SYLLABUS AND WELCOME!
Fall 2015

COURSE: P123 Frontiers Physics
http://www.phys.cwru.edu/courses/p123/
(we use website and email instead of blackboard, except for the possibility of links to video clips)

INSTRUCTOR: R. W. Brown (rwb@case.edu)
- Office phone = 216-368-4058
- Cell phone = 440-666-1953
- Home phone = 440-248-5651
- Office hours = usually all day in Rockefeller 109
- Brown’s research areas: Astroparticle, industrial/MRI and physics education research

LECTURE: Rockefeller 301, M W F 11:30am-12:20pm

LABORATORY: See website

LEARNING GOALS:
1. Learn physical laws and math tools for today’s technology (both standard P1 stuff and advanced topics).
2. That is, learn how we model the interactions (forces) between bodies and predict the results of those interactions.
3. Delve into the nonlinear frontier of chaos science; other topics may be discussed.

P123 SCHEDULE:
Roughly speaking,
- 2 hours per week on mechanics (standard stuff)
- 1 hour per week on frontiers (chaos theory plus ?)

STANDARD STUFF:
Topics = Motion, Forces, Rotation, Gravitation, and Oscillations
Hardcopy handouts each day
- maybe all you need for a textbook, but …
OPTIONAL REFERENCES
a) 121/123 cycle notes available in the bookstore and on the website
b) Physics for Engineers and Scientists (Ohanian and Markert available in the bookstore)

CHAOS FRONTIER:
Topics = Details behind most stories in Gleick
(fractals, strange attractors, Mandelbrot set, unpredictability of weather, Feigenbaum-Lorenz-Henon maps, etc.)
Hardcopy handouts
Reference = Chaos paperback by Gleick (not absolutely required, but you’ll enjoy it, I am sure)

Project - Computational modeling using the fascinating world of nonlinearity analysis is to be introduced through our series of lectures and problems. In a word, we flesh out the mathematics behind Gleick’s book (Chaos – Making a New Science). A final project and a laboratory experiment to test the results are included. A robust investigation is carried out and a professional word-processed integrated report is required AS A GROUP EFFORT exhibiting state-of-the-art computer programming, graphics, and spreadsheet usage.

PREREQUISITES: high school calculus/physics
CREDIT: 4 Credit Hours – P123 replaces P121 (“P1”)

EDUCATION METHODOLOGY: In developing the critical thinking enabling one to use what is learned in new applications and to learn how to learn after coursework is finished, we have found a cyclic approach has helped. In this approach, we spend the first five weeks going over the whole course but at a simple level, then the next five weeks revisiting everything with more sophistication and math, and once more in the last five weeks. By research, assessment, and questionnaires, we have found this has helped students remember, reflect, and think more deeply about the subject, without increasing the time spent outside the classroom.
GRADING:
Three “Hour Exams”, each = 10%, given on Sept. 25, Oct. 30, and Dec. 4 (exams are also in Rock 301)
Note that we will have a review session before each hour exam at 6-7:30pm also in 301 Rockefeller: Sept. 24, Oct. 30, and Dec. 3.

Homework on a daily basis IS REQUIRED and due AT THE BEGINNING of the next class period. Some of the work will be done in groups of three or four.

Total HW = 15%
Daily In-class exercises (“checkpoints”) = 5%
Three Hour Exams @ 10% each
Chaos Project = 5%
Laboratory Work = 25%
“Final Exam” Weight = 20%
Date of final exam
Dec. 14, 4:00-7:00pm, Monday, but it MAY NOT be 301 Rock
Note: we will have a final-exam review session at 3-5pm, Sunday, Dec 13, in 301 Rockefeller

NOTE: PLEASE MAKE ANY TRAVEL PLANS CONSISTENT WITH ALL EXAM TIMES, AND WITH THE FACT THAT WE WILL HAVE A CLASS THE DAY BEFORE THANKSGIVING!

NETWORK INFO
All network-based class materials is accessed through our website: http://www.phys.cwru.edu/courses/p123/

Homework Hints: We give these for every HW problem.
Hints will be sent to you by email.

Email: Send questions and any inquiry to: rwb@case.edu. I can serve as clearinghouse for these in place of a public bulletin board.