

DEREE COLLEGE SYLLABUS FOR:									
ITC 3154 COGNITIVE COMPUTING									
(Previously ITC 3254 Cognitive Computing with IBM Watson)									
(Updated Fall 2021)									
3/0/3									
UK LEVEL: 5									
UK CREDITS: 15									
PREREQUISITES:	ITC 2088 Introduction to Programming								
COREQUISITES:	None.								
CATALOG DESCRIPTION:	Cognition vs AI; learning and reasoning; deep learning; tools; computer vision; audio; natural language representation, processing, and generation; sentiment analysis, dialog reasoning.								
RATIONALE:	The course introduces the methodologies that enable the effort to automate cognitive tasks normally performed by humans. Students have the opportunity to learn and practice approaches for computer vision, speech recognition, language processing and generation, data analysis and reasoning over multiple modalities of input data.								
LEARNING OUTCOMES:	As a result of taking this course, the student should be able to: <ol style="list-style-type: none"> 1. Demonstrate understanding of the underpinning cognitive concepts of artificial cognitive systems and frameworks. 2. Apply AI architectures to real world cognitive problems. 3. Analyze the performance and results of experimentation in the field. 								
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, 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:	<p>Summative:</p> <table border="1"> <tr> <td>1st assessment: Coursework Short implementations</td> <td style="text-align: right;">30%</td> </tr> <tr> <td>2nd assessment: Portfolio of student work and oral assessment</td> <td style="text-align: right;">10%</td> </tr> <tr> <td>Final assessment: Group projects to explore one of the cognitive computing problems/applications; report writing (3000-5000 words)</td> <td style="text-align: right;">60%</td> </tr> </table> <p>Formative:</p> <table border="1"> <tr> <td>Take-home short problems</td> <td style="text-align: right;">0%</td> </tr> </table> <p>The formative assessments aim to prepare students for the summative assessments. The 1st summative assessment tests the LOs 1, 2. The 2nd summative assessment tests the LOs 1-3. The final summative assessment tests the LOs 1-3.</p>	1 st assessment: Coursework Short implementations	30%	2 nd assessment: Portfolio of student work and oral assessment	10%	Final assessment: Group projects to explore one of the cognitive computing problems/applications; report writing (3000-5000 words)	60%	Take-home short problems	0%
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Final assessment: Group projects to explore one of the cognitive computing problems/applications; report writing (3000-5000 words)	60%								
Take-home short problems	0%								

	<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. Instructor’s notes. 2. Installation manuals/libraries for AI tools over Pytorch, TensorFlow, Python. <p>RECOMMENDED READING: (indicative)</p> <ol style="list-style-type: none"> 1. Ayyadevara V K., Reddy Y. (2020). <i>Modern Computer Vision with PyTorch: Explore deep learning concepts and implement over 50 real-world image applications</i>, Pakt Publishing, Kindle edition available. 2. Manning C., Schütze H. (latest reprint). <i>Foundations of Statistical Natural Language Processing</i>, The MIT Press, Kindle edition available. 3. Hagiwara M. (MEAP 2019 - estimated pbl Summer 2021). <i>Real-World Natural Language Processing: Practical applications with deep learning</i>, Manning Publications. 4. Kamath U., Liu J., Whitaker J. (2019). <i>Deep Learning for NLP and Speech Recognition</i>, Springer, Kindle edition available.
INDICATIVE MATERIAL: <i>(e.g. audiovisual, digital material, etc.)</i>	<p>REQUIRED MATERIAL: N/A</p> <p>RECOMMENDED MATERIAL:</p> <ul style="list-style-type: none"> • Coursera NLP courses • Coursera Computer Vision Courses • Stanford Seminar: Speech Recognition and Deep Learning https://www.youtube.com/watch?v=RBgflVAOrss
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>MS-Office Python PyTorch TensorFlow</p>
WWW RESOURCES:	<ul style="list-style-type: none"> • https://www.python.org/ • https://pytorch.org/ • https://www.tensorflow.org/
INDICATIVE CONTENT:	<ol style="list-style-type: none"> 1. Introduction to Cognitive Computing and AI concepts 2. Computer Vision Using Deep Learning Architectures 3. Image Recognition 4. Video Analysis/Generation – Deep Fake 5. Speech Recognition using Deep Learning Architectures 6. Natural Language Processing Statistical Methods

	<ol style="list-style-type: none">7. Natural Language Processing Deep Learning: Word and Sentence Embeddings8. Natural Language Processing Deep Learning: Entity Recognition/Tagging9. Question Answering/Comprehension10. Dialog Management11. Natural Language Generation.12. Knowledge Representation and Reasoning13. Analysing Large Sequences of Data14. Ethical issues, data bias, and exploiting errors.
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