

### Course Synopses

<b>Semester and Level</b>	Continuing education course at Level 03, offered in the first semester					
<b>Course Code</b>	ADE3200					
<b>Course Title</b>	Applied Calculus I					
<b>Credit value</b>	02					
<b>Core/Optional</b>	Optional					
<b>Prerequisites</b>	Three passes at GCE A/L or from Foundation courses in the Physical Science stream including Combined Mathematics or three passes in the GCE A/L Biological Science stream with a minimum of B grade for CYE3200 or any other equivalent qualification					
<b>Hourly breakdown</b>	<b>Theory</b>		<b>Practical</b>	<b>Independent Learning</b>	<b>Assessment</b>	<b>Total</b>
	17×2 = 34 hours	12 Day School hours		17×3=51 Learning using the online module: 9 hours	CA = 2 hours	108 hours
<b>Course Aim/s.</b>	The main aim of the course is to equip learners with a clear understanding on the elementary concepts related to limits and derivatives, analyze the behaviour of graphs of functions and thereby solve elementary applied problems.					
<b>PLOs addressed by course</b>	<p>PLO1: Knowledge: Explain the fundamental, principles and broader knowledge pertaining to the chosen science disciplines offered for the degree.</p> <p>PLO2: Practical Knowledge and Application: Demonstrate the competency to use the knowledge and practical skills appropriately.</p> <p>PLO3: Communication: Demonstrate the competency in communicating efficiently and effectively to present information, ideas and concepts to the scientific community as well as to the wider society.</p> <p>PLO4: Individual Work, Teamwork and Leadership: Demonstrate the competency in working independently and in groups in addressing issues in multi-disciplinary environments and completing the tasks on time through collaborative learning while exhibiting leadership.</p> <p>PLO5: Creativity and Problem Solving: Identify and analyze problems using quantitative and/or qualitative approaches using scientific methodology to provide valid conclusions.</p> <p>PLO9: Lifelong Learning: Develop the capacity to foresee new trends and their impacts and continuously update knowledge and develop skills willingly to meet those future challenges.</p>					
<b>Course Learning Outcomes (CLO)</b>	<p>The students should be able to:</p> <p>CLO1: Plot functions using basic transformations (PLO1, PLO2).</p> <p>CLO2: Find derivatives of functions using basic rules for differentiation and analyze functions using limits and derivatives (PLO1, PLO3, PLO5).</p> <p>CLO3: Effectively use derivatives to solve simple optimization problems (PLO2, PLO3, PLO4, PLO5, PLO6).</p> <p>CLO4: Apply theory of convexity to plot graphs of complex functions (PLO1, PLO2)</p> <p>CLO5: Carry out implicit differentiation and solve single variable optimization problems (PLO1, PLO2, PO5)</p> <p>CLO6: Define sequences, and identify sub sequences, bounded and unbounded sequences and find the limit of a sequence (PLO1, PLO2, PLO5)</p> <p>CLO7: Define a series and determine convergence and divergence of a series using partial fractions, root test and ratio test (PLO1, PLO2, PLO5)</p>					

<b>Content</b> <b>(Main topics, sub topics)</b>	Plotting functions using basic transformations. Limits and derivatives of functions. Properties of derivatives. Plotting graphs of functions using derivatives. Asymptotes. Convexity, Higher derivatives. Implicit differentiation. Single variable optimization. Convexity, higher order derivatives of functions, solve basic equations of derivatives to find functions, Implicit differentiation, Plotting graphs of curves using implicit differentiation, applications of derivatives, sequences, sub sequences, bounded and unbounded sequences, limits of sequence, introduction to series, convergence of a series, determining convergence of a series using partial fractions, root test and ratio test.	
<b>Teaching Learning methods</b>	Self-Learning/Independent learning of Self-study <ul style="list-style-type: none"> <li>▪ Instructional Material (IL)</li> <li>▪ Online Activities (OL)</li> <li>▪ Reference Work (RF)</li> </ul> Compulsory contact sessions <ul style="list-style-type: none"> <li>▪ Assessments (AS) and Feedback – MCQs (MCQ); Structured Essay (SEQ); Essay Questions (ES)</li> </ul> Non-compulsory contact sessions Day Schools (DS)	
<b>Assessment strategy</b>	Overall Continuous Assessment Mark (OCAM): 40%  Details: Continuous Assessment1 (CAT1): -1hr Continuous Assessment2 (CAT2): -1hr OCAM=60% of the best CAT1/CAT2 + 40% of the other CAT1/CAT2	Final Assessment: 60%  Two-hour Structured Essay Type Question Paper: Have to answer 4 questions out of 6 questions
<b>Recommended Readings:</b>	<ul style="list-style-type: none"> <li>• Calculus: Early Transcendentals by James Stewart, Published by Cengage Learning. ISBN-10: 8131531899.</li> <li>• Thomas' Calculus: Early Transcendentals by Joel R. Hass, Christopher E. Heil, Maurice and D. Weir, Published by Pearson. ISBN-978-93-530-6041-1.</li> </ul>	