

# Syllabus for Physics 110A – Classical Mechanics

Winter 2017-2018, Physics Department, UCSD

INSTRUCTOR: Congjun Wu (5430 MH)

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TA: Tapan Goel (tgoel@ucsd.edu)

Time/Place: 1:00pm - 1:50 pm, M W F, WLH2204

Instructor Office hour: Friday 2pm-3pm at my office

TA Office hour : Tuesday 3-4pm at the coffee lounge on the 7th floor in Urey hall.

Problem session: Friday 4:00 – 5:00pm, PCYNH 122.

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 110A.

Homework Assignments:

Homework will be assigned every one or two weeks.

## Class Schedule

### 1. Newtonian Mechanics

Lecture 1: Basic concepts – Galilean space-time, Newton's laws

Lecture 2: Simple examples

Lecture 3: Projectile with linear resistance

Lecture 4: Projectile with quadratic resistance, magnetic cyclotron

### 2. Conservation law

Lecture 5: Momentum and angular momentum

Lecture 6: Work and energy

Lecture 7: Applications of energy

Lecture 8: More on energy

### 3. More on applications

Lecture 9: Kepler Problem (I)

Lecture 10: Kepler problem (II)

Supplemental Material: Runge-Lenz vector

Lecture 11: Oscillation (I)

Lecture 12: Oscillation (II)

Lecture 13: Oscillation (III): normal modes

### 4. Analytical Mechanics

Lecture 14: Calculus of variation

Lecture 15: The least action principle

Lecture 16: Lagrangian for systems with constraint

Lecture 17: Applications of Lagrangian formalism

Lecture 18: Conservation laws, Lagrangian for magnetic forces