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Office hours: 10am - 11am MTh, and by appointment.

Texts: Landau and Lifshitz, *Mechanics*; Goldstein, *Classical mechanics*.

Grading: 17% for each of two one-hour exams, 33% for the final, 20% for the homework.

Homework: assigned weekly and collected on a week later. Late homework will not be accepted.

Course outline

1. **Equations of motion.** Generalized coordinates. The principle of least action. Relativity principle in classical mechanics. Lagrangian for a free particle and for the system of particles.
2. **Conservation Laws.** Energy. Momentum. Angular momentum. Mechanical similarity.
3. **Scattering.** Motion in a central field. Particle decays. Elastic and inelastic collisions. Differential and total cross section. Small-angle scattering.
4. **Oscillations.**
5. **Canonical equations.** Hamilton equations. Poisson brackets. The action as a function of the coordinates. Canonical transformations. The Hamilton-Jacobi equations. Adiabatic invariants.
6. **Continuous systems and fields.** The Lagrangian density. Equations of motion. Energy-momentum tensor. Noether theorem.
7. **Fluid dynamics.** Continuity equation. Euler equations. Bernoulli equation. Potential flow. Navie-Stokes equations.