**PHYS 449**

**Syllabus:** What is taught in this course will depend in part on the interests and backgrounds of the students. The intent is to give students a good grounding in analytic, numerical and mixed analytic/numeric techniques of mathematical physics. Likely topics include:

Solution techniques for Ordinary Differential Equations
Complex Variables, analytic functions, and Integration
   - Analytic functions, simple and complicated partial fractions
   - Deforming analytic and numerical integrals in the complex plane to evaluate them or make them easier to approximate (analytically or numerically)
Integration
   - Various techniques for calculating integrals, including moment generating functions
Asymptotic analysis
   - Asymptotic analysis of sums, integrals and ordinary differential and difference equations
   - Analysis of an integral representation of a special function as an example of an asymptotic expansion
   - Use of complex analysis to improve analytic and numeric calculations of sums and integrals
   - The principle of asymptotic balance, boundary layer theory, asymptotic matching, global asymptotic analysis
   - Analysis of asymptotic series, including Pade approximates, two-point Pade’s, Borel resummation.
   - Finding accurate approximations to complex functions / integrals simply so they can be evaluated quickly in numerically in “inner loops”
   - Multiple time scale analysis
Transform techniques
   - Fourier Transforms, fast fourier transforms and applications
   - Convergence of various transform methods for representing functions
   - Transform techniques in partial differential equations
Group Theory?