

## PHYS 401 – 501 SYLLABUS

### Introduction:

This is the syllabus for PHYS401/501 Classical Mechanics. It is a double coded class, given to undergraduates and graduates with the same material. The homeworks and midterms may be different based on the level of class, 401 and 501 may have different homeworks and exams. The grading and the rest is the same.

I will use SUCOURSE extensively for homework assignment/collection, announcement, sharing resources, etc.

I will use TOPHAT to ask questions. Join code: 310903

### Contents:

- 0 introduction to class
- 1. Equations of motion
  - Lagrangian
- 2. Conservation laws (homework 1)
  - Energy
  - Momentum
  - Angular momentum
- 3. Integration of equation of motion (homeworks 2,3)
  - One dimension
  - Reduced mass
  - Central field
  - Kepler
- 3.5 Motion in non-inertial frames
- 4. Collisions (homework 4)
  - Elastic
  - Scattering
  - Rutherford
  - Small angle
- 5. small oscillations (homeworks 5,6)
  - Free
  - Forced
  - Vibrations
  - Damped
  - Friction
  - Resonance
  - Non-linear
- 5.5 Continuum limit, waves
- 6. rigid body (homework 7)
  - Motion
  - Eulerian angles
  - Symmetric top
- 7. canonical eqns. (homework 8)
  - Hamiltons principle
  - Poisson brackets
  - Canonical trans
  - Liouville
  - Hamilton jacobi

### Grading:

8 homeworks = 50 pts (I will have 7 best grades over each, 7pts each+ 1 point bonus for those who turns in at least 5 homeworks)  
final = 35 pts

midterm=25 pts  
Catalog over 110 points.

**Books:**

Landau Lifshitz – Mechanics (main book)

Goldstein – Classical Mechanics

Marion – Classical Dynamics of Particles and Systems

Fetter and Walecka – Theoretical Mechanics of particles and continua

**Times, places, days, and SUCOURSE INFORMATION**

If we can find a better day and time, these could change, but do not bet on it. I will take attendance, as per YOK regulations, but I will also honor registration override requests. You are on your own if you fail to attend the classes. The videos will be online.

Monday 12:40 – 13:30, FENS G049

<https://sabanciuniv.zoom.us/j/92921183343?pwd=dUt3M1A0MkpiakFOYTNEc29yQT09>

Friday 14:40 – 16: 30, FENS G035

<https://sabanciuniv.zoom.us/j/96309880512?pwd=Uy9NZXM2MExzam9WbjZTQTIDT2ZwUT09>

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