PHYB54
Mechanics: From Oscillations to Chaos

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COURSE DESCRIPTION:

The linear, nonlinear and chaotic behaviour of classical mechanical systems such as oscillators, rotating bodies, and central field systems. The course will develop analytical and numerical tools to solve such systems and determine their basic properties. The course will include mathematical analysis, numerical exercises (Python), and demonstrations of mechanical systems.

By the end of the term you should be able to: solve simple systems exactly; construct numerical simulations to model more difficult systems; and be able to analyze and describe some of the basic properties of chaotic systems.

COURSE TEXTBOOK:

None. Notes will be provided online. You might want to look at the A. P. French's *Vibrations and Waves* for the first part of the course.

COURSE WEBSITE

Most material for the course will be available electronically via Blackboard.

OFFICE HOURS:

To be determined. If you cannot make them it will be possible to schedule office hours at different times. Please setup an appointment via e-mail, and expect it to take a few days (so don't wait until the day before a test to try to visit).

If you wish to ask questions electronically, please use the discussion board on the course site on Blackboard unless the issue is of a personal nature.

ASSESSMENT:

FINAL EXAM:	50%
TERM TESTS (4):	40%
PAPER:	10%

Note: if your final exam mark is better than your term mark (term tests + paper), the exam will be worth 75% and your other grades will be halved.

PAPER:

Towards the end of the term you will be given an assignment that you will hand in. The assignment is more of a computer-based lab than a conventional assignment. Note that you will not be require to do much programming. Rather, you will be given programs and expected to adjust certain values in order to discover what you can about certain chaotic systems.

Remember that plagiarism is a serious academic offense. Any material that you hand in as a part of the assignment must be your own original work or must be properly cited.

TESTS, ASSIGNMENTS AND TUTORIALS:

There will be 4 tests. Each test will be held during tutorials. These will happen in weeks 4, 6, 8, and 10. The tests will take up all of the 1-hour tutorials.

Test questions will be based on the assignments. The assignments are not graded. The assignments are practice for the tests. You should work hard to understand the assignments so that you can do well on the tests.

Tutorials in weeks 3, 5, 7, and 9 will involve class discussions of the assignment material. We will discuss difficult questions as time permits. Students will be allowed to volunteer to lead the discussions. If you so volunteer and do a good job on a question, you will be allowed to drop your worst question from one of the tests (past or future). Each student is entitled to do this at most twice in the term. The last two tutorials will be in support of the assigned paper.

There will be no make-up tests. If you miss a test for an excusable reason (usually medical) the remaining tests will count for more to make up the grade. If you miss more than one test then your ability to drop the worst questions from leading tutorial discussions will be reduced or eliminated entirely.

The final exam will cover all material.

NOTE:

If you have concerns about your ability to do well in this course, *please* come visit me as soon as possible so we can discuss things. I will do my best to address any issues fairly.