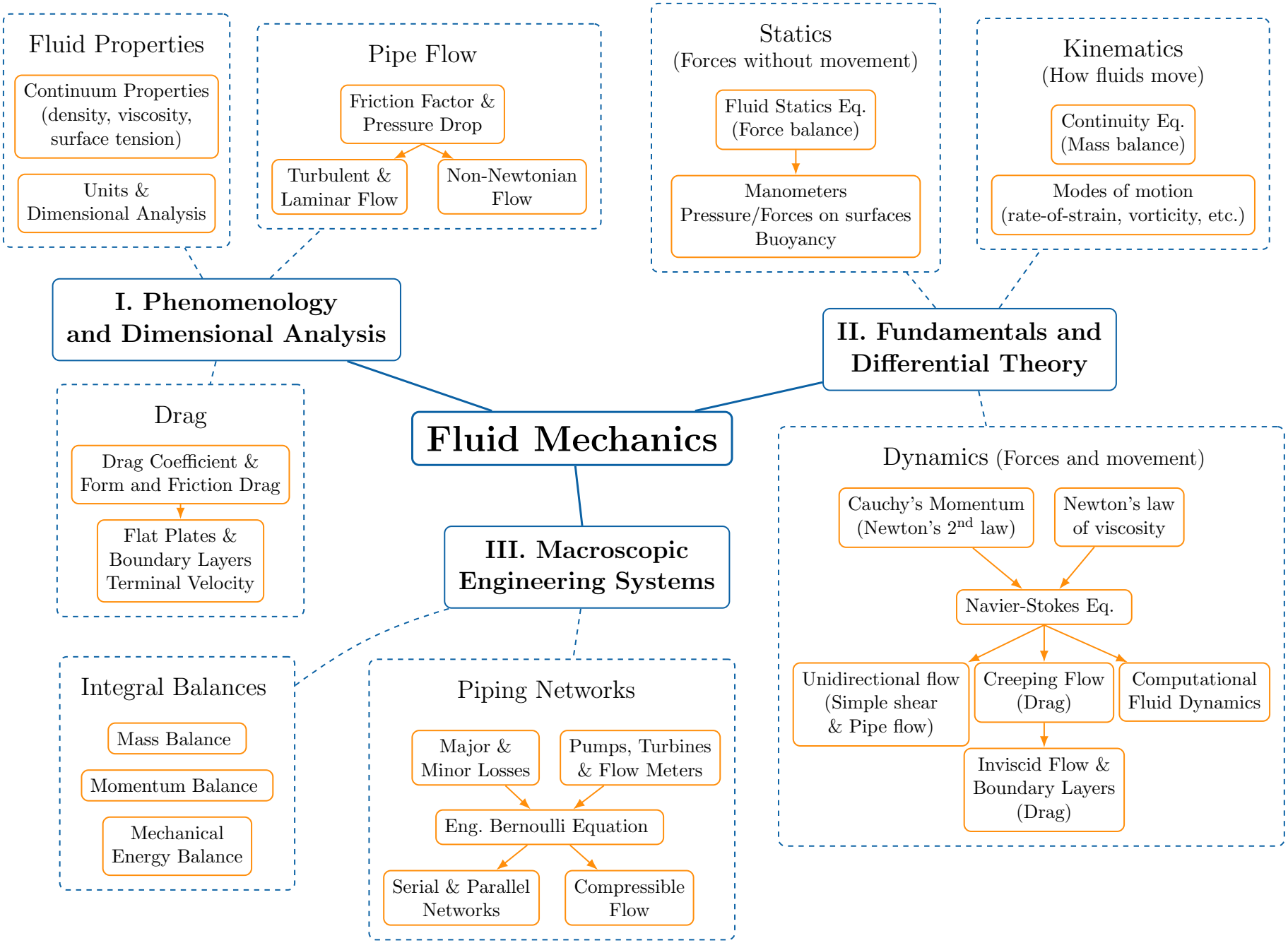
Fluid Properties
Continuum Properties (density, viscosity, surface tension)
Units & Dimensional Analysis
Pipe Flow
Friction Factor & Pressure Drop
Turbulent & Laminar Flow
Non-Newtonian Flow
Statics (Forces without movement)
Fluid Statics Eq. (Force balance)
Manometers
Pressure/Forces on surfaces
Buoyancy
Kinematics (How fluids move)
Continuity Eq. (Mass balance)
Modes of motion (rate-of-strain, vorticity, etc.)
I. Phenomenology and Dimensional Analysis
II. Fundamentals and Differential Theory
Fluid Mechanics
Drag
Drag Coefficient & Form and Friction Drag
Flat Plates & Boundary Layers
Terminal Velocity
III. Macroscopic Engineering Systems
Dynamics (Forces and movement)
Cauchy's Momentum (Newton's 2nd law)
Newton's law of viscosity
Navier-Stokes Eq.
Unidirectional flow (Simple shear & Pipe flow)
Creeping Flow (Drag)
Computational Fluid Dynamics
Inviscid Flow & Boundary Layers (Drag)
Integral Balances
Mass Balance
Momentum Balance
Mechanical Energy Balance
Piping Networks
Major & Minor Losses
Pumps, Turbines & Flow Meters
Eng. Bernoulli Equation
Serial & Parallel Networks
Compressible Flow