Physics 321b

Classical Mechanics II

Midterm: TBD, *First midterm: first Wedn after the break; Second midterm: end of March*

3 hrs/week, lectures begin on Jan 4, 2017.

Instructor: Maxim Pospelov
Office: 216 Elliott
Office hours: TBD
Phone: 250 721 7734
Email: pospelov@uvic.ca

Recommended Texts:
L.D. Landau & Lifshitz, *Mechanics*, Volume I of the series (main reference)
H. Goldstein *Classical Mechanics*

NB: The book by L&L is very concise, and has few examples. H. Goldstein has more examples.

Homework

Home assignments is an important part of the course, and contribute heavily to the final grade. Make sure that you hand in the assignment on time. Late assignments are not accepted.

Practice Problems

In preparation for the exams (midterm and final), practice problems will be provided.

Grades

The course grade will be determined from various components of the course in the following way:
(a) The homework assignments will count for 20 %.
(b) Two midterm exams will count for 10 % each = 20%.
(c) The labs will count for 15 %.
(d) The final will count for 45%. *One has to pass the final exam to get a passing grade.*

Tentative Schedule

1. Introduction, Review of Phys321a.
Review of main concepts of classical mechanics

2. Lagrange mechanics
Action and Lagrange function. Generalized coordinates
Hamilton's principle. Euler-Lagrange equations. Conservation laws.
Application of Lagrange mechanics to simple[st] systems

3. From point particles to solid bodies
Main concepts of solid body motion.
Euler's angles and Euler's equations

4. Particle in external EM and gravitational fields
Action for a free relativistic particle
EM fields in the action via the vector-potential
Equations of motions; solutions for simple field configurations
Backreaction of radiation on particle trajectory
Small perturbations of Keplerian orbits

5. Hamilton dynamics
Legendre transformations, Hamilton function and Hamilton's EOM
Poisson brackets
Canonical transformations and application to simple problems
Action as a function of coordinates
Maupertuis principle (another form of "least action")
Hamilton-Jacoby Equation

6. Adiabatic processes and applications
Adiabatic invariants; action-angle variables
Liouville's therem
Notion of Boltzmann equation, particle scattering and collision integral