# Topics

### 1. Overview, Equations, Ideal Fluids

— OV of phenomenology, especially current research
— Euler Equations
— Potential flow, induced mass

### 2. Vorticity and Viscous Flow

— Kelvin's Theorem, Induction Equation, Freezing-in Law, Boundaries
— Navier–Stokes Equations, Viscous Flow, Stokesian Dynamics and Drag, Clamshell Theorem

### 3. Instabilities

— Interfacial: Rayleigh–Taylor, Kelvin–Helmholtz
— Generalized Interchanges: Rayleigh–Bénard convection and extensions
— Rotation Convection; Taylor–Proudman Theorem

### 4. Boundary Layers

— Blasius Boundary Layer, Drag
— Basics of Drag, Laminar Wake
— Drag Crisis

### 5. Turbulence I - Microscopics

— Basic ideas, K41 Model, Richardson Phenomenology
— Asymptotics, Scaling, and Anomalous Exponents

### 6. Turbulence II - Macroscopics

— Pipe Flow Turbulence, Prandtl Law of Wall
— Turbulent Wakes, Wake Structure
— Turbulence in two dimensions

### 7. Module I (4 lectures) — TBA

### 8. Module II (4 lectures) — TBA