Fall 2007: Physics 311 Classical Mechanics
Syllabus

Class Details:
Classroom: Currens Hall 202
Meeting Time: MWF 10:00-10:50 AM
Textbook: "Classical Mechanics", John R. Taylor (University Science Books, 2005)

Instructor Information:
Instructor: Dr. Kishor T. Kapale
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Motivation:
Though classical mechanics has been superseded by relativistic mechanics and quantum mechanics, there are still a large class of interesting phenomena where classical mechanics provides an accurate and complete description. Furthermore, the physical and mathematical tools used in the study of classical mechanics are indispensable for study of physics in general, and especially for the non-classical mechanics that invalidated or extended the principles of classical mechanics.

Course Objective:
The objective for this course is three fold: (1) To provide the students with a strong background in the technics of classical mechanics at an intermediate level. (2) To introduce the mathematical and computational techniques for setting up and solving differential equations to determine the motion of particles and rigid bodies. (3) To acquaint the students with the concept of "reading a physics book" and develop self-study techniques for physics.
There shall be reading assignments every week along with the standard problem solving assignment some of which may require use of a computer. To note, reading physics is very different from reading a novel, for example. The steps omitted in the book in arriving at the results shall have to be completed by the student in order to make an attempt to understand the material. Furthermore, arriving at a mathematical formulae is not sufficient to understand the physical phenomena; a proper physical interpretation of the results is necessary. An honest effort from the students to understand the material to be discussed in the class shall be necessary. This will allow us to engage in a meaningful dialogue about the course content instead of spending too much time on the straightforward nitty-gritty details.

Grading Strategy:
Homework: 30%, Midterm Exam 1: 20%, Midterm Exam 2: 20%, Final Exam: 30%.
Scale: There will be *NO CURVING* on the exams. The tentative grade cut-offs are: **A**: (above 85%), **B**: (between 70%-85%), **C**: (between 70%-55%), **D**: (between 55%-40%), and **F**: (below 40%),

Homework Schedule:
For the first week, light homework shall be assigned on Monday (Aug. 20) and it will be due the following Friday (Aug. 24). After that, each friday homework shall be assigned, which will be due next Friday. No late homework shall be accepted. The 10 best homework scores shall be used for final grade determination.

Calender of Events: (Tentative):
Final version shall be handed out in the class at the end of the first week.

Aug. 20: Newton's Laws *Read:* Ch. 1:1-5	Aug. 22: Coordinate Systems *Read:* Ch. 1:6-7	Aug. 24: Linear Air Resistance *Read:* Ch. 2:1-3; *Due:* **HW 1**
Aug. 27: Quadratic Air Resistance *Read:* Ch. 2:4	Aug 29: Motion of Charges *Read:* Ch. 2:5-7	Aug 31: Linear Momentum Conservation *Read:* Ch. 3:1,2; *Due:* **HW 2**
Sept. 3: Labor Day (No Class)	Sept. 5: Center of Mass *Read:* Ch. 3:3	Sept. 7: Angular Momentum *Read:* Ch. 3:4,5; *Due:* **HW 3**
Sept. 10: Mechanical Energy *Read:* Ch. 4:1-3	Sept. 12: Conservative Forces *Read:* Ch. 4:4,5	Sept. 14: Energy in 1-D systems *Read:* Ch. 4:6,7; *Due:* **HW 4**
Sept. 17: Energy of Interactions *Read:* Ch. 4:8-9	Sept. 19: Simple Harmonic Motion *Read:* Ch. 5:1-2	Sept. 21: 2-D Oscillators *Read:* Ch. 5:3; *Due:* **HW 5**
Sept. 24: Midterm Exam 1	Sept. 26: Damped Oscillations *Read:* Ch. 5:4	Sept. 28: Driven Oscillations *Read:* Ch. 5:5; *Due:* **HW 6**
Oct. 1: Resonance *Read:* Ch. 5:6	Oct. 3: Fourier Series *Read:* Ch. 5:7,8	Oct. 5: Calculus of Variations *Read:* Ch. 6:1,2; *Due:* **HW 7**
Oct. 8: Euler-Lagrange Equation *Read:* Ch. 6:3	Oct. 10: Multivariate E-L Equation *Read:* Ch. 6:4	Oct. 12: Lagrange's Equation *Read:* Ch. 7:1; *Due:* **HW 8**
Oct. 15: Constrained Systems *Read:* Ch. 7:2-4	Oct. 17: Lagrange's Equations: Examples *Read:* Ch. 7:5	Oct. 19: Generalized Momenta *Read:* Ch. 7:6,7; *Due:* **HW 9**
Oct. 22: Central Force Problems *Read:* Ch. 8:1-3	Oct. 24: Orbits *Read:* Ch. 8:4,5	Oct. 26: Kepler Orbits *Read:* Ch. 8:6,7; *Due:* **HW 10**
Oct. 29: Midterm Exam 2	Oct. 31: Non-inertial Ref. Frames *Read:* Ch. 9:1,2	Nov. 2: Rotating Frames *Read:* Ch. 9:3,4; *Due:* **HW 11**
Nov. 5: Coriolis and Centrifugal Forces *Read:* Ch. 9:5-7	Nov. 7: Focault Pendulum *Read:* Ch. 9:8-10	Nov. 9: Rigid Body Rotation *Read:* Ch. 10:1,2; *Due:* **HW 12**
Nov. 12: The Inertia Tensor *Read:* Ch. 10:3	Nov. 14: Principal Axes *Read:* Ch. 10:4-5	Nov. 16:Precession of a Top *Read:* Ch. 10:6; *Due:* **HW 13**
Nov. 26: Euler Equations *Read:* Ch. 10:7,8	Nov. 28: Euler Angles and Spinning Top *Read:* Ch. 10:9,10	Nov. 30: Coupled Oscillators *Read:* Ch. 11:1,2; *Due:* **HW 14**
Dec. 3: Double Pendulum *Read:* Ch. 11:3,4	Dec. 5: Normal Coordinates *Read:* Ch. 11:5-7	Dec. 7: Hamilton's Equations *Read:* Ch. 13:1,2; *Due:* **HW 15**
Dec 10: Final 10 AM		

Attendance:
Attendance is expected although not mandatory. Nevertheless, the students are responsible for all the material presented in the class, all homework assignments and for all changes in the schedule or plans that are announced in the class.

Student Rights and Responsibilities:
See the WIU web page: http://www.wiu.edu/provost/student/