Scheme of

B. Tech. CSE (Human Computer Interaction & Gaming Technology)

Year	Semester	Course Code	Course Name	Type	L	T	P	Credits
FIRST YEAR								
1ST	1ST	MAL 103	Calculus for Engineers	BS	3	1	0	4
1ST	1ST	CSL106	Introduction to Gaming	DC	2	0	0	2
1ST	1ST	CSL101	Computer Programming	DC	3	0	2	4
1ST	1ST	BEL101	Mechanics & Graphics	ES	3	0	2	4
1ST	1ST	SAP101	Health, Sports & Safety	HU	0	0	2	0
1ST	1ST	HUL101	Communication Skills	HU	2	0	2	3
1ST	1ST	CSL107	Introduction to HCI	DC	2	0	0	2
			Subtotal					**21**
1ST	2nd	MAL104	Matrices, Transform Techniques, and Differential Equations	BS	3	1	0	4
1ST	2nd	ASL103	Applied Physics for Gaming	BS	3	0	2	4
1ST	2nd	CSL102	Data Structures	DC	3	0	2	4
1ST	2nd	CSL103	Application Programming	DC	3	0	2	4
1ST	2nd	CSL108	Game Development Design Thinking	DC	2	0	0	2
1ST	2nd	HUL102	Environmental Studies	HU	2	0	0	0
1ST	2nd	ECL103	Applied Electronics	ES	3	0	2	4
			Subtotal					**20**
				Total				**41**
SECOND YEAR								
2nd	3rd	CSL204	Discrete Maths & Graph Theory	DC	3	1	0	4
2nd	3rd	CSL211	Gamification for Learning	DC	3	0	0	3
2nd	3rd	CSL202	Introduction to Object Oriented Programming	DC	3	0	2	4
2nd	3rd	CSL212	Computer Architecture & Organization	DC	3	0	0	3
2nd	3rd	CSL210	Data Structures With Applications	DC	2	0	2	3
2nd	3rd	CSP201	IT Workshop – I	DC	0	0	4	2
			Subtotal					**19**
2nd	4th	CSL205	Design & Analysis of Algorithms	DC	3	0	2	4
2nd	4th	CSL207	Operating Systems	DC	3	0	2	4
2nd	4th	CSL432	Human Computer Interaction	DC	3	0	0	3
2nd	4th	CSL213	Software Engg. & Game Testing	DC	3	0	0	3
2nd	4th	MAL201	Numerical Methods and Probability Theory	DC	3	1	0	4
2nd	4th	CSP202	IT Workshop – II	DC	0	0	4	2
			Subtotal		**15**	**0**	**12**	**20**
				Total				**39**
THIRD YEAR								
3rd	5th	CSL302	Computer Networks	DC	3	0	2	4
3rd	5th	CSL431	Computer Graphics	DC	3	0	0	3
3rd	5th	CSL303	Theory of Computation	DC	3	1	0	4
3rd	5th	CSL306	UI and UX Design	DC	3	0	2	4

3rd	5th	CSL301	Database Management Systems	DC	3	0	2	4
			Open Course – I	OC	3	0	0	3
			Subtotal					**22**
3rd	6th	CSL307	Augmented & Virtual Reality	DC	3	0	2	4
3rd	6th	CSL308	Computer Vision Techniques	DC	3	0	2	4
3rd	6th	CSL309	GPU Computing	DC	2	0	2	3
3rd	6th	CSL310	2D & 3D game development	DC	3	0	2	4
3rd	6th		Open Course – I	OC	3	0	0	3
3rd	6th	CSD301	Mini Project - I	DE	0	0	6	3
			Subtotal					**21**
			Total					**41**
			FINAL YEAR					
4th	7th	CSD 403	Project Phase - I	DE	0	0	2	2
4th	7th		Elective – I	DE	3	0	2	4
4th	7th		Elective – II	DE	3	0	2	4
4th	7th		Elective – III	DE	3	0	0	3
4th	7th		Elective - IV	DE	3	0	0	3
4th	7th		MooC Course / Open Course II	OC	3	0	0	3
			OR					
4th	7th	CSD 402	Industry Internship Project	DE	0	0	4	6
4th	7th	CSD 403	Project Phase - I	DE	0	0	2	2
			Subtotal		**15**	**0**	**12**	**19 / 8**
			Total					**27**
4th	8th	CSD 402	Industry Internship Project	DE	0	0	4	6
4th	8th	CSD 404	Project Phase - II	DE	0	0	4	6
			OR					
4th	8th	CSD 404	Project Phase - II	DE	0	0	4	6
4th	8th		Elective – I	DE	3	0	2	4
4th	8th		Elective – II	DE	3	0	2	4
4th	8th		Elective – III	DE	3	0	0	3
4th	8th		Elective - IV	DE	3	0	0	3
4th	8th		MooC Course / Open Course II	OC	3	0	0	3
			Subtotal		**15**	**0**	**16**	**12 / 23**
			Total					**35**
			GRAND TOTAL					**154**

TYPE	CREDITS
BS	12
ES	08
HU	03
OC	09
DE	31
DC	91
Total	**154**

Syllabus

1st Year

Course Code	ASL103	Course Title	Applied Physics for Gaming			
Category	Core	Credit Assigned	**L**	**T**	**P**	**C**
			3	0	2	4
Pre-requisite (If any)	-	Type of Course	Basic Science			

Objective Game Physics is a course for the students to learn the required basics of physics needed for game programming. The course will train the students to add realism to the games scientifically during the game development process.

Course Outcomes:
> To develop realistic games using laws of physics
> •To meet the need of gamers that demand quite more realistic approach.
> •To improve game development skills by independent conceptual thinking.
> •To increase the desire for the game programmers in creating fascinating games.

Course Contents:

Module 1:
Basic concepts Game physics –game engine (introduction) - Physics realism –importance in games, physics concepts and game performance, Fundamentals - Coordinate Systems and Frames of Reference, Scalar and vectors, computing magnitude of vector, vector cross product, matrices - multiplication and rotation, derivatives.

Module 2:
Basic Newtonian mechanics & Kinematics Newtons three laws of motions – inertia – force – mass – acceleration equal & opposite forces , Force vector, Types of forces – gravitational – friction-centripetal – force balance and diagrams, Work, Energy – kinetic – potential – conservation – power, Translational motion – equation of motion, Rotational motion - torque – angular acceleration, 2D particle kinematics, 3D particle kinematics, Rigid body kinetics.

Module 3:
Projectiles Projectile properties, Simple trajectories & gravity, Drag, Magnus effect – spin effect to projectile, specific projectiles types in games – cannon balls – bullets – arrows, Variable Mass.

Module 4:
Collisions: Impulse and momentum principle- linear and angular Impulse, elastic & inelastic collisions Impact, coefficient of restitution, collision direction and detection, collision with movable & immovable objects, collision with friction, 2D and 3D collisions, Application to games.

Module 5:
Physical Modelling : physics of gaming vehicles(Aircraft, Ships and Boats, Cars & Hovercraft, Guns and Explosion , Sports)

Text Books:
1. Physics for Game Programmers, Grant Palmer, Apress publishers, (2005)
2. Fundamental Physics, Halliday – Resnick, 8th Edtion, Weiley (2009)
3. Game Physics, David H. Eberly, Morgan Kaufmann publications, Second Edition (2010)
4. Classical Mechanics, Herbert Goldstein, 3rd Edition, Addison- Wesley (2002)

Reference Books:
1. Game Physics Engine Development, Ian Millington, Morgan Kaufmann Publishers, 2 n d Edition, CRC press, 2010
2. Mathematics and Physics for Programmers, John Patrick Flynt& Danny Kodicek, Second Edition, Course Technology, a part of Cengage Learning. (2012).
3. Mechanics, Keith R. Symon, 3rd Edition, Addison- Wesley, (1971)
4. Advanced Physics, M. Nelkon, P. Parker, 7 th Edition, Heinemann Educational Books (1970).

Course Code	CSL106	Course Title	Introduction To Gaming			
Category	Core	Credit Assigned	L	T	P	C
			2	0	0	2
Pre-requisite (If any)	-	Type of Course	Computer Science and Engineering			

Course Outcomes:

- Understand basic principles of Game Design and Game Design Process.
- Understand importance of standards for good quality code and testing and the basics of display technology, Software Development Kit (SDK), Application Programming Interface (API).
- Understand basic design guidelines for gaming application, industry wide best practices and various ways in game to grabs inputs from various devices.

Course Contents:

Module 1: Core Design: What Is a Game? Games Aren't Everything. Games Mean Gameplay. Creating the Game Spec. Example Game Spec, Initial Design: The Beginning. Hardware Abstraction. The Problem Domain. Thinking in Tokens.

Module 2: Use of Technology: The State of the Art. Blue-Sky Research. Reinventing the Wheel. Use of Object Technology, Building Bricks: Reusability in Software, Initial Architecture Design: The Birth of Architecture. The Tier System. Architecture Design.

Module 3: Development: The Development Process. Code Quality. Coding Priorities. Debugging and Module Completion. The Seven Golden Gambits. The Three Lead Balloons. GAME PROGRAMMING: Technologies: Display, Mixing 2D and 3D, DirectX, User Interface code, Resource caching, the main loop.

Module 4: Design Practices: Smart & naked pointers, using memory correctly, Game scripting languages, Building your game: Creating a project, source code repositories and version control, Building the game and scripts, User interface programming and input devices: Getting the Device State, Working with the Mouse (and Joystick), Working with the Keyboard, User Interface Components, More Control Properties.

Text Books:

- Game Architecture and Programming, Shankarmani, Jain, Sinha, Wiley Publication, India
- Fundamentals of Game Design, 3rd Edition, Ernest Adams, Pearson Publication

Reference Books:

- Game Theory: An Introduction, E. N. Barron, Wiley Student Edition.
- ActionScript 3.0 Game Programming University, 2nd Edition, Gary Rosenzweig, Pearson Education.
- "Game Architecture and Design", Andrew Rollings and Dave Morris 4. "Professional Game Programming" Mike McShaffry, Dreamtech Press.

Course Code	CSL107	Course Title	Introduction to HCI

Category	Core	Credit Assigned	L	T	P	C
			2	0	0	2
Pre-requisite (If any)	-	Type of Course	Computer Science and Engineering			

Course Contents:

Module 1: What is HCI?, Disciplines involved in HCI, Why HCI study is important? The psychology of everyday things, Principles of HCI, User-centred Design.

Module 2: Input-output channels, Human memory, Thinking: Reasoning and Problem Solving, Human emotions, Individual differences, Psychology and Design.

Module 3: Models of interaction, Ergonomics, Interaction styles, WIMP Interface, Interactivity, Context of interaction, User experience, Paradigms of Interactions.

Module 4: What is interaction design?, The software design process, User focus, Scenarios, Navigation Design, Screen Design, Prototyping techniques, Wire-Framing, Understanding the UI Layer and Its Execution Framework

Module 5: Introduction to : Principles that support usability, Design standards, Design Guidelines, Golden rules and heuristics, Using toolkits, User interface management system (UIMS), Goals of evaluation, Evaluation Criteria, Evaluation through expert analysis, Evaluation through user participation, Choosing an Evaluation Method.

Module 6: Introduction to: Goal and task hierarchy model, Linguistic model, Physical and device models, Cognitive architectures, Hierarchical task analysis (HTA), Uses of task analysis, Diagrammatic dialog design notations, Computer mediated communication, Ubiquitous Computing, Finding things on web Future of HCI.

Text Books:

- Alan Dix (2008). Human Computer Interaction. Pearson Education. ISBN 978-81-317-1703-5.

Course Code	CSL108	Course Title	Game Development Design Thinking			
Category	Core	Credit Assigned	L	T	P	C
			2	0	0	2
Pre-requisite (If any)	-	Type of Course	Computer Science and Engineering			

Course Outcomes:

- To analyse the various design techniques
- To develop design methodology by using different technique
- Apply reverse engineering to determine the construct of product
- To draw the technical drawing for the design of game

Course Contents:

Module 1:

Design Process: Product Life Cycle, Design Ethics, Design Process - Four Step, Five Step, Twelve Step, Creativity and Innovation in Design Process, Design limitation.

Module 2:

Creating and Developing Ideas: Create Thinking, Generating Design Ideas, Lateral Thinking, Anologies, Brainstorming, Mind mapping, National Group Technique, Synectics, Development of work, Analytical Thinking, Group Activities Recommended.

Module 3:

Reverse Engineering: Reverse Engineering for New Understanding about Products, Reasons for Reverse Engineering, Reverse Engineering Process, Step by Step - Case Study.

Module 4:

Drawing to develop design ideas: Many Uses of Drawing, Communication through Drawing, Drawing Basis: Line, Shape/ Form, Value, Colour, Texture.

Module 5:

Technical drawing to develop design: Perspective Drawing - One Point Perspective, Two Point Perspective. Isometric Drawing, Orthographic Drawing, Sectional Views.

Text Books:
- Everett N McKay, UI is Communication: How to Design Intuitive, User Centered Interfaces by Focusing on Effective Communication, 2013.
- Don Norman, The Design of Everyday Things: Revised and Expanded Edition, 2013.
- Steve Krug, Don't Make Me Think: A Common Sense Approach to Web Usability, 2nd ed., 2005
- Jesse James Garrett, The Elements of User Experience: User-Centered Design for the Web and Beyond, 2nd ed, 2010.

Reference Books:

- Russ Unger, A Project Guide to UX Design: For user experience designers in the field or in the making, 2nd ed., 2012.
- Jeff Johnson, Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Guidelines, 2014
- Chris Nodder, Evil by Design: Interaction Design to Lead Us into Temptation, 2013.
- Jon Yablonski, Laws of UX: Using Psychology to Design Better Products & Services 1st Edition, 2020.

- Andrew Couldwell, Laying The Foundations: How to Design Websites and Products Systematically, 2020.

Course Code	ECL103	Course Title	Applied Electronics			
Category	Core	Credit Assigned	L	T	P	C
			3	0	2	3
Pre-requisite (If any)	-	Type of Course	Electronics Engineering			

Course Contents:

Module 1: ELECTRONIC DEVICES
Theory of P-N Junction Diode, Junction Transistors Theory of Operation, Static Characteristics, Break Down Voltages, Current Voltage Power Limitations, Field Effect Transistor & MOSFET, Principle of Operation & Characteristics.

Module 2: APPLICATIONS of ELECTRONIC DEVICES
Rectifiers, Zener Diode as Regulators, Biasing of BJT Different Biasing Arrangements, Stability Factor, Small Signal Analysis & High Frequency Analysis of BJT, Power Amplifiers, Push Pull Configuration, Complimentary Symmetry, Feedback Amplifiers, RC, LC & Crystal Oscillators.

Module 3: COMBINATIONAL and SEQUENTIAL LOGIC
Logic minimization using K-map method, multiplexers, demultiplexers, decoders, encoders, Arithmetic circuits, Adders, Combinational multiplier and code converters. Basic latches, master-slave latch, Flip flops, Registers, Counters.

Module 4: MEMORIES
Introduction to PLA, PAL and ROM, Programmable Logic Devices and FPGAs.

Module 5: INTRODUCTION TO MICROPROCESSORS
Architecture, bus structure, timing diagrams, T-states, machine cycle, instruction cycle. Memory and IO devices interfacing.

Reference Books:
1) Electronic devices and circuit theory / Robert L. Boylestad, Louis Nashelsky
2) Milman and Halkias, "Integrated Electronics", Second Edition, 2011, McGraw Hill.
3) Digital Design by M. Morris Mano and Michael D. Ciletti
4) Microprocessor Architecture, Programming, and Applications with the 8085 by Ramesh Gaonkar