

DEREE COLLEGE SYLLABUS FOR: ITC 4226 DISTRIBUTED SYSTEMS (Updated Fall 2023)		3/0/3 UK LEVEL: 6 UK CREDITS: 15								
PREREQUISITES:	ITC 2093 Operating Systems Concepts ITC 2024 Computer Networks and Cybersecurity Fundamentals <i>or</i> ITC 3175 Introduction to Computer Networks									
COREQUISITES:	None.									
CATALOG DESCRIPTION:	Distributed systems principles; communication; processes; naming; synchronization; fault tolerance; security; consistency and replication; object-based systems; document-based systems; distributed file systems; coordination-based systems; payment systems; Internet and web protocols; scalability.									
RATIONALE:	Principles and concepts of distributed systems underpin development of real-world applications. Students will get a deeper understanding of these principles as well as the design and the complexity of a distributed system, with the use of up to date paradigms. Students will be exposed to the concepts of distributed system's inter-operability, transparency and autonomy and to the difficulties of concurrency, lack of a global clock and independent failure of components.									
LEARNING OUTCOMES:	As a result of taking this course, the student should be able to: <ol style="list-style-type: none"> 1. Determine and explain the needs to design a distributed system. 2. Analyze distributed system models. 3. Explain and assess communication approaches of distributed systems and processes. 4. Evaluate distributed system architectures, consistency, security, process synchronization and data replication needs. 									
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, and review of real-world cases based on specific theoretical concepts. Laboratory practical sessions. • 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:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">Summative:</td> </tr> <tr> <td>1st assessment: Midterm exam short essay questions and case problems</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: Individual research project Literature review/methodology/interpretation</td> <td style="text-align: right;">60%</td> </tr> </table>		Summative:		1 st assessment: Midterm exam short essay questions and case problems	30%	2 nd assessment: Portfolio of student work and oral assessment	10%	Final assessment: Individual research project Literature review/methodology/interpretation	60%
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	<p>Formative:</p> <table border="1" data-bbox="587 185 1497 248"> <tr> <td data-bbox="587 185 1417 248">Individual and group case problems</td> <td data-bbox="1417 185 1497 248">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 and 2. The 2nd summative assessment tests the LOs 1-4. The final summative assessment tests the LOs 1-4.</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>	Individual and group case problems	0%
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<p>INDICATIVE READING:</p>	<p>REQUIRED READING:</p> <ol style="list-style-type: none"> 1. Coulouris, G. (2012). <i>Distributed systems: Concepts and design</i> (5th ed.). Pearson Education. ISBN: 978-0273760597 2. Instructor's notes. <p>RECOMMENDED READING:</p> <ol style="list-style-type: none"> 1. Anthony, R. (2015). <i>Systems Programming: Designing and Developing Distributed Applications</i>. Morgan Kaufmann. 2. Carlos, A. Varela (2013). <i>Programming Distributed Computing Systems: A Foundational Approach</i>. MIT Press. ISBN: 978-0262018982 3. Fokkink, W., (2014). <i>Distributed Algorithms: An Intuitive Approach</i>. MIT Press. 4. Ghosh, S. (2014). <i>Distributed systems: An algorithmic approach</i>. Second Edition. Chapman and Hall/CRC. 5. Kshemkalyani, A., & Singhal, M. (2011). <i>Distributed computing: Principles, algorithms, and systems</i>. Cambridge: Cambridge University Press. 6. Tanenbaum, A., & Steen, (2013). M. <i>Distributed systems: Principles and paradigms</i>. Pearson. 7. Thomas, A. Limoncelli , Strata R. Chalup, Christina J. Hogan (2014). <i>The Practice of Cloud System Administration: Volume 2: Designing and Operating Large Distributed Systems</i>. Addison Wesley. 8. Journals / Magazines: <ul style="list-style-type: none"> • International Journal of Distributed Systems and Technologies (IJDST) • International Journal of Grid and High Performance Computing (IJGHPC) • Journal of Parallel and Distributed Computing (ELSEVIER) • International Journal of Communication Networks and Distributed Systems (Inderscience) 		
<p>INDICATIVE MATERIAL: (e.g. audiovisual, digital material, etc.)</p>	<p>REQUIRED MATERIAL: N/A</p> <p>RECOMMENDED MATERIAL: N/A</p>		
<p>COMMUNICATION REQUIREMENTS:</p>	<p>Daily access to the course's site on the College's Blackboard CMS. Communication using proper written and oral English.</p>		

	Use of word processor, spreadsheet, and presentation SW for documentation and presentation of assignments.
SOFTWARE REQUIREMENTS:	MS-Office Distributed systems middleware C, Python
WWW RESOURCES:	<ul style="list-style-type: none"> • IEEE Xplore: Distributed Systems Online, IEEE (http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?reload=true&punumber=8968) • IEEE Distributed Systems Online (https://www.researchgate.net/journal/1541-4922-IEEE-Distributed-Systems-Online) • Recent Journal of Parallel and Distributed Computing Articles (http://www.journals.elsevier.com/journal-of-parallel-and-distributed-computing/recent-articles/) • International Journal of Internet and Distributed Systems (Scientific Research Publishing Inc) (http://www.scirp.org/journal/ijids/) • ReasearchGate Publications on Distributed Systems (https://www.researchgate.net/publications) • Top journals in distributed & parallel computing (http://academic.research.microsoft.com/RankList?entitytype=4&topDomainID=2&subDomainID=16&last=0&start=1&end=100) • Distributed-Systems.net (Publications) (http://www.distributed-systems.net/index.php?id=publications) • CORBA Middleware (http://www.corba.org/) • Fusion Middleware (http://docs.oracle.com/cd/E21764_01/core.1111/e10103/intro.htm#ASCON109) • Object Management Group (OMG) Interface Definition Language (IDL) (http://www.omg.org/gettingstarted/omg_idl.htm)
INDICATIVE CONTENT:	<ol style="list-style-type: none"> 1. Characterization of Distributed Systems 2. System Models 3. Inter-Process Communication 4. Remote Invocation 5. Indirect Communication 6. Operating System Support 7. Security 8. Name Services 9. Time and Global States 10. Transactions and Concurrency Control 11. Replication