

FACULTY OF COMPUTER APPLICATIONS
B.Sc.(IT) (Animation, Vfx and Game Design)

- **Sem** : 6
- **Subject Code** : 05BA0602
- **Subject** : Realtime FX

- **Course Objectives** : Students will be able:
 1. Understand the core concepts of real-time visual effects.
 2. Create dynamic particle systems using Unreal Engine's Niagara.
 3. Simulate and integrate complex VFX using Houdini for real-time workflows.
 4. Optimize VFX for real-time performance across games and virtual production.
 5. Design and implement industry-standard real-time VFX assets.

- **Prerequisites** : Basic knowledge of 3D software, materials, and rendering; familiarity with Unreal Engine interface.

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PRACTICALS

Unit No	Topics Covered	No of lectures required
1	Introduction to Realtime FX <ul style="list-style-type: none"> ▪ Overview of Niagara & Houdini ▪ Emitter & System creation in Niagara ▪ Particle types, spawn, update logic ▪ Creating Fire, Smoke, and Sparks 	30
2	Niagara Advanced Concepts <ul style="list-style-type: none"> ▪ Collisions, forces, and GPU simulation ▪ Ribbon and beam emitters ▪ Cascade to Niagara migration ▪ Real-time FX optimization and LODs 	30
3	Houdini for Realtime <ul style="list-style-type: none"> ▪ VFX simulation basics: Pyro, Flip, RBD ▪ Houdini Engine for Unreal integration ▪ Exporting simulations as flipbooks, meshes, point caches ▪ Real-time FX conversion for game engines 	30
4	Realtime FX Project <ul style="list-style-type: none"> ▪ Stylized FX: Magic, Portals, Weather ▪ FX Sync with Gameplay Events ▪ Final Project: Design and execute a real-time VFX shot combining Niagara & Houdini 	30

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Course Outcomes:

1. Students will understand real-time VFX systems and workflows.
2. Students will build dynamic particle systems using Niagara.
3. Students will simulate and convert effects from Houdini to Unreal.
4. Students will optimize effects for performance and game engines.
5. Students will produce a polished VFX sequence for a portfolio/demo reel.

Course Outcomes – Program Outcomes Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	L	-	H	-	-	M	-	H	-	L	M
CO2	-	H	-	M	-	-	L	-	H	-	M
CO3	H	-	L	-	M	-	-	M	-	H	-
CO4	-	L	-	H	-	-	M	-	M	-	H
CO5	M	-	-	-	H	L	-	L	H	M	-

Text Book:

1. The VFX Handbook: Real-time Effects using Niagara and Houdini 2023 by Packt Publishing.

Reference Books:

1. The Art of Real-Time FX by Saber Jlassi & Mohsen Mousavi 2023 by Rebelway
2. Mastering Unreal Engine: Niagara & VFX Techniques 2022 by Ashif Ali

Web Reference:

1. <https://www.sidefx.com/>
2. <https://dev.epicgames.com/community/learning/>

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App Reference:

1. YouTube – CGHOW, ActionVFX, Unreal Engine
2. Skillshare / Udemy – Niagara & Houdini Real-Time FX Courses.

Syllabus Coverage from text /reference book & web/app reference:

Unit	Chapter Numbers
1	Niagara Basics – Epic Dev Docs, CGHOW Intro Series
2	Advanced Niagara – Ribbons, GPU FX – Unreal Docs, VFX Handbook Ch. 2-4
3	Houdini Simulation – Pyro, RBD – SideFX Learning Path, FX TD Vol. 1
4	Final Project Planning – Combined Shot Design, FX Sync Techniques (Skillshare/Udemy courses, YouTube workflows)