gamedev.net/articles/visual-arts/the-total-beginner%E2%80%99s-guide-to-better-2d-game-art-r2959/">https://www.gamedev.net/articles/visual-arts/the-total-beginner%E2%80%99s-guide-to-better-2d-game-art-r2959/</a>	



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**Paper: Introduction to C# Code in Game**

**Code: BGD – 106**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Collision Detection (Colliders, Colliders as Triggers, Rigidbodies, Adding Physics Forces, Adding Physics Torque, Physics Materials, Physics Joints, Detecting Collisions with On Collision Enter, Raycasting)
Unit 2	C# code on 2D platform game (How Does Unity 3D Use C#? Working with C# script files, What Does C# Look Like? Toolbar, Hierarchy Panel, Scene and Game View, Inspector Panel , Project and Console Panel, Writing C#, Separator Tokens, Operator Tokens, Other Operator Tokens, Literals, Transitive and Non-,Transitive Operations) 2D Platformer, Written part - Analysis, Critic and Description, Class Initialization, New , Constructors
<b>Suggested Readings:</b> <ol style="list-style-type: none"><li>1. <a href="https://gamedevopertips.com/vector-in-game-development/">https://gamedevopertips.com/vector-in-game-development/</a></li><li>2. <a href="https://learn.unity.com/tutorial/3d-physics">https://learn.unity.com/tutorial/3d-physics</a></li><li>3. <a href="http://www.allitebooks.in/learning-c-programming-unity-3d/">http://www.allitebooks.in/learning-c-programming-unity-3d/</a></li></ol>	

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**SEMESTER-II**

**Paper: Making Game Codes**

**Code: BGD – 201**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Fixed-Sized Arrays. Using the While Loop with Arrays, Setting Array Values, Getting Array Values.ZombieData.Multidimensional Arrays. How to make A Puzzle Board. Timers
Unit 2	Working with platform runner games (Push Gitignore Pull Contributors) Platform runner game mechanics & tools (Single screen movement, Classification of early platformers, Scrolling movement, Second-generation side-scrollers, The third dimension, True 3D)
<b>Suggested Readings:</b>	
1. <a href="http://file.allitebooks.com/20160708/Learning%20C-%20Programming%20with%20Unity%203D.pdf">http://file.allitebooks.com/20160708/Learning%20C-%20Programming%20with%20Unity%203D.pdf</a>	
2. <a href="https://gameanalytics.com/blog/how-to-perfect-your-games-core-loop.html">https://gameanalytics.com/blog/how-to-perfect-your-games-core-loop.html</a>	
3. <a href="http://www.allitebooks.in/learning-c-programming-unity-3d/">http://www.allitebooks.in/learning-c-programming-unity-3d/</a>	

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**Paper: Making FPS Game**

**Code: BGD – 202**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	What is FPS First person shooting game structure (Multiple Args, Using Args.Adding Lighting, Spawn Points, and the End Zone, Designing the First Room, Designing the Second Room)
Unit 2	Collision Detection (Push Gitignore Pull Contributors), C# code on FPS Physics and logic on FPS(Single screen movement, Classification of early platformers, Scrolling movement, Second-generation side-scrollers, The third dimension, True 3D)
<b>Suggested Readings:</b>  1. <a href="https://www.youtube.com/watch?v=Sqb-Ue7wpsI">https://www.youtube.com/watch?v=Sqb-Ue7wpsI</a> 2. <a href="https://www.youtube.com/watch?v=0fGB2H1AGP8">https://www.youtube.com/watch?v=0fGB2H1AGP8</a>	

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**Paper: AI in Game**

**Code: BGD – 203**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	All about AI in game. AI for saving labor cost, Content generation for characters, AI invents new games, Enhancing Gaming Experience with AI, Develop a smart and human-like NPCs to better interact with gamers; Predict human players' behaviors that lead to improved game testing and game design; Classify their behaviors to enable the personalization of the game; Discovery frequent patterns or sequences of actions to determine how a player behaves in a game. Prototyping and Pitching
Unit 2	How To Perfect Your Game's Core Loop ( Enter a new room, Kill all the enemies, Get rewards, Build upon a strong theme )
<b>Suggested Readings:</b>	
1. <a href="https://www.amazon.in/Neural-Networks-Keras-Cookbook-leveraging/dp/1789346649/ref=sr_1_1?keywords=artificial+intelligence+for+game+development&amp;qid=1559290714&amp;s=books&amp;sr=1-1">https://www.amazon.in/Neural-Networks-Keras-Cookbook-leveraging/dp/1789346649/ref=sr_1_1?keywords=artificial+intelligence+for+game+development&amp;qid=1559290714&amp;s=books&amp;sr=1-1</a>	
2. <a href="https://www.amazon.in/Artificial-Intelligence-Games-Ian-Millington/dp/0123747317/ref=sr_1_2?keywords=artificial+intelligence+for+game+development&amp;qid=1559290714&amp;s=books&amp;sr=1-2">https://www.amazon.in/Artificial-Intelligence-Games-Ian-Millington/dp/0123747317/ref=sr_1_2?keywords=artificial+intelligence+for+game+development&amp;qid=1559290714&amp;s=books&amp;sr=1-2</a>	
3. <a href="https://www.amazon.in/Unity-Artificial-Intelligence-Programming-believable/dp/1789533910/ref=sr_1_4?keywords=artificial+intelligence+for+game+development&amp;qid=1559290714&amp;s=books&amp;sr=1-4">https://www.amazon.in/Unity-Artificial-Intelligence-Programming-believable/dp/1789533910/ref=sr_1_4?keywords=artificial+intelligence+for+game+development&amp;qid=1559290714&amp;s=books&amp;sr=1-4</a>	

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**Paper: Database in Game**

**Code: BGD – 204**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	All about DB in game. Content generation for objects, database invents new games, Enhancing Gaming Experience with DB and core data Predict human players' behaviors that lead to improved game testing and game design; Classify their behaviors to enable the personalization of the game and save in server.
Unit 2	How To Perfect Your Game's Core Storing system ( Enter a new room, Kill all the enemies, Get rewards, Build upon a strong theme )
<b>Suggested Readings:</b>	
1. <a href="https://www.reddit.com/r/gamedev/comments/28td8c/how_are_databases_used_in_games/">https://www.reddit.com/r/gamedev/comments/28td8c/how_are_databases_used_in_games/</a>	

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**Paper: 3D Character Development Introduction**

**Code: BGD – 205**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Working with 3D, games Rigidbody, physics, User input and UI, Balancing games, analyzing games, the MDA framework Low poly character modelling.
Unit 2	Setting Up the Image Reference, Camera and the Light , Background Images, Starting to Model the Face, Blocking the Nose and Lips, Adding the Subdivision Modifier
<b>Suggested Readings:</b>	
2. <a href="https://cgi.tutsplus.com/tutorials/female-character-modeling-in-blender-part-1--cms-19723">https://cgi.tutsplus.com/tutorials/female-character-modeling-in-blender-part-1--cms-19723</a>	
3. <a href="https://www.youtube.com/watch?v=uGg04oAm4C8">https://www.youtube.com/watch?v=uGg04oAm4C8</a>	
4. <a href="https://www.youtube.com/watch?v=sHN1_GBwqcw">https://www.youtube.com/watch?v=sHN1_GBwqcw</a>	
5. <a href="https://www.youtube.com/watch?v=spi41GxnMZg">https://www.youtube.com/watch?v=spi41GxnMZg</a>	

**Internship & Lab Making Causal 2D Game**

**Code: BGD – 206**

**Contacts Hours / Week:**

**Credits:**

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**SEMESTER-III**

**Paper: 3D Character Development & Rigging**

**Code: BGD – 301**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Working with 3D, Low poly character modelling. Male body vs Female body, cartoon making process. Animal making, Alien body, physics of making characters.
Unit 2	Indian character development, Russian character development, sculpting in software, depth of character making, how rigging works. Need of rigging, working with rigged body, human rigging, animal rigging, alien rigging
<b>Suggested Readings:</b>	
1. <a href="https://www.youtube.com/watch?v=cOokoFED7QE">https://www.youtube.com/watch?v=cOokoFED7QE</a>	
2. <a href="https://www.youtube.com/watch?v= TaYF-lt6vA">https://www.youtube.com/watch?v= TaYF-lt6vA</a>	
3. <a href="https://www.youtube.com/watch?v=487VwwL95hE">https://www.youtube.com/watch?v=487VwwL95hE</a>	

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**Paper: 3D Animation**

**Code: BGD – 302**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Working with 3D Animation. Fundamentals of movement and timing, Apply, manipulate and combine media to create advanced 3D animated performances, Animation Cycles and Body Mechanics, 3D Naturalistic Character Animation. Walk style, Run, Jump, Action.
Unit 2	Indian animation development, Asian animation development, Western style of animation, Drawing in Motion, Advanced Character Rigging, Advanced Animation Techniques, Advanced Character Animation
<b>Suggested Readings:</b>  1. <a href="https://www.youtube.com/watch?v=m9N_sIBRWvY">https://www.youtube.com/watch?v=m9N_sIBRWvY</a> 2. 3D Animation for the Raw Beginner Using Maya (Chapman & Hall/CRC Computer Graphics, Geometric Modeling, and Animation by Roger King 3. <a href="https://www.youtube.com/watch?v=H4AuZzRLves">https://www.youtube.com/watch?v=H4AuZzRLves</a> 4. <a href="https://www.lynda.com/3D-Animation-training-tutorials/1-0.html">https://www.lynda.com/3D-Animation-training-tutorials/1-0.html</a>	



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**Paper: Defining Game with Animation**

**Code: BGD – 303**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	CubeShip Game, Working with Animations, UI Development, Unity Editor Intermediate Topics. Raycasting
Unit 2	Start on Game Design, Game Programming, Objects in a 3D animation exist in an X, Y & Z world , Animation vs Video Game Design, Different Types of Animation in game.
<b>Suggested Readings:</b>	
<ol style="list-style-type: none"><li>1. Hands-On Game Development without Coding: Create 2D and 3D games with Visual Scripting in Unity Kindle Edition by Lucas Bertolini (Author)</li><li>2. Getting Started with Unity 2018: A Beginner's Guide to 2D and 3D game development with Unity, 3rd Edition Paperback – Import, 22 Mar 2018 by Dr. Edward Lavieri (Author)</li><li>3. The Animator's Survival Kit: A Manual of Methods, Principles and Formulas for Classical, Computer, Games, Stop Motion and Internet Animators Paperback – 8 Dec 2009 by Richard Williams</li><li>4. <a href="https://www.raywenderlich.com/2505-unity-4-3-2d-tutorial-animations">https://www.raywenderlich.com/2505-unity-4-3-2d-tutorial-animations</a></li></ol>	

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**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
(Effective for Students Admitted in Academic Session 2019-20)**

**Paper: Game Design**

**Code: BGD – 304**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Game Design wrap-up, Intermediate Game Production Topics, Useful code libraries, Data Structures Global Illumination. 2D Game Jam
Unit 2	3D Game Design Level Design & Tutorials (Understanding Constraints, General Constraints, Critical Constraints, Game's Macro Design Require, Bubble Diagrams, Rough Maps, Connect the Areas Together, Finishing the Design) . Last major game design, 3D Models, texture & lights.
<b>Suggested Readings:</b>	
<ol style="list-style-type: none"><li>1. Hands-On Game Development without Coding: Create 2D and 3D games with Visual Scripting in Unity Kindle Edition by Lucas Bertolini (Author)</li><li>2. Getting Started with Unity 2018: A Beginner's Guide to 2D and 3D game development with Unity, 3rd Edition Paperback – Import, 22 Mar 2018 by Dr. Edward Lavieri (Author)</li><li>3. <a href="https://gamedevelopment.tutsplus.com/tutorials/a-beginners-guide-to-designing-video-game-levels--cms-25662">https://gamedevelopment.tutsplus.com/tutorials/a-beginners-guide-to-designing-video-game-levels--cms-25662</a></li></ol>	

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**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
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**Paper: Advanced AI, Sound and Physics in Game Design**

**Code: BGD – 305**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Debugging, Editor extensions I/O. Intro to 3D AI. AI Path Planning Agent/Decision Architectures Camera Programming (Camera System Overview, Camera Fundamentals, Camera Types, Cinematic Cameras, Camera Design Principles, Prevent the camera passing through (or close to) game objects or physical environmental features, Game Genre Cameras, Camera Design Process, Player Control ) Audio Programming – Sound, Optimise sounds, sound making, music loops, 10 secs music vs 3 secs music. Audio program with engine and objects
Unit 2	Physics Programming , Multiplayer/Network Programming Overview, Tools Programming Overview More on 3D level texture & lights
<b>Suggested Readings:</b>	
1. Game Programming in C++: Creating 3D Games, First Edition by Sanjay Madhav 2. Fundamentals of Real-Time Camera Design Mark Haigh-Hutchinson	

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**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
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**Paper: HTML 5 Game**

**Code: BGD – 306**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Procedural programming in game development, what are browser, future of web based games, why HTML 5 games. HTML 5 and CSS 3 programming. Creating the canvas, Game loop, Creating the player, Keyboard controls.
Unit 2	Physics Programming , Player movement, Adding more game objects Projectiles, Enemies, Loading and drawing images, Collision detection, Sound.
<b>Suggested Readings:</b>	
1. <a href="https://www.html5rocks.com/en/tutorials/canvas/notearsgame/">https://www.html5rocks.com/en/tutorials/canvas/notearsgame/</a>	
2. <a href="https://www.youtube.com/watch?v=5JqjwYn8pw">https://www.youtube.com/watch?v=5JqjwYn8pw</a>	
3. <a href="https://www.youtube.com/watch?v=3EMxBkqC4z0">https://www.youtube.com/watch?v=3EMxBkqC4z0</a>	

**Internship & Lab Making**

**Code: BGD – 307**

**Contacts Hours / Week:**

**Credits:**

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**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
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**SEMESTER-IV**

**Paper: Introduction to 3D Play Station Game Programming**

**Code: BGD – 401**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Procedural programming in game development, what are 3D playstation , future of PS based games, Engine programming. Game loop, Creating the player, controller programming.
Unit 2	Applications Algorithms & Trees 3D character code & texture, PlayStation Mobile, Playstation 3 SDK, Playstation 3 Devkits, API Documentation , Running programs, APP HOME
<b>Suggested Readings:</b>	
1. <a href="https://research.ncl.ac.uk/game/mastersdegree/workshops/ps3introduction/Tutorial0.pdf">https://research.ncl.ac.uk/game/mastersdegree/workshops/ps3introduction/Tutorial0.pdf</a>	

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**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
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**Paper: Networking in Game Development**

**Code: BGD – 402**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Networking intro & JSON, Creating non-Unity C#. applications Web server basics, Deploying web servers Creating a RESTful, Connecting games to services Databases along with Multiplayer gaming.
Unit 2	Peer-to-peer networking, Client-server networking, Networking protocols – UDP and TCP, game client, game server code, game socket programming.
<b>Suggested Readings:</b>  1. <a href="https://www.youtube.com/watch?v=4yzsVLhN4FQ">https://www.youtube.com/watch?v=4yzsVLhN4FQ</a> 2. <a href="https://www.youtube.com/watch?v=1RphLzpQiJY">https://www.youtube.com/watch?v=1RphLzpQiJY</a> 3. Multiplayer Game Programming: Architecting Networked Games, by Sanjay Madhav, Josh Glazer Publisher: Addison-Wesley Professional	

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**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
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**Paper: Introduction to RPG Game**

**Code: BGD – 403**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Scene graph, Particles, Overview of Shaders, Intro to 3D RPG games, type of RPG games. Character design, object design, environment design, level design, UI treatment.
Unit 2	Character movement, animation for RPG, making library controls for RPG, character animation and bones for RPG. Game client for RPG, RPG server code.
<b>Suggested Readings:</b>	
1. Multiplayer Game Programming: Architecting Networked Games, by Sanjay Madhav, Josh Glazer Publisher: Addison-Wesley Professional	

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**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
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**Paper: Introduction Helper Systems**

**Code: BGD – 404**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Common Helper Functionality - Localization <ul style="list-style-type: none"><li>• Test/Tuning Support</li><li>• Tracking User Statistics</li><li>• Recording Play Sessions</li></ul>
Unit 2	Advanced Features <ul style="list-style-type: none"><li>• Event System Optimization</li><li>• Custom Memory Allocation</li><li>• Resource Management (Block Loading, Instancing)</li><li>Streaming Technology</li><li>• Save/Load</li></ul>
<b>Suggested Readings:</b>	
1.	



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**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
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**Paper: Hardware in Game Programming**

**Code: BGD – 405**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Know your CPU – game CPU & GPU, need of graphics cards, load balance, hardware for high-end games. Memory as a bottleneck Multiprocessor systems Trend: Higher percentage of silicon on the CPU dedicated to cache rather than branch Prediction, GPUs – parts features Other auxiliary processors – physics, sound, network
Unit 2	Advanced Features User Interface, Systems Design, Requirements of a user interface, Basic Implementation. Considerations of streaming, Style and type of streaming.
<b>Suggested Readings:</b>  1. <a href="https://www.pcgamer.com/game-development-pc/">https://www.pcgamer.com/game-development-pc/</a> 2. <a href="http://index-of.co.uk/Algorithms/Core%20Techniques%20and%20Algorithms%20in%20Game%20Programming.pdf">http://index-of.co.uk/Algorithms/Core%20Techniques%20and%20Algorithms%20in%20Game%20Programming.pdf</a>	

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**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
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**Paper: Project and Team in Game Development**

**Code: BGD – 406**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	“Team Structures” “Stages of Development” (particularly: how to make a project plan )- Planning the agile way, Avoid multitasking.
Unit 2	Iterative Development, Backlog, Notifications, Data Customization, Activity Logs, Production Formula.
<b>Suggested Readings:</b>  1. <a href="https://www.pcgamer.com/game-development-pc/">https://www.pcgamer.com/game-development-pc/</a> 2. <a href="http://index-of.co.uk/Algorithms/Core%20Techniques%20and%20Algorithms%20in%20Game%20Programming.pdf">http://index-of.co.uk/Algorithms/Core%20Techniques%20and%20Algorithms%20in%20Game%20Programming.pdf</a>	

**Internship & Lab Making (Making of Full Length FPS 3D Game)**

**Code: BGD – 407**

**Contacts Hours / Week:**

**Credits:**

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**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
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**SEMESTER-V**

**Paper: Android Game Development**

**Code: BGD - 501**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Controlling smartphone , Smartphone structuresm, Building for Android with controls and movement How to build 3D game apps using Android SDK, NDK, and OpenGL ES Which Android SDK and NDK APIs are most useful for 3D game development How to get a 3D Math Review for game development How to build 3D graphics using OpenGL ES
Unit 2	Motion Patterns: How to create various motion patterns ,How to set up a game environment, including gravity grid, sounds, and heads-up display, How to create the characters, including the player and its enemies or targets, How to develop a rich menu system with high score table Building a Game Engine, Building Game Levels with Collision, Virtual Cameras, Using the Android Development Environment
<b>Suggested Readings:</b>	
1. Beginning Android 3D Game Development - Robert Chin 2. <a href="http://blaqueyard.com/download/Beginning%20Android%20C++%20Game%20Development.pdf">http://blaqueyard.com/download/Beginning%20Android%20C++%20Game%20Development.pdf</a>	

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**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
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**Paper: iOS Game Development**

**Code: BGD - 502**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Controlling iOS , iOS structure, Building for iOS with controls and movement How to build 3D game apps using iOS SDK, XCode, and OpenGL ES Which iOS SDK and APIs are most useful for 3D game development iOS Game Development Platform Introduction iOS Game Development History Comparing with Other Platform Tools, Technologies and Capabilities Xcode
Unit 2	Motion Patterns: How to create various motion patterns ,How to set up a game environment, including gravity grid, sounds, and heads-up display, How to create the characters, including the player and its enemies or targets, How to develop a rich menu system with high score table Building a Game Engine, Building Game Levels with Collision, Virtual Cameras, Using the Android Development Environment
<b>Suggested Readings:</b>  1. <a href="http://1.droppdf.com/files/ejGQp/game-development-with-swift.pdf">http://1.droppdf.com/files/ejGQp/game-development-with-swift.pdf</a> 2. <a href="http://ptgmedia.pearsoncmg.com/images/9780132928625/samplepages/0132928620.pdf">http://ptgmedia.pearsoncmg.com/images/9780132928625/samplepages/0132928620.pdf</a>	

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**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
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**Paper: Apple Game Development Framework**

**Code: BGD - 503**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Xcode . Elements of Sprite Kit, Scene ,Nodes ,Actions , Features of Sprite Kit , Particle Emitter Editor , Texture atlas generator, Shaders , Lighting and Shadows , Simulating Physics , The Game Loop
Unit 2	INTRODUCTION TO LAPLAND Game Description, Art and Sound, Scenes in Sprite Kit, Working with Sprites , Physics in Sprite Kit, Animation and Texture, Controlling the Game , Gameplay Kit.
<b>Suggested Readings:</b>	
1.	

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**Paper: SDK**

**Code: BGD - 504**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	What is SDK, How SDK works Errors & Debugs Building the UI & attach with main game play with the SDK. SDK integration for ads
Unit 2	How a game makes money – Publishers point, How to attract users, Branding strategy. There are 300 plus local ap stores, how to tag them while publish
<b>Suggested Readings:</b>  1. <a href="https://developers.google.com/admob/unity/start">https://developers.google.com/admob/unity/start</a> 2. <a href="https://www.youtube.com/watch?v=BwVYUR0UUhk">https://www.youtube.com/watch?v=BwVYUR0UUhk</a>	

**Internship & Lab Making (Making of Full Length Android and iOS Game)**

**Code: BGD - 505**

**Contacts Hours / Week:**

**Credits:**

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**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
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**SEMESTER-VI**

**Paper: Introduction to VR**

**Code: BGD – 601**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Introduction to VR , What are various type of Virtual Reality systems. How to develop in VR game system. Equipment for VR apps and movies. Camera systems, 3D game and VR game.
Unit 2	Tools for VR & Engine working sectors. In-class work-session for final project
<b>Suggested Readings:</b>	
<ol style="list-style-type: none"><li>1. <a href="https://developer.oculus.com/documentation/mobilesdk/latest/">https://developer.oculus.com/documentation/mobilesdk/latest/</a></li><li>2. Emerging Trends in Virtual Reality for Gaming: an assessment of best practices from research and development in the gaming industry Dr. Jason Nolan, Daniel Harley (RE/Lab, Ryerson University) Anthony Walsh, Eric McQuiggan (Phantom Compass Inc.)</li><li>3. <a href="http://ict.usc.edu/pubs/Virtual%20Reality%20and%20Interactive%20Digital%20Game%20Technology-%20New%20Tools%20to%20Address%20Obesity%20and%20Diabetes.pdf">http://ict.usc.edu/pubs/Virtual%20Reality%20and%20Interactive%20Digital%20Game%20Technology-%20New%20Tools%20to%20Address%20Obesity%20and%20Diabetes.pdf</a></li></ol>	

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**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
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**Paper: Introduction to AR**

**Code: BGD – 602**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Introduction to AR , What are various type of Augmented Reality systems. How to develop in AR game system. Equipment for AR apps .
Unit 2	How you can plan for making AR based games, Basic game structures, Making of casual AR game
<b>Suggested Readings:</b>	
<ol style="list-style-type: none"><li>1. Game Development For An Augmented Reality System By Thomas Wright Advisor Michael G. Branton</li><li>2. Research Article: KioskAR: An Augmented Reality Game as a New Business Model to Present Artworks Yoones A. Sekhavat</li></ol>	



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**Paper: AR Game Development**

**Code: BGD – 603**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	3D game and AR game. Location-Based versus Marker-Based AR. AR View, Usability. Load detection. AR 3D pipeline and Debug
Unit 2	AR Design for Social Interaction.
<b>Suggested Readings:</b>	
<ol style="list-style-type: none"><li>1. Game Development For An Augmented Reality System By Thomas Wright Advisor Michael G. Branton</li><li>2. Research Article: KioskAR: An Augmented Reality Game as a New Business Model to Present Artworks Yoones A. Sekhavat</li></ol>	

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**Paper: XR Game Development**

**Code: BGD – 604**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Final project on VR and AR casual game. XR 3D game introduction, XR 3D pipeline. Different languages for VR and AR which makes Mixed reality games.
Unit 2	XR Design for Social Interaction.
<b>Suggested Readings:</b>	
<ol style="list-style-type: none"><li>1. Game Development For An Augmented Reality System By Thomas Wright Advisor Michael G. Branton</li><li>2. Research Article: KioskAR: An Augmented Reality Game as a New Business Model to Present Artworks Yoones A. Sekhavat</li></ol>	

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**Syllabus for B.Sc.in Gaming & Mobile Application Development (In-House)  
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**Paper: Business and Legal Issues for Video Game Developers**

**Code: BGD – 605**

**Contacts Hours / Week:**

**Credits:**

<b>Units</b>	<b>Course Content</b>
Unit 1	Console Manufacturers ,Digital Distributors ,Mobile, Console and PC publishers ,Mobile publishers The Changing Landscape of the Video Game Industry , End of Life Economics , Future Consoles Rise of Digital Distribution, Rise of Mobile Gaming , Rise of Free-to-Play and other Monetization Schemes , Legal Challenges Created by Innovation.
Unit 2	The Role of the Publisher - Funding ,Quality Assurance (QA) and Submission , Retail Distribution, Marketing
<b>Suggested Readings:</b>	
<ol style="list-style-type: none"><li>1. Mastering The Game - By David Greenspan With Contributions From S. Gregory Boyd, Jas Purewal And Matthew Datum</li><li>2. <a href="https://www.crcpress.com/rsc/downloads/SB3_Practices_of_Game_Design_Indie_Game_Marketing_FreeBook.pdf">https://www.crcpress.com/rsc/downloads/SB3_Practices_of_Game_Design_Indie_Game_Marketing_FreeBook.pdf</a></li></ol>	