

# PHY 321 - Classical Dynamics

Syllabus

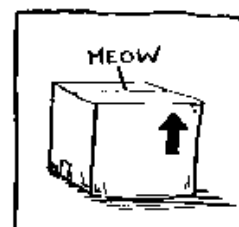
Dr. R.L. Herman

Fall 2007

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Theoretician's Cat



Experimentalist's Cat

## Course Content:

This is the first half of a course on what is called classical dynamics or classical mechanics. By the end of this course you should be comfortable with the material in chapters 2-7 of the text. The course will focus on the dynamics of a finite number of masses. The chapters, topics and approximate dates are listed at the web site:

<http://people.uncw.edu/hermanr/dynamics/>

The prerequisite for the course is general physics (PHY 201-202) and a co-requisite of either mathematical physics (PHY 311) or differential equations (MAT 361). As the techniques are fairly mathematical, you should have a good calculus background, be comfortable with vector operations. Additional mathematics is provided in the appendices and Chapter 1.

## Course Philosophy:

This is most likely your first physics class after taking introductory physics. This will be an extension of the mechanics that you had seen in PHY 201. So, you might want to review some of the earlier chapters in your general physics course as you read through the first chapters in our text. You will find that we will be developing more sophisticated tools for understanding the foundations of classical mechanics. These tools are important in your further studies of quantum mechanics and relativity. There are a lot of good problems in classical mechanics. While not all problems will be assigned, it certainly should be fun to attempt as many of them as you can.

This will strengthen your physics background and your mathematical skills in problem solving.

Classical dynamics (classical mechanics, Newtonian mechanics) is the study of the motion of material objects, the forces and energy involved and some of the fundamental building blocks needed to understand the deterministic world of Newton and others that followed. It provides a description applicable to everyday physics. The fundamental principles of classical mechanics were spelled out by Galileo and Newton in the 16th and 17th centuries. Over the next one to two hundred years these principles were reformulated by Euler, Lagrange, Hamilton and others. The new tools and concepts, such as symmetry induced conservation laws, have become important tools in the study of modern theories today, such as general relativity, quantum theory, and even string theory. Therefore, a firm foundation of classical mechanics in formulations of Newton, Lagrange, and Hamilton, is important in the study of physics.

## Group Work:

In this course you will occasionally work with other students to complete a task. For many of you group work will be a new experience. In order to make this experience both productive and enjoyable, we offer the following suggestions:

- ▶ Start the project as soon as it is assigned. Do not put it off until the last minute. Some of the assignments will take time and working in a group may require more time due to scheduling difficulties.

- ▶ Read over the entire assignment, carefully before discussing or completing any part of it.
- ▶ Initially, you may have no idea as to how to get started. Don't panic! Discuss the lab with the group and generate some ideas.
- ▶ Project work is not always as straightforward as standard homework assignments. You may need to make some assumptions and later justify these assumptions, indicating how they affect your results.
- ▶ The final report should be thoughtful, well-written and neatly organized. It should summarize your approach to the problem, present your results and conclusions, and be furnished with full explanations.
- ▶ If you have investigated the project as far as possible and still have questions, or there is a need for clarification of some point, then discuss them with your instructor before writing the report.

## Course Requirements:

**Attendance:** YOU ARE EXPECTED TO ATTEND ALL OF THE CLASSES! After two excused absences there will be a penalty of 2% for each absence from your total grade.

**Homework:** Homework assignments will be collected on a regular basis and you will be told when the work is due. As doing homework is very important for learning the material in this course, it will count as 30% of your grade. You will be expected to do the given assignments. Some of these assignments could be challenging, so you need to start them early and be prepared to communicate often with the instructor.

**Projects:** Projects will be an integral part of this course. You will use computers as tools for analysis and exploration. You will report your findings in a format consisting of project reports. This part of the course will count 10% of the grade.

**Exams and Grades:** There will be three in-class exams and a final for this course. The exams will cover the material up to the date of the exam. The tentative dates for the exams are below.

Exams	Chap	Date
Exam I	Chap 2	Sep 11
Exam II	Chap 3-4	Oct 11
Exam III	Chap 6-7.4	Nov 13
Final	Chap 2-7	Dec 11, 7:00 PM

Your final grade will be based on the following:

Homework	30%
Projects	10%
Exams	40%
Final	20%

90-100	A
80-89.5	B
70-79.5	C
60-69.5	D

**Plus-minus grading may be used in special cases.**

**Academic Honor Code:** "The University of North Carolina at Wilmington is committed to the proposition that the pursuit of truth requires the presence of honesty among all involved. It is therefore the institution's stated policy that no form of dishonesty among its faculty or students will be tolerated. Although all members of the university community are encouraged to report occurrences of dishonesty, each individual is principally responsible for his or her own honesty." Student Handbook. (*This includes plagiarism, bribery and cheating.*)

**Student Disabilities:** UNCW Disability Services supplies information about disability law, documentation procedures and accommodations that can be found at <http://www.uncw.edu/stuaff/disability/>. To obtain accommodations the student should first contact Disability Services and present their documentation to the coordinator for review and verification. (If you feel that you should qualify for disability testing or accommodations during this course, contact the Office of Disability Services in Westside Hall or call ext. 3746.)

**This syllabus is subject to change!**

*Several scientists were all posed the following question:  
"What is pi?"*

*The engineer said: "It is approximately 3 and 1/7"*

*The physicist said: "It is 3.14159"*

*The mathematician thought a bit, and replied,  
"It is equal to pi".*