

# Syllabus for Physics 110B – Classical Mechanics

Winter 2015-2016, Physics Department, UCSD

INSTRUCTOR: Congjun Wu (5430 MH)

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TA: Wang Yang (wyang@physics.ucsd.edu) office: MH5206

Time/Place: 9:00am - 9:50 am, M W F, Peter 102

Instructor Office hour: Friday: 1:00-2:00 pm

TA Office hour: Monday: 1:00-2:00pm

Problem session: Wednesday: 6:00 –6:50pm Peterson 102.

Text Books:

1. John R. Taylor, *Classical Mechanics*, University Science Books, 2005.
2. L. D. Landau and E.M. Lifshitz, *Mechanics*, Butterworth-Heinemann; 3 edition (January 15, 1976).

Grade:

30% problem sets, 35% midterm, 35% final exam. There will be only one midterm in Physics 110B.

Homework Assignments:

Homework will be assigned every one or two weeks.

## Class Schedule

1. Noninertial Frames (5 classes)
  - Lecture 1: Noninertial frame without rotation; the tide force;
  - Lecture 2: Newton's laws in a rotating frame
  - Lecture 3: the Coriolis force; Foucault Pendulum;
2. Rigid body (6 classes)
  - Lecture 4: Rigid body, Rotation around fixed axis;
  - Lecture 5: Inertial tensor; principal axes of inertial tensor;
  - Lecture 6: Euler equation;
  - Lecture 7: Euler angle, spinning top;
3. Hamiltonian Mechanics (5 classes)
  - Lecture 8: Lagrangian equation v.s. Hamiltonian equation; Poisson bracket;
  - Lecture 9: Canonical transformation;
  - Lecture 10: Conserved quantities;
  - Lecture 11: Liouville's theorem; Boltzmann transport equation;
4. Continuum Mechanics (6 classes)
  - Lecture 12: Waves
  - Lecture 13: Stress and Strain
  - Lecture 14: Fluid; Bernoulli's equation
5. Special Relativity (5 classes)
  - Lecture 15: Lorentz transformation
  - Lecture 16: 4-vectors; 4-momentum
  - Lecture 17: Lorentz transformation of E & M field
  - Lecture 18: Action and Lagrangian for relativistic particle