

DEREE COLLEGE SYLLABUS FOR:									
ITC 3338 EDGE COMPUTING (Fall 2021)	3/0/3 UK LEVEL: 5 UK CREDITS: 15								
PREREQUISITES:	ITC 1070 Information Technology Fundamentals <i>or</i> ITC 2088 Introduction to Programming ITC 2024 Computer Networks and Cybersecurity Fundamentals ITC 2193 Operating Systems Concepts								
COREQUISITES:	None.								
CATALOG DESCRIPTION:	New computing paradigms; fog, edge infrastructures; slicing, management and orchestrations; IoT integration; applications; IIoT; business models; big data analytics in the fog; GDPR restrictions.								
RATIONALE:	The course introduces students to edge computing, an important branch of distributed computing and IoT with significant applications in Data Science. It further discusses the associated concepts of fog and cloud computing and exposes students to modern tools and APIs for use and deployment of relevant infrastructures.								
LEARNING OUTCOMES:	As a result of taking this course, the student should be able to: <ol style="list-style-type: none"> 1. Explore the need for new computing paradigms. 2. Explain major components of fog and edge computing architectures. 3. Identify potential technical challenges of the transition process and suggest solutions. 4. Analyze data and application requirements and pertaining issues. 5. Design and model infrastructures. 								
METHOD OF TEACHING AND LEARNING:	In congruence with the teaching and learning strategy of the college, the following tools are used: <ul style="list-style-type: none"> • Lectures and laboratory sessions. • Office hours held by the instructor to provide further assistance to students. • Use of the online content management system (Blackboard CMS) to further facilitate communication. 								
ASSESSMENT:	<p>Summative:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">1st assessment: Midterm exam Short answers and/or case problems</td> <td style="width: 20%; text-align: center;">30%</td> </tr> <tr> <td>2nd assessment: Portfolio of student work and oral assessment</td> <td style="text-align: center;">10%</td> </tr> <tr> <td>Final assessment: Research Project Infrastructure modelling</td> <td style="text-align: center;">60%</td> </tr> </table> <p>Formative:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Take-home short problems</td> <td style="width: 20%; text-align: center;">0%</td> </tr> </table> <p>The formative assessments aim to prepare students for the summative assessments and expose them to teamwork. The 1st summative assessment tests the LOs 1,2. The 2nd summative assessment tests the LOs 1-5.</p>	1 st assessment: Midterm exam Short answers and/or case problems	30%	2 nd assessment: Portfolio of student work and oral assessment	10%	Final assessment: Research Project Infrastructure modelling	60%	Take-home short problems	0%
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Final assessment: Research Project Infrastructure modelling	60%								
Take-home short problems	0%								

	<p>The final summative assessment tests the LOs 1-5.</p> <p><i>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.</i></p>
INDICATIVE READING:	<p>REQUIRED READING:</p> <ol style="list-style-type: none"> 1. Buyya R., Srirama S.N., "Fog and Edge Computing", Wiley, 2019. 2. Instructor's notes. <p>RECOMMENDED READING:</p> <ol style="list-style-type: none"> 1. Taheri J. & Deng S. (eds.): "Edge Computing: Models, technologies and applications", IET, 2020 2. Sabella D., Reznik A., Frazao R., "Multi-access Edge Computing in Action", 1st edition, Kindle, 2019 3. Al-Turjman F. (ed.): "Edge Computing: from hype to reality", Springer, 2019.
INDICATIVE MATERIAL: (e.g. audiovisual, digital material, etc.)	<p>REQUIRED MATERIAL: The New Frontier of the Web https://hackernoon.com/edge-computing-a-beginners-guide-8976b6886481</p> <p>RECOMMENDED MATERIAL: IoT Edge Computing: Introduction to AWS Greengrass https://www.pluralsight.com/courses/iot-edge-computing-introduction-aws-greengrass?aid=7010a00002LUv2AAG&promo=&utm_source=non_branded&utm_medium=digital_paid_search_google&utm_campaign=XYZ_EMEA_Dynamic&utm_content=&gclid=EAlaIqobChMI5sC76ua87wIV0_hRCh0BxAJ7EAAYiAAEgJla_D_BwE</p>
COMMUNICATION REQUIREMENTS:	<p>Daily access to the course's site on the College's Blackboard CMS and the acg email.</p> <p>Effective communication using proper written and oral English.</p> <p>Use of word processing and/or presentations software for documentation and presentation of deliverables and the final project.</p>
SOFTWARE REQUIREMENTS:	<p>Microsoft Office</p> <p>Python 3.8+</p> <p>OPENStack</p> <p>Docker Compose CU</p>
WWW RESOURCES:	<ul style="list-style-type: none"> • https://www.openstack.org/ • https://www.docker.com/ • https://www.automationworld.com/fog-computing-vs-edge-computing-whats-difference • https://a16z.com/2016/12/16/the-end-of-cloud-computing/ • http://www.faredge.eu/#/ • https://en.wikipedia.org/wiki/Edge_computing • https://opcfoundation.org/markets-collaboration/openfog/

INDICATIVE CONTENT:

1. New computing paradigms
2. The Business and IIoT challenge
3. C2F2T integration infrastructures
4. Autonomic management and orchestration
 - 4.1. Slicing in 5G
 - 4.2. Slicing in software-defined clouds
 - 4.3. Slicing management in Edge and Fog
5. Optimization and modelling frameworks
6. Middleware Infrastructures
 - 6.1. Edge cloud architectures
 - 6.2. Lightweight Edge Clouds
 - 6.3. IoT Integration and Blockchain-based orchestration
7. Data in the fog
 - 7.1. Big Data analytics
 - 7.2. Data management
 - 7.3. Data protection by design
 - 7.4. GDPR restrictions
8. Applications and techniques
 - 8.1. Smart e-Health, smart surveillance, smart transportation
 - 8.2. Predictive analysis for Fog applications deployment
 - 8.3. Testing of Fog IoT apps
 - 8.4. ML techniques for defending IoT systems