DEREE COLLEGE SYLLABUS FOR:

ITC 4056 ENABLING TECHNOLOGIES **3/0/3**
(Fall 2021) **UK LEVEL: 6**
UK CREDITS: 15

PREREQUISITES:	None.
COREQUISITES:	None.
CATALOG DESCRIPTION:	IoT and industrial IoT (iIoT) architectures; standards; softwarisation and virtualisation technologies; fifth generation (5G) networks; federated learning AI systems; blockchain; edge computing; virtual and augmented.
RATIONALE:	The course explores the potential of state-of-the-art technologies to 'enable' innovation in the broader ICT sector. Students have the opportunity to assess existing and emerging technologies based on field research and propose possible spin-offs or new application areas.
LEARNING OUTCOMES:	As a result of taking this course, the student should be able to: 1. Demonstrate understanding of the evolution process of technologies and technology innovation. 2. Discuss the potential of identified enabling technologies to evolve or drive radical change. 3. Interpret international technical ICT standards. 4. Compose structured technical reports on state-of-the-art ICT technologies.
METHOD OF TEACHING AND LEARNING:	In congruence with the teaching and learning strategy of the college, the following tools are used: • Lectures, class discussions, 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: Individual Technical Report On real-life case — **20%** 2nd assessment: Portfolio of student work and oral assessment — **10%** Final assessment: Group research project — **70%** **Formative:** Homework, in-class discussions — **0%** The formative assessments aim to prepare students for the summative assessments. The 1st summative assessment tests LO 1,3. 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. Sartal A., Carou D., Davim P.J. (2020). *Enabling Technologies for the Successful Deployment of Industry 4.0*, 1st ed., CRC Press, ISBN: 9780367572983 2. Instructor's notes. **RECOMMENDED READING:** 1. Sun H., Wang C., Ahmad B.I. (2020). From Internet of Things to Smart Cities, 1st ed., CRC Press, ISBN: 9780367572983 2. Ghosh U., et al. (2020). Internet of Things and Secure Smart Environments, 1st ed., CRC Press, ISBN: 9780367266394. 3. Sharma S.K., et al. (2021). Blockchain Technology for Data Privacy Management, 1st ed., CRC Press, ISBN: 9780367679200 4. Dervojeda K., et al. (eds.) (2016). Boosting the potential of Key Enabling Technologies: Addressing Skills Needs in Europe, European Commission *Complete list of sources available through Blackboard.*
INDICATIVE MATERIAL: *(e.g. audiovisual, digital material, etc.)*	**REQUIRED MATERIAL:** XR - The Future of VR, AR & MR in One Extended Reality https://www.youtube.com/watch?v=E0QLVj9FJ0A 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 **RECOMMENDED MATERIAL:** 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
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:	MS-Office
WWW RESOURCES:	• Journal of ACM: http://jacm.acm.org/ • IEEE Access: https://ieeeaccess.ieee.org/

	• IEEE Spectrum: https://spectrum.ieee.org/ • ETSI: https://www.etsi.org/
INDICATIVE CONTENT:	1. Enabling what? a. Overview of Industry 4.0 b. Understanding Digital Transformation c. Concepts in Augmented and Virtual Reality 2. IoT and iIoT a. Definition, advantages and impact b. IoT sensors and actuators c. IoT protocols and standards 3. Cloud and Edge computing 4. Automation – Robots and CoBots 5. Software Defined and Virtualization Technologies a. Software Defined Radio (SDR) b. Software Defined Networks (SDN) 6. 5G Networks a. History and overview of standards b. Applications c. 6G and beyond 7. Blockchain 8. Introduction to Federated Learning for AI