DEREE COLLEGE SYLLABUS FOR:

ITC 3006 MATHEMATICS FOR COMPUTING **3/0/3**
(Previously ITC 3106) **UK LEVEL: 5**
(Updated Fall 2020) **UK CREDITS: 15**

PREREQUISITES:	None.
COREQUISITES:	None.
CATALOG DESCRIPTION:	Concepts of Algebra, Geometry, Proofs, Structures, Counting, Probabilities and Inference, Statistics.
RATIONALE:	The course aims to expose students to a synthesis of algebra, logic, combinatorics, probabilities, graph theory, and machine learning topics. It provides students with the necessary mathematical background to address issues in ICT related areas.
LEARNING OUTCOMES:	As a result of taking this course a student should be able to: 1. Demonstrate understanding of the use of algebraic concepts like polynomial functions, matrices, eigenvectors, eigenvalues and their applications. 2. Discuss geometric concepts like vector spaces, norms, projections and their applications. 3. Explain the use of probabilities and apply concepts from graph theory in solving computing problems; discuss models of probabilistic inference. 4. Construct statements and demonstrate the logic of compound statements
METHOD OF TEACHING AND LEARNING:	In congruence with the teaching and learning strategy of the college, the following tools are used: • Lecturing on the various topics complemented by applications and conjectures or interesting problems. • Problem solving activity conducted by the students and supervised by the instructor. • Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions see their exam paper, and/or go over lecture material. • Use of the Blackboard website, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.
ASSESSMENT:	**Summative:** 1st assessment: Midterm exam Short answers to problems — **30%** 2nd assessment; Portfolio of student work and oral assessment — **10%** Final assessment: Final Exam Short answers to problems. — **60%** **Formative:** In-class and take home short problems. — **0%**

	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 1-4. The final summative assessment tests the 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. Anton, H. and Rorres, C. (2010). *Elementary Linear Algebra*. John Wiley and sons 2. Ross, S. M. (2012). *A first course in probability*. Pearson Education 3. Johnsonbaugh, R. (2007). *Discrete mathematics*. Pearson Education 4. Instructor's notes. **RECOMMENDED READING:** 1. Books on reserve in the library
INDICATIVE MATERIAL: *(e.g. audiovisual, digital material, etc.)*	**REQUIRED MATERIAL**: N/A **RECOMMENDED MATERIAL**: N/A
COMMUNICATION REQUIREMENTS:	Daily access to the course's site on the College's Blackboard CMS. Communication using proper written and oral English.
SOFTWARE REQUIREMENTS:	Matlab (including Simulink) Octave R, Python
WWW RESOURCES:	• http://en.wikipedia.org/wiki/Portal:Mathematics • http://mathworld.wolfram.com/ • http://www.mathacademy.com/
INDICATIVE CONTENT:	**1. Algebra** 1.1 Functions and their Properties 1.2 Polynomial Functions 1.3 Matrices and Matrix Operations 1.4 Eigenvectors and eigenvalues. 1.5 Introduction to Matlab **2. Geometry** 2.1 Vectors; Norms; Vector Arithmetic 2.2 Dot Product; Projections; Cross Product **3. Proofs** 3.1 Propositions / Mathematical Formulas 3.2 Induction 3.3 Patterns of proof **4. Structures** 4.1 Graph Theory 4.2 Directed Graphs

	4.3 Relations and partial orders **5. Counting** 5.1 Sums 5.2 Recurrences 5.3 Cardinality rules **6. Probability Theory and Applications** 6.1 Events and Spaces 6.2 Conditional Probability 6.3 Independence 6.4 Random variables and distributions 6.5 Expectation 6.6 Bayesian inference / Rule of total probability 6.7 Statistical models and probability 6.8 Applications of probability