Faculty of Science
Department of Mathematics

MA4198 PROJECT PROPOSAL (PROJECT CUM SEMINAR GROUP)

SUPERVISOR'S INFO

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PROJECT ID: PS2610-03

TITLE

Riemann Surfaces: The Geometry of String Theory

BRIEF DESCRIPTION OF PROJECT

Riemann surfaces lie at the intersection of geometry, analysis, and physics. In this project, students will explore how ideas from complex analysis lead inevitably to these surfaces, and how they turn out to be the right geometric framework for string theory.
The construction of Riemann surfaces will be motivated from ideas in complex functions. What begins as a problem in complex functions gradually leads to a new kind of geometry. Students will then explore the main geometric structures on these surfaces, and see how different ways of describing them come together into a single, coherent picture.
This perspective then connects directly to string theory. As a string moves, it traces out a two-dimensional surface called a worldsheet. Students will uncover why this surface is naturally viewed as a Riemann surface, and see why this viewpoint is both natural and powerful.

EXPECTATION/S

Students will be directed to specific sections of the reading materials and are expected to engage with them independently. Students will take turns to explain their learning to the group and actively contribute to discussions.
Each student is expected to connect the material presented to build a coherent understanding of the project. The project will culminate in a written report.
At the end of the project, we will also aim to create something tangible to celebrate your journey, your achievement, and the identity you have built together as a group.

PREREQUISITE/S (at level 3000 or below, with at most one course at level 3000)

MA2104

READING REFERENCE/S

Introduction to Smooth Manifolds,
Introduction to Complex Manifolds,
Algebraic Curves and Riemann Surfaces