Course title	Virtual Reality
Course code	BIMA-453
Course type	Elective
Level	1st Cycle
Year / Semester	4th
Teacher's name	Dr C G Christou

ECTS	6	Lectures / week	12	Laboratories / week	

Course purpose and objectives	The main objectives of the course are to: • Provide students with basic knowledge for creating immersive virtual reality (VR) applications. • Introduce the historical backgrounds of Virtual Reality (VR) and Augmented Reality (AR) • Discuss immersive and augmented experiences, how they are created and how they differ from conventional viewing experiences. • Identify hardware and software requirements for VR systems, including stereoscopic displays, position & orientation trackers, interaction devices and motion control techniques. • Show how a game engine can be used to create immersive experiences. • Explain the various methods by which content can be created for extended reality including computer generated models and 360 degree videos. • Explore the best practices for creating XR displays including psychological and physiological issues • Identify the challenges of VR including realism, optical limitations, display limitations, locomotion, and simulator sickness.
Learning outcomes	After completion of the course students are expected to be able to: • Develop innovative immersive experiences leveraging virtual reality (VR) technologies. • Outline the historical evolution and technological advancements that have enabled the emergence of VR. • Diagnose and articulate challenges and considerations associated with various VR hardware platforms.

	• Evaluate diverse hardware configurations, including Cave Automatic Virtual Environments (CAVEs), Wide-Screen, Surround Screen, and Head-Mounted Displays (HMDs), and assorted VR tracking mechanisms. • Discuss the psychological and physiological implications of VR usage, including phenomena like cybersickness. • Select suitable components for the assembly of a three-dimensional VR experience. • Conceptualize and construct 3D environments and experiences, including the procurement of necessary assets. • Develop software and applications for immersive 360-degree VR experiences on Android and desktop environments. • Engineer software and applications for computer graphics-based VR experiences for desktop and Android platforms.
Prerequisites	Introduction to Interactive Media and Animation **Required** BIMA-380, BIMA-164
Course content	History of VR. Overview of AR and VR display Technology. The Unity3D game engine and how to create a basic scene. Creating a basic VR scene with interaction using Unity, OpenXR and the Meta Quest HMD. Interaction: Motion Control, Interactors and Interactables. Creating 360 images and video. Displaying 360 video on YouTube, Meta Quest. Creating a 360 image tour in Unity. Problems with immersive systems: cybersickness, nausea, adaptation. Creating a basic VR app in Unity for Desktop and Android
Teaching methodology	Lectures, Lab Presentations, Lab Tutorials, Quizzes, Practical Exercises and Assignments.
Bibliography	Creating Augmented and Virtual Realities, Erin Pangilinan, O'Reilly, 2018, 1492044199 Christou & Parker (Chp. 3) Simulated and Virtual Realities. Slater, M., & Wilbur, S. (1997). A framework for immersive virtual environments (FIVE): Presence: Teleoperators & Virtual Environments, 6(6), 603-616 Missing the Point: An Exploration of How to Guide Users' Attention During Cinematic Virtual Reality: Lasse T. Nielsen, Matias B. Møller, Sune D. Hartmeyer, Troels C. M. Web: https://www.vrs.org.uk/virtual-reality/history.html https://learn.unity.com/

Assessment	Class attendance and performance, assignment and practical projects. Classwork, Quizzes and Homework
Language	English