PHYS 3202 SYLLABUS

Part I. Lagrangian Formulation of Mechanics

1. Degrees of freedom and generalized coordinates.
2. D'Alembert principle and derivation of the Lagrange equations.
3. Least action principle, general discussion of vibrational calculus.
4. Lagrange equations for nonholonomic constraints.
5. Special problems: velocity-dependent potentials, non-conservative forces and dissipation function.

Part II. Hamiltonian Formulation of Mechanics

1. Hamilton equations, phase space and Liouville's theorem.
2. Transition to quantum mechanics.

Part III. Vibrating Systems

1. Vibrations of coupled mass points.
2. Molecular vibrations.
3. Driven and damped oscillations.
4. The vibrating string: solutions of the wave equation, normal vibrations.
5. Mechanics of elastic bodies: stress and strain, disturbance propagation in elastic medium, sound.
6. Mechanics of liquids and gases: general properties, stationary flow, viscosity, turbulence and hydrodynamic instabilities.

Part IV. Introduction to Special Relativity

1. Galillean invariance and Lorentz transformation.
2. Spacetime and 4-vectors.
3. Relativistic kinematics.

Place and Times: L5, Howey Physics Building; M, W, F 9:05-9:55 a.m.
Recommended textbook:
J. Marion and S. Thornton, Classical Dynamics of Particles and Systems
Instructor: Zhigang Jiang, email: zhigang.jiang(at)physics.gatech.edu
Office hours: Fridays from 10 am to noon in B18 at Boggs Building
Homework: assigned on Wednesday, and will be due the following Wednesday in class or in mailbox by 9:55 am. There will be about n homework assignments ($n \approx 10$). The solutions will be available immediately after class, so that no late homework will be accepted. You can discuss problems with each other, but the solutions have to be executed and submitted individually. All students are expected to comply with the *academic honor code*.
Grading:
Home work (n-1 of n best scores) 30%; Quizzes (3 of best 4 scores) 40%; Final exam 30%