

## 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 study questions and midterms may be different based on the level of class. The grading and the rest is the same.

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

I will use TOPHAT to ask questions. Join code: 234356

Tuesday 09:40 – 10:30, FENS L030

Wednesday 09:40 – 11:30 FASS G025

Zoom link:

<https://sabanciuniv.zoom.us/j/96724950088?pwd=WDJGL0s5OWRUTzFCNi9OUXlob05sQT09>

### Contents:

- 0 introduction to class
- 1. Equations of motion
  - Lagrangian
- 2. Conservation laws
  - Energy
  - Momentum
  - Angular momentum
- 3. Integration of equation of motion
  - One dimension
  - Reduced mass
  - Central field
  - Kepler
- 3.5 Motion in non-inertial frames
- 4. Collisions
  - Elastic
  - Scattering
  - Rutherford
  - Small angle
- 5. small oscillations
  - Free
  - Forced
  - Vibrations
  - Damped
  - Friction
  - Resonance
  - Non-linear (PHYS 501 only)
- 6. rigid body
  - Motion
  - Eulerian angles
  - Symmetric top
- 7. canonical eqns. (PHYS 501 only)
  - Hamiltons principle
  - Poisson brackets
  - Canonical trans
  - Liouville

Hamilton jacobi

**Grading:**

final = 45 pts  
midterm=30 pts  
Homeworks=20 pts  
Tophat participation = 15 pts

**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. I WILL NOT POST LECTURE VIDEOS ONLINE.

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TOPHAT: 234536