

MA 773 001 Spring 2011
Topics in Analysis

**An introduction to geometric analysis:
Eigenvalues, Eigenfunctions, and Resonances**

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MWF 1:00-1:50 CB 343

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Office Hours: Monday, Wednesday, and Friday 3-4, or call or email

This course will be an overview of selected topics in geometric analysis: isoperimetric inequalities, eigenvalue inequalities (for example, the Faber-Krahn inequality, the Szegő-Weinberger inequality, inequalities between Neumann and Dirichlet eigenvalues), spectral analysis of compact hyperbolic manifolds including the Selberg trace formula. We will then study problems for noncompact domains highlighting the theory of resonances for Schrödinger operators and noncompact manifolds.

Basic knowledge of Banach and Hilbert space theory, some differential geometry, and basic familiarity with linear operators and PDEs will be useful.

1. Laplacians on bounded domains in R^d
2. Isoperimetric inequalities
3. Eigenvalue estimates
4. Estimates on eigenfunctions, quantum ergodicity
5. Hyperbolic manifolds
6. Spectral analysis of the Laplacian on hyperbolic manifolds
7. Selberg trace formula for compact hyperbolic manifolds
8. Resonances and estimates on resonances

Each class member will be expected to write a paper and make a presentation.