Faculty of Science
Department of Mathematics

MA4198 PROJECT PROPOSAL (PROJECT CUM SEMINAR GROUP)

SUPERVISOR'S INFO

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PROJECT ID: PS2610-10

TITLE

Tate's Thesis

BRIEF DESCRIPTION OF PROJECT

Tate's thesis is the 1950 PhD thesis of John Tate at Princeton University. It applies invariant integration on the locally compact group of ideles to study the zeta function of a number field.
Tate proved the functional equation and meromorphic continuation of the zeta integral and the Hecke L-function. He also located the poles of the twisted zeta function.

EXPECTATION/S

To get a passing grade, students should understand and explain the proof of the functional equation in Tate's thesis. It would be great if they could venture beyond Tate's thesis, but this is optional.

This project assumes certain background in number theory, harmonic analysis and complex analysis.
We list the background below.

- Number theory: Number fields, local fields, idele group of a number field, characters of a number field, local field or idele group.
- Fourier Analysis: Integration on a local field. Fourier transform and its inverse transform.
- Complex analysis: Holomorphic and meromorphic functions on the complex plane. Analytic continuation on the complex plane.

The prerequires may look intimidating but they are modest and manageable. We will review these topics as the project progresses. Students who is lacking in one or more of the topics above could learn it while working on the project.

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

MA2101/MA2101S, MA2108/MA2108S, MA3211/MA3211S

READING REFERENCE/S

Tate's Thesis.
S. Lang, Algebraic Number Theory. GTM 110 (Springer).