

Classical mechanics

- Lagrangian Mechanics:
 - Hamilton's Principle with Constraints
 - Variational Principle
 - Conservation Theorems and Symmetry Properties
- Hamiltonian Formalism:
 - Hamilton's Equations of Motion
 - Canonical Transformation
 - Symplectic Approach and Poisson Brackets
 - Hamilton-Jacobi Theory
- Central Force Problems
 - Equations of Motion and Effective Potential for Central Force Problems
 - Kepler's Problem
 - Scattering with Central Force
- Rigid Body Motion
 - Euler Angles
 - Non-inertial Reference Frames
 - Inertia Tensor
 - Euler Equations of Motion
- Small Oscillations
 - Eigenvalue Equation and Principle Axis Transformation
 - Normal Coordinates

Suggested literature: *Classical Mechanics 3rd Edition*, by Herbert Goldstein, Charles P. Poole, and John L. Safko