Office Hours: Tuesday 8:30 - 10:30, 14:00-15:00, 17:00-18:00 and Thursday 8:30 - 9:30 and by appointment. I am also generally available to answer questions after class. I will usually be glad to answer a few questions outside of office hours. Some Mondays I am likely to be off campus. I am quite willing to make special appointments for longer periods of time outside of office hours. If we find that different office hour times would be better for the class, I am willing to change them.

Texts: Classical Dynamics, 5th edition, by S.W. Thornton J.B. Marion, (Thomson-Brooks/Cole). This text has just been updated, and the new edition was made available in mid-July. An Introduction to Error Analysis 2nd edition, by John R. Taylor (University Science Books), Practical Physics 4th edition by G.L. Squires (Cambridge U. Press). You are also expected to purchase the lab book, and my notes on vibrations and waves, since normal modes will be taught following these notes, and not Marion.

This course covers the traditional topics of classical mechanics. Differential equations and vector calculus are by necessity the language used in this course, and we will make heavy use of the identity $e^{i\theta} = \cos \theta + i \sin \theta$. This course has a laboratory component, which in reality goes both with mechanics and PY403, mathematical methods in physics. Since PY403 is a pre-requisite for this course, it will be assumed that you have more than a passing knowledge of differential equations, vector calculus, linear algebra, and can use them to solve problems.

Grades: There will be a mid-term examination and a final examination. Your grade will be determined by your performance on the exams, as well as your performance in the laboratory and on homework. The breakdown is as follows: $\frac{1}{6}$ for the midterm, $\frac{1}{6}$ discussion (i.e. homework), $\frac{1}{3}$ lab, $\frac{1}{3}$ final exam. The final exam will cover all the material we have covered during the term. Class, laboratory and discussion participation will be used as a factor in assigning final grades. Remember that once a numerical average is calculated, we still have to assign letter grades. Do not underestimate the influence class participation can have on the assignment of grades.

Labs: Laboratory Instructor: Marta Lewandowska (mkl@buphy.bu.edu) Labs are scheduled to begin on the week of 8 September. The mondays lab on the 8th will be devoted to statistics and the preliminary lab exercise. Please read it before coming to lab. The first several weeks will be spent learning about statistics, errors and uncertainties in measurement. You will be expected to do fairly sophisticated, open-ended laboratory exercises and to write them up in a clear cogent fashion. We will spend quite a lot of time
discussing the uncertainties in your measurements as well as the results you get. Over the course of the semester you should become more and more sophisticated in your laboratory technique. We will use An Introduction to Error Analysis by John R. Taylor extensively in the laboratory and G.L. Squires’ book Practical Physics. By the end of the term you should be quite conversant with the issues of uncertainty in measurements.

Before coming to the first laboratory session you should have read the first three chapters of Taylor’s book, and the first chapter of the laboratory manual.

If all labs are not completed by the final deadline, it will be difficult to pass the course.

Discussion: Discussion Instructor: Marta Lewandowska    Sections will begin on Wednesday, 4 September. The discussion sections are where the homework problems are worked in detail. Please attend these, and hand in your homework there. Remember the homework is a significant part of your course grade. The homework will will be graded each week. In order to learn the material adequately to pass the tests you will have to do the homework. You may consult your classmates, but if you do not do most of the work yourself you will pay at test time. If copying homework becomes a problem we will start giving quizzes in discussion.

Tests: The midterm will be on on October 30\textsuperscript{st}.

Final Exam: The final exam is scheduled for Tuesday 17 December 2000 at 3:00pm.

PURPOSE OF THE COURSE: This course is a one-semester introduction to classical mechanics. We will cover the usual topics along with an introduction to non-linear oscillations.

This course consists of two closely related parts, lecture and discussion section. The laboratory is a more independent exercise, which will bring together topics from this course, PY403 and from your first-year course.

I will not spend a great deal of time in lecture working detailed problems – this will be done in section. I will have to focus the lectures on the basic concepts, with some illustrations of physical systems which obey these equations. I expect you to be familiar with the mathematics. There simply is not enough time in three hours a week to present the new material, and fully illustrate it with examples. It’s your job to read the book and come to class prepared, rather than expecting to get it all from lecture. In an upper level class not preparing is a prescription for disaster. The homework problems are assigned to give you the challenge of using the material yourself. It is crucial that you go and participate in the discussion/problem-sections, in order to be exposed to sufficient problem solving techniques.

If you are having difficulties with the course, PLEASE come to us and ask questions. We are here to help you understand the material. On the other hand, the importance of work on your part cannot be overestimated.
Please read the material in the book in advance of the lecture on it.

**Sept. 3** Lecture in Discussion 3:00-4:00 pm Introduction, Newtonian Mechanics
- 4 Newtonian Mechanics
- 9 finish Newton, begin Oscillations
- 11 Oscillations
- 16 Oscillations
- 18 Oscillations, begin Non-Linear Oscillations
- 23 Non-Linear Oscillations, Begin Coupled Oscillators
- 25 Coupled Oscillators
- 30 Coupled Oscillators

**Oct. 2** Coupled Oscillators
- 7 no class, but office hours in the classroom during class time with MKL. There will be no other office hours this week.
- 9 Coupled Oscillators, the infinite loaded string
- 14 *Monday Schedule, No Class!!*
- 16 The loaded string
- 21 Gravitation
- 23 Calculus of Variations
- 28 Calculus of Variations
- 30 **Test** through gravitation

**Nov. 4** Hamilton/La Grange Mechanics
- 6 Hamilton/La Grange Mechanics
- 11 Hamilton/La Grange Mechanics
- 13 The Central Force
- 18 Systems of Particles
- 20 Non-inertial Frames
- 25 Non-inertial Frames, Rigid Bodies
- 27 *Thanksgiving!!*

**Dec. 2** Rigid Bodies
- 4 Continuum Mechanics, waves
- 9 Continuum Mechanics
- 11 Continuum Mechanics (last class).
- 17 Final Examination 3:00 - 5:00pm.PRBI48