

DEREE COLLEGE SYLLABUS FOR: MA2130 CALCULUS I													
(Spring 2021)	UK LEVEL: 4 UK CREDITS: 20 US CREDITS: 3/1.5/4												
PREREQUISITES:	MA1008 College Algebra												
CATALOG DESCRIPTION:	An introductory course in differential and integral calculus focusing on science and engineering applications. Differentiation and integration methods are applied to solve problems involving rates of change and optimization of one or two-variable functions of various forms including polynomial and transcendental functions.												
RATIONALE:	This mathematics module aims to introduce the basic calculus concepts and techniques necessary for calculus-based science and engineering courses. The knowledge gained in this course will provide students with important transferable skills necessary to use the mathematics of calculus in real-life applications in related disciplines.												
LEARNING OUTCOMES:	<ol style="list-style-type: none"> 1. Demonstrate understanding of the concepts of differential calculus and find the derivative of univariate functions. 2. Apply differentiation rules to solve approximation and max/min problems with applications in sciences and interpret the results. 3. Demonstrate understanding of the concepts of integral calculus and evaluate the indefinite and definite integral of univariate functions. 4. Make use of integration to solve problems with applications in sciences and interpret the results. 5. Demonstrate understanding of the concepts of vector analysis and partial differentiation. 												
METHOD OF TEACHING AND LEARNING:	<p>In congruence with the teaching and learning strategy of the college, the following tools are used:</p> <ul style="list-style-type: none"> ➤ Classes will consist of lectures where the concepts of the course will be introduced. Coursework will be regularly assigned and discussed in class with students actively participating in the discussion. Computer software will be available both as a teaching aid and as the medium for solving problems. ➤ 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 a blackboard site, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources. 												
ASSESSMENT:	<p>Summative:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 60%;">First assessment, midterm examination (in class, 1 hr)</td> <td style="width: 10%; text-align: center;">40%</td> <td style="width: 30%;">Solving calculus exercises and word-problems, interpretation of results</td> </tr> <tr> <td>Second assessment, portfolio</td> <td style="text-align: center;">10%</td> <td>Solving calculus problems using software, interpretation of results</td> </tr> <tr> <td>Third assessment, final examination (in class, 2 hrs)</td> <td style="text-align: center;">50%</td> <td>Solving calculus exercises and word-problems, interpretation of results</td> </tr> </tbody> </table> <p>Formative:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 60%;">Online exercises and word problems assigned through Blackboard.</td> <td style="width: 10%; text-align: center;">0%</td> <td style="width: 30%;">Solving calculus exercises and word-problems, interpretation of results</td> </tr> </tbody> </table> <ul style="list-style-type: none"> ▪ The first assessment (midterm exam) tests Learning Outcomes 1 and 2. ▪ The second assessment tests Learning Outcomes 2, 4 and 5. ▪ The third assessment (final exam) tests Learning Outcomes 1, 2, 3, 4, 5. The final exam tests all learning outcomes of this module, therefore students pass the module if the average module grade is 40 UK or higher. ▪ The formative assessment aims to prepare students for the examinations. <p>The final grade for this module will be determined by averaging all summative assessment grades, based on the predetermined weights for each assessment. If</p>	First assessment, midterm examination (in class, 1 hr)	40%	Solving calculus exercises and word-problems, interpretation of results	Second assessment, portfolio	10%	Solving calculus problems using software, interpretation of results	Third assessment, final examination (in class, 2 hrs)	50%	Solving calculus exercises and word-problems, interpretation of results	Online exercises and word problems assigned through Blackboard.	0%	Solving calculus exercises and word-problems, interpretation of results
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	<p>students pass the comprehensive assessment that tests all Learning Outcomes for this module and the average grade for the module is 40 or higher, students are not required to resit any failed assessments. Students are required to resit failed assessments in this module.</p>
INDICATIVE READING:	<p>REQUIRED READING:</p> <p>Ron Larson, Bruce Edwards, <i>Calculus: Early Transcendental Functions</i>, Cengage, © 2019, 7th Edition (International Metric Edition, WebAssign e-book)</p> <p>RECOMMENDED READING:</p> <ul style="list-style-type: none"> • Robert Smith, Roland Minton, <i>Calculus</i>, McGraw Hill, © 2011, 4th Edition. • Sophie Goldie, Roger Porkess, <i>Pure Mathematics 2 and 3</i>, Cambridge International AS and A Level Mathematics-Hodder Education ©2012
INDICATIVE MATERIAL:	<p>REQUIRED MATERIAL: N/A</p> <p>RECOMMENDED MATERIAL:</p> <ul style="list-style-type: none"> • College Mathematics • Mathematics Magazine • American Mathematical Monthly
COMMUNICATION REQUIREMENTS:	<p>Oral and written communication skills using academic / professional English.</p>
SOFTWARE REQUIREMENTS:	<p>Any software distributed with the course textbook.</p> <p>Opensource math software <i>Scilab</i> (www.scilab.org)</p>
WWW RESOURCES:	<p>http://mathworld.wolfram.com</p> <p>http://sosmath.com</p> <p>https://www.khanacademy.org/math</p> <p>https://www.symbolab.com</p>
INDICATIVE CONTENT:	<ol style="list-style-type: none"> 1. Trigonometric Functions <ol style="list-style-type: none"> 1.1 Trigonometric functions and identities 2. Differentiation <ol style="list-style-type: none"> 2.1 The concept of the derivative as a limit 2.2 Basic rules of differentiation and rates of change 2.3 Higher order derivatives and the chain rule for composite functions 2.4 Implicit differentiation and related rates 2.5 Differentiation of inverse functions 2.6 Monotonicity and extrema of functions 2.7 Concavity and inflection points of functions – Curve sketching 2.8 Optimization problems and approximations with differentials 3. Integration <ol style="list-style-type: none"> 3.1 Antidifferentiation: The indefinite integral and its basic rules 3.2 The definite integral and the Fundamental Theorem of Calculus 3.3 Integration by substitution 3.4 The natural logarithmic function and its integration 3.5 Integration of trigonometric and inverse trigonometric functions 3.6 The hyperbolic functions and their calculus 3.7 Modelling with separable first order differential equations 3.8 Area of a region between two curves 4. Vectors and the Geometry of Space <ol style="list-style-type: none"> 4.1 Vectors in the plane and in space 4.2 The dot product 4.3 The cross product 5. Functions of Several Variables <ol style="list-style-type: none"> 5.1 Functions of several variables 5.2 Partial derivatives