DEREE COLLEGE SYLLABUS FOR:

ITC 4350 IMMERSIVE COMPUTING **3/0/3**
(Updated Fall 2025) **UK LEVEL: 6**
UK CREDITS: 15

PREREQUISITES:	ITC 2088 Introduction to Programming ***and*** ITC 2197 Object Oriented Programming Techniques **OR** ITC 2053 Introduction to Game Programming ITC 3051 User Experience and Interaction Design
COREQUISITES:	None.
CATALOG DESCRIPTION:	Virtual, augmented and mixed realities; concepts in immersion, presence, and flow; approaches, tools and techniques; immersive technologies and paradigms; perceptual, cognitive, and symbolic aspects of the experience of VR and AR; impact on the user experience.
RATIONALE:	The course explores immersive computing with a focus on augmented and mixed reality. Students get acquainted with approaches, techniques, ethical and moral concerns, and contemporary research in the field. The course offers the opportunity for practice with the development of digital environments, as well as the integration of virtual with physical content into hybrid environments.
LEARNING OUTCOMES:	As a result of taking this course, the student should be able to: 1. Demonstrate understanding of extended reality (XR) types, attributes and infrastructures. 2. Evaluate the usability of supporting hardware. 3. Discuss contemporary practices and developments in the field. 4. Design and develop XR components and prototypes.
METHOD OF TEACHING AND LEARNING:	In congruence with the teaching and learning strategy of the college, the following tools are used: • Lectures, class discussions, use of generative AI tools to inform course content, laboratory practical sessions and problem solving. • Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material. • Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.
ASSESSMENT:	**Summative:** 1st assessment: Research report review of a major aspect of contemporary XR — **20%** 2nd assessment: Portfolio of student work including project defense and presentation. — **10%**

	<table><tr><td>Final assessment: Individual project XR component or prototype or small-scale app// report</td><td>70%</td></tr></table> Formative: <table><tr><td>programming problems</td><td>0%</td></tr></table> The formative assessments aim to prepare students for the summative assessments and expose them to teamwork. The 1st summative assessment tests LO 1,2,3. The 2nd summative assessment tests LO 1,4. The final summative assessment tests LOs 1-4. The final grade for this module will be determined by averaging all summative assessment grades, based on predetermined weights for each assessment. If students pass the final summative assessment, which tests all Learning Outcomes for this module, and the average grade for the module is 40 or above, students are not required to resit any failed assessments.
INDICATIVE READING:	**REQUIRED READING:** 1. Schmalstieg D., Hollerer T. (2016). *Augmented Reality: Principles and Practice.* Addison-Wesley Professional, Kindle edition available 2. Greengard S. (2019). *Virtual Reality (The MIT Press Essential Knowledge Series),* The MIT Press, Kindle version available 3. Instructor's notes **RECOMMENDED READING:** 1. Pangilinan E., Lucas S., Mohan V. (2020). *Creating Augmented and Virtual Realities: Theory and Practice for Next-Generation Spatial Computing*. O'Reilly Media, Kindle edition available. 2. Murray J.W. (2020). *Building Virtual Reality with Unity and SteamVR*, 2nd ed., CRC Press, Kindle edition available. 3. McCaffey M. (2017). *Unreal Engine VR Cookbook: Developing VR with UE4 (Game Design)*. Addison-Wesley Professional, Kindle edition available. 4. Glover J., Linowes J. (2019). *Complete VR and AR Development with Unity*. Packt Publishing, Kindle version available. 5. Han, B., (2019). *Mobile Immersive Computing: research Challenges and the Road Ahead*. IEEE Communications Magazine, vol. 57, Issue 10, pp.112-118 6. Papermaster M., (2016). *The Immersive Era Starts Now: A Pervasive Computing Sequel*. Forbes Technology Council
INDICATIVE MATERIAL: *(e.g. audiovisual, digital material, etc.)*	**REQUIRED MATERIAL:** Getting started with AR development in Unity https://docs.unity3d.com/Manual/AROverview.html Getting started with Vuforia engine in Unity https://library.vuforia.com/articles/Training/getting-started-with-vuforia-in-unity.html Immersive Computing at Google https://www.youtube.com/watch?v=ZHIY6Uwmk-8 XR - The Future of VR, AR & MR in One Extended Reality https://www.youtube.com/watch?v=E0QLVj9FJ0A

	RECOMMENDED MATERIAL: Immersive Computing https://www.slideshare.net/davidcchou/immersive-computing Streaming AR Over 5G https://www.youtube.com/watch?v=OC4rER-BFZo Will AR Glasses Replace Smartphones By 2023? - The Science Behind Augmented Reality Technology https://www.youtube.com/watch?v=2mY4nlzrUIE HoloLens 2 AR Headset: On Stage Live Demonstration https://www.youtube.com/watch?v=uIHPPtPBgHk Augmented Reality Zoo https://www.youtube.com/watch?v=Xmpe1uYTDgI 5 Best Augmented Reality Tech 2018 https://www.youtube.com/watch?v=vQtwWzfzKXI The Evolution of Virtual Reality by 2025 https://www.youtube.com/watch?v=_d-hMZaU5Po
COMMUNICATION REQUIREMENTS:	Daily access to the course's site on the College's Blackboard CMS. Effective presentation skills using proper written and oral English. Communicate and coordinate during team activities.
SOFTWARE REQUIREMENTS:	Unity UnReal 3D Max, Blender Adobe CC Suite
WWW RESOURCES:	• http://jacm.acm.org/ • http://figma.com • http//balsamiq.com • https://www.adobe.com/products/xd.html# • https://www.g2.com/categories/digital-learning-platforms#
INDICATIVE CONTENT:	1. Introduction to Immersive Computing a. XR: Virtual vs Augmented vs Mixed b. Immersing Web and mobile apps c. Basics of computer vision d. Overview of enabling technologies 2. Vision-based hardware devices a. Holographic and immersive headsets b. Smart glasses c. Projection technologies 3. Other hardware technologies a. Immersive audio technologies b. 3D printers c. Experimental technologies 4. Development Techniques a. Design issues b. Component attributes c. Environment/World development d. Projection-based XR 5. Multi-user Gaming – Multi-user Interaction 6. Uses and applications a. Immersive solutions and application areas

	b. Real-world case studies and projects 7. Psychological and social impact 8. Legal and moral issues