Physics 6321:

Classical Mechanics
Spring 2024
MWF 10am Rm 60

Instructor: Professor Fredrick Olness
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Office Hours   I am available most any time, especially following class, and from 2-4 most afternoons. For a class this size, I find it easier if you just set up an appointment individually. I am also available for review sessions before the exams if requested.

Text: *"Classical Mechanics"* by H. Goldstein, (either 2nd or 3rd edition)

Optional Reference: *"Mathematica for Physics"*
by R. Zimmerman & F. Olness (2nd Edition

COURSE WEB PAGE:
Linked from below under "Physics Courses"
www.physics.smu.edu/olness

Grading: The final course grade will be determined as follows. Homework 40%, Exams 40%, Final 20%.

Homework: Homework is to be handed in as scheduled. Even though the homework is graded, you are encouraged to work together on the assignments. If you find the homework too easy, then you can practice tutoring your classmates.

Homework is roughly assigned weekly, and solutions are posted on the web following the assignments; these are often in Mathematica so you can try out the solutions intereactively.

Exams: There will be 3 exams during the semester, in addition to the final.

General Topics Covered:

- Newton's Laws
- D'Alemberts Principle
- Lagrange Equations
- Principle of least action
- Calculus of variations
- Kepler problem, and variations
- Rigid body mechanics
- Groups, Rotation matrices
- Small Oscillations
- Special Relativity
- Hamilton's Equations
- Legendre Transformation
- Canonical Transformation
- Poisson Brackets & connection to QM
- Hamilton-Jacobi Equations
- Canonical Perturbation Theory
- Chaos

References:

Classical Mechanics. (2nd or 3rd Edition) by Herbert Goldstein

Classical Mechanics with Applications, by Porter Wear Johnson
A fresh, modern approach to mechanics w/ 150 exercises.

Mechanics, by Keith R. Symon
A   classic! Provides an intuitive introduction to
               relativity, cosmology, quantum mechanics, and
               more.

Classical Dynamics of Particles and Systems. by Thornton and
               Marion

Mathematica for Physics. by Zimmerman and Olness

Schaum's Outline of Mathematical Handbook of Formulas and
               Tables