Title: MATH 663 Semiclassical Analysis

Course Description: Semiclassical analysis is a theory underlying the classical/quntum correspondence, particle/wave duality, the geometric optics approximation ("light travels in straight lines"), and the semiclassical approximation in quantum mechanics. It is closely related to microlocal analysis and involves the study (in phase space) of the high-frequency behavior solutions of partial differential equations.

This course will cover an introduction to the toolkit of semiclassical analysis, including the stationary phase approximation, semiclassical pseudodifferential operators, and defect measures, as well as their adaptations to manifolds. We will also use these tools to prove:

- the celebrated control theorem of Rauch--Taylor for the damped wave equation on the torus,
- Weyl's law for the asymptotic behavior of the eigenvalue counting formula for the Laplacian, and
- quantum ergodicity (i.e., equidistribution) for eigenfunctions on a space with an ergodic billiard map.

Average time dedicated per week: 5-8 hours