Physics 220

FALL 2024

Lecture: TR 10:00 – 11:50 am PAB 2434

Online Lecture link: https://ucla.zoom.us/j/ 95535854940
Passcode: 353058

Instructor: Dr. P. Musumeci Office: Knudsen 3-164

Office Hours: Thursdays 2.00 pm + Glad to meet any other time by appointment

E-mail: *musumeci@physics.ucla.edu*

Course TA: Niccolò Porciani niccolo.porciani@gmail.com
Office hours: TBA
Discussion session: Fridays 2:00 - 2:50 pm

Textbook and notes:

Classical Mechanics (Addison-Wesley 3rd ed.) by H. Goldstein.
Mechanics (Pergamon Press, 3rd ed.) by L. Landau & E. Lifshitz

Logistical details

All lectures will be recorded by Zoom. The recordings will be available on the class website just few hours after the lecture takes place. Note that we are planning to have in-person exams (with mandatory attendance) as scheduled below.

Course Description:

Instruction includes lecture and discussion sections, with homework and simple computer exercises. The TA will also hold office hours. There will be an in-class midterm open book and open notes with calculators allowed.

Holidays: Thursday Nov 28th, Thanksgivings.

First class: Thu Sept 26th

Grading:

Homework and discussion 20 %
Midterm (2 hr. on Tue Nov. 5th) 30 %
Final (Monday, December 9th 3-6 pm): 50 %
In class exams will be closed book closed notes

Homework:

Homework will be given ~weekly (tentatively due on Thursday of the following week). You are encouraged to work together in groups as you solve homework problems (it should go without saying that "working together" does not mean taking/copying others solutions; you need to understand the solution and turn in your own work).

In fact, we will work together on problems during class/discussion time; this will include problems assigned as homework. Whenever possible, we will include questions from past (and perhaps future?) comprehensive exams as homework problems.

Course Outline:

Week	Topic
9/26	Lagrangian description of motion. Euler-Lagrange equations.
10/1-3	Symmetries, conservation laws and Noether theorem. Motion with constraints.
10/8-10	Hamiltonian description of motion. Liouville theorem. Symplectic dynamics. Generating functions.
10/15-17	Poisson brackets. Action angle variables. Hamilton Jacobi-theory. Adiabatic Invariants
10/22-24	Special relativity. 4-vectors. Kinematics. Dynamics.
10/29-31	Small Oscillations. Normal modes. Damped and driven pendulum.
11/5-7	Non linear dynamics and onset of chaos. Numerical methods.
11/12-14	Green's functions. Classical perturbation theory. Focault's pendulum. Parametric resonances. Ponderomotive focusing.
11/19-21	Rigid bodies. Euler angles.
11/26	Motion in central force potential. Two-body problem. Precession of perihelion.
12/5-7	Collision and scattering. Rutherford cross section