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| Module code | SM-2207 | | |
| Module Title | Complex Analysis | | |
| Degree/Diploma | Bachelor of Science (Mathematics) | | |
| Type of Module | Major Core | | |
| Modular Credits | 4 | Total student Workload | 10 hours/week |
| | | Contact hours | 4 hours/week |
| Prerequisite | SM-1202 Advanced Mathematical Methods for the Sciences | | |
| Anti-requisite | None | | |
| Aims | | | |
| To learn main principles of complex analysis and its applications in other fields of mathematics | | | |
| Learning Outcomes | | | |
| <i>On successful completion of this module, a student will be expected to be able to:</i> | | | |
| Lower order : | 30% | - work with complex numbers, describe various sets in the complex plane and actions of elementary functions on the characteristic sets. | |
| Middle order : | 60% | - know the analyticity conditions and properties of analytic functions. Differentiate and integrate complex valued functions. | |
| Higher order: | 10% | -Be familiar with residues of analytic functions and their applications for evaluation of real and complex integrals. | |
| Module Contents | | | |
| <ul style="list-style-type: none"> -Representation of complex numbers in algebraic and polar form. Complex conjugation and main properties of complex numbers. Roots of complex numbers. -Topology of complex plane. Open and closed subsets. Compact sets. Continuous arcs. Connected sets. Multi-valued and single-valued functions. Branches of multi-valued functions. Limit theorems. Continuous functions. -Differentiability. Properties of differentiable functions. Differentiation rules. Cauchy-Riemann equations. Analytic functions. Conformal mappings. Harmonic functions. Elementary complex functions -Line and contour integrals. Cauchy theorem and its consequences. Cauchy integral formula and properties of analytic functions. Series representation of analytic functions. -Singular points. Laurent series and classification of singularities. Properties of analytic functions around singular points.. -Calculus of residues. Cauchy theorem. Applications. Evaluation of real integrals and summation of series. | | | |
| Assessment | Formative assessment | Weekly exercises will be discussed to give feedback for student's learning. | |
| | Summative assessment | Examination: 60% Coursework: 40% - One (1) class test (20%) - One (1) assignment (20%) | |