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| | EN6914 | Mathematics for Engineers 2 |

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| Course Aim | To provide students with detailed understanding of differential and integral calculus, and develop the ability to formulate and solve models of simple engineering systems. |

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| Short Title | None | Version | 3.00 |
| Faculty | EDICT | Effective From | September 1, 2015 |
| Polytechnic Level | | Indicative NQF Level | 6 |
| Credits | 15 | Student Contact hrs | 90 |
| Pre-requisites | None | Self-directed hrs | 60 |
| Co-requisites | None | Other directed hrs | None |
| Anti-requisites | None | Total learning hrs | 150 |

| Learning Outcomes | On successful completion of this course, students will be able to: | NQF Sub-strand |
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| 1 | Demonstrate understanding of the principles of important functions used in the mathematical and engineering sciences | Theoretical Understanding |
| 2 | Formulate the fundamental concepts of limits | Theoretical Understanding |
| 3 | Apply differentiation in engineering problems | Theoretical Understanding |
| 4 | Apply integration in engineering problems | Theoretical Understanding |
| 5 | Formulate and solve first-order differential equation models | Theoretical Understanding |
| 6 | Understand and apply suitable numerical methods | Theoretical Understanding |
| 7 | Understand and apply sequences and series | Theoretical Understanding |

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| Topics / Content | • Introduction: review of algebra, geometry and trigonometry fundamental concepts<br>• Vectors: concepts, properties, analysis and applications<br>• Polynomial Algebra: rational functions<br>• Differentiation Calculus: methodology and applications<br>• Integral Calculus: methodology and applications<br>• Limits, Sequences and Series: Taylor and Mauclaren expansion of functions<br>• Differential Equations -- First-Order: methodology of solutions and applications |

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| Learning and Teaching Strategies | Underpinning knowledge will be attained through directed tutorial sessions which will be supported by PBL based worksheets, independent homework and consolidated by tests. Practical knowledge and applications will be achieved through completion of two main practical PBL project-assignments within a team, allowing students to obtain the skills necessary to acquire data analyse and interpret results. Students will also be given the opportunity to discuss their work in detail.<br>PBL is introduced in this course as for many students it will be their first encounter with this type of learning experence. This course primarily covers fundamental mathematical theory which students will later use for engineering applications.<br>Formative assessment: tutors have short quizzes and mock test throughtoutthe semester to assess students' progress. |

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| Completion Requirements | 60% aggregate |

| Assessment | Assessment Task Description | Weight (%) | Must Pass (Y/N) | Learning Outcomes Assessed | Form of Assessment Task |
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| | Tests<br>Tests will demonstrate relevant underpinning knowledge gained and provide consolidation across the content range | 20 | N | 1,3,6 | Examination (unseen) |
| | Assignments<br>Practical problem-based project-assignments aimed at consolidation of the course content-topics and train students to work as a team. | 20 | N | 1,2,3,4,5,6 | Practical project |
| | Final Exam<br>Final Exam will demonstrate comprehensive underpinning knowledge gained by learners in the course as a whole and provide consolidation across the entire content range of the studied subject. | 60 | N | 1,2,3,4,5,6,7 | Examination (unseen) |

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| Assessment Method | Achievement |