**Course outline**: Asymptotic analysis and perturbation methods provide powerful techniques in applied mathematics for obtaining simple analytical forms to reliably approximate solutions to complicated problems in a range of different mathematical settings. The course will cover asymptotic expansions, solution of nonlinear algebraic equations, regular and singular perturbations problems, matrix eigenvalue problems, asymptotics of integrals - Fourier and Laplace transforms, and solutions of differential equations - singular points, WKB theory, multiple-scale analysis, boundary layers, and matched asymptotic expansions.

**Prerequisites**: Background in ordinary differential differential equations (Math 353, 356 or higher), undergraduate background in multi-variable calculus (line integrals or contour integrals from complex variables).