- People
- Curriculum
  - Courses
  - Additional topics?
  - Skill set
- Policies

Full

- Adalsteinsson, David
- Camassa, Roberto
- Forest, Gregory
- Huang, Jingfang
- McLaughlin, Richard
- Mitran, Sorin
- Mucha, Peter

Associate

- Griffith, Boyce
- Newhall, Katherine

Assistant

- Copos, Calina
- Kovalsky, Shahar
- Saenz, Pedro

- Semester-long, single instructor
- Distinction between "Methods" and "Computation"
- Methods:
  - MATH668: Methods of Applied Mathematics I
  - MATH669: Methods of Applied Mathemtics II
  - MATH768: Mathematical Modeling I
  - MATH769: Mathematical Modeling II
- Computation:
  - MATH661: Scientific Computation I
  - MATH662: Scientific Computation II
  - MATH761: Numerical ODE/PDE I
  - MATH762: Numerical ODE/PDE II
- Special topics: MATH891/2

Sem.	#	Methods	#	Computation
Fall	668	• Complex variables: branch cuts, Laurent series, contour integration • Asymptotics: convergence, Laplace's method, Watson lemma, steepest descent, stationary phase • Bifurcation • Generalized Laplace	661	• Errors: truncation, floating point • Approximation: interpolation, least squares, min-max • Numerical calculus: finite differences, quadrature • Nonlinear equations: simple iteration, secant, Newton • Gauss elimination • Numerical ODE: multi-step, multi-stage, consistency, stability, convergence
Spring	669	• Nondimensionalization, small parameters • Perturbations: algebraic & ODE expansions, singular perturbation, multiple scale, boundary layers • Eigenfunctions & WKB: particle in well, turning points, bound states, scattering matrix • Homogenization: 1D, nD, solvability, Fredholm alternative • PDEs: transport, characteristics, shocks, rarefactions, diffusion	662	• Basics: linear combination, scalar product, norm, orthogonality, SVD • Least squares: QR, Householder, projection • Conditioning: condition number, forward & backward stability • Systems: Gauss, pivoting, Cholesky • Eigenvalues: Rayleigh, QR • Iterative methods: Jacobi, Gauss-Seidel, SOR, Krylov

Sem.	#	Methods	#	Computation
Fall	768	• Nondimensional parameters: scales, Buckingham π theorem • Fluid models: potential, Euler, Navier-Stokes • Asymptotic fluid models: lubrication, slender filament, thin films, Stokes flow • Weakly nonlinear envelopes	761	• ODEs: systems, stiffness, boundary locus, BVPs • Finite difference: linear advection • Finite volumes: conservation law, Hugoniot relation, Godunov schemes, high resolution
Spring	769	• Polymers: dilute, Oldroyd-B, reptation, kinetics • Continuum mechanics: large deformation theory, hyperelasticity • Geophysical models: ocean circulation, quasi-geostrophic flows, atmospheric vortices	762	• Finite element: Galerkin, Rayleigh-Ritz, simplicia • Spectral: FFT, pseudo-spectral • Integral equations: fast summation, FMM • Adaptive computation • Lattice methods: Boltzmann, Fokker-Planck

- Stochastic calculus
- Nonlinear model reduction

- Deep Neural Networks
- Computational geometry & topology
- Optimization
- Stochastic PDE
- Graphs and networks

- Analytical
- Computational
- Scholarly
- Presentation
- Career networking