

PHY 523 - Fall 2011 - Advanced Mechanics

Course Description

This course is aimed to give a good preparation of mechanics to students who wish to continue their studies of physics in graduate school. Students taking this course are supposed to be familiar with the topics covered in the first *seven* chapters of the textbook for this course. This course will cover material presented in the remaining chapters of the book (chapter 8, 9, 10 and 11); additionally, an introduction to the use of applied mechanics in modern astronomy and space science will be presented. After a few lectures aimed at reviewing material contained in the first seven chapters, we will introduce Lagrangian mechanics (chapter 10), motion of rigid bodies in two and three dimensions (chapters 8 and 9), celestial mechanics - as an application - and dynamics of oscillating systems (chapter 11). Broadly speaking, the course will emphasize problem solving coupled with conceptual understanding; ample time will be devoted to exercises. *Active participation is required; the instructor is there to help you.* There are useful appendices at the back of the book. Note that there are answers in the back for many of the odd-numbered problems. The timetable (to be released later on Blackboard) will be the compass; it has up-to-date information on where we stand in the course, and reading and homework assignments. **Pre-requisites:** The course has the following co-requisites: PHY320 *Vibrations, Waves and Optics* or equivalent.

Course Goals

- * To introduce advanced methods to solve problems of motion of particles and of extended bodies
- * To prepare you to courses in graduate school that use methods taught in this course
- * To strengthen skills in problem solving

Textbook

The required textbook is:
* Analytical Mechanics by G. R. Fowles and G. L. Cassiday, 7th ed., 2005

Meeting Times and Location

Lectures: Tuesdays and Thursdays 11:00 AM- 12:20 PM, Rm. 105 Physics Bldg.

Attendance Policy

Attendance at lectures is strongly advised; skipping classes is at your own risk. Active participation will be rewarded. Reading and homework assignments, and other important communications are given during regular contact times; sometimes it is not possible to post such announcements on the Web in a timely fashion.

Instructor

Lecturer: Prof. Gianfranco Vidali
Office: Rm. 221 Physics Bldg.
Contact information: 443-9115, gvidali@syr.edu
Office hours by appointment; You are welcome to drop in at other times too. If I am not in my office, I am probably in my lab, B215, sub-basement.
Prof. Vidali's research interests: see the Website [laboratory astrophysics](http://physics.syr.edu/astro) (<http://physics.syr.edu/astro>)

Coursework

The course is at the 500 level. A certain level of self-direction is expected. If you think you are having difficulty understanding the course material or completing the assignments, see the instructor at once!
Coursework consists in: studying using the assigned weekly reading and doing the assigned weekly homework sets. This course uses Blackboard Information Technology. Written and reading assignments and reading material will be posted on Blackboard. Access Blackboard through "myslice.syr.edu".

Homework Assignments

Homework assignments, as underscored by the weight given to them in the grading, perform a very important function: they test what you just learned, they develop or build up thinking skills in you, and they make you revisit material learned in class. For your solutions, do not simply provide a stream of equations. Rather, you should start almost all problems with a clearly labeled diagram that defines the essential variables (and sometimes constants) in the problem. Then use words to explain the logic and flow, as you transition through your equations. Notice how solutions to example problems are presented in the textbook (as well as the main textual material), and use that style as a model. For clarity, place a rectangular outline box around each of your answers. Some students find it helpful to start each solution with a paraphrased statement of the problem; this increases the chances that the problem will be understood properly and solved correctly. You should do your homework on your own. However, if you need occasional assistance from classmates or other persons, or from other resources besides the text and your class notes, you should make explicit acknowledgment of that at the end of each such problem. Some of the problems in this course will be rather challenging. Therefore, you are strongly encouraged to get an early start on each problem set (e.g., the day the problem set is assigned). Do not wait till the evening before the due date to start the assignment. **Each student is required to present his/her own work.**

IMPORTANT: Every bit of material that has been taken verbatim by whatever source (books, journals, Internet, etc.) should be placed in quotes and its source acknowledged, including input from consultations with fellow students or other individuals.

Homework assignments will be given approximately once a week; you are expected to turn them in within one week after the day they were assigned. **No late homework assignments will be accepted.** Some of the problems in the assignments will be discussed in class. The completed homework assignment will be graded in the following way. Grading will be based on: a) understanding of the physics in the problem; b) setting up the method of solution; c) carrying out the calculations; d) doing an honest effort in tackling the problem even if unsuccessful. The grade will represent an overall assessment of how the student has done on the assignment. It is important that you attempt to work on all problems, even if unsuccessful. Partial credit is given. If you would like to have detailed information on how parts of the assignments are graded, or want to have a certain solution clarified, you should see the instructor.

Exams

There are two exams during the semester. The lowest scoring exam of the two exams is dropped. The final exam is comprehensive. **The date of the final exam is Thu, Dec 15, 3:00pm-5:00pm.** All the exams are closed books and notes, except for the following.

You can bring a single sheet of paper with your notes (such as: equations, formulas, definitions). This sheet of paper must be turned in with the completed work. You can bring a calculator.

Please read this carefully.

Honesty:

Homework assignments: If you may consult with other fellow students particularize the extent of the consultation. Work by others, whether is taken verbatim or paraphrased, must be clearly identified. Turning in an assignment copied from somebody else's solutions (including solutions found on the Web) or completed by somebody else is considered **cheating**.

Exams: It is a violation of the academic code to seek or give assistance during the exams. The instructor is the only person you can communicate with during the tests. Please do not make any changes or marks to the graded exams, if you want to preserve a right to appeal grading mistakes. The general Syracuse University guidelines will be followed in case of violations.

Grading

You will be graded on your homework (25%; the lowest scoring homework assignment is dropped), the highest scoring exam of the **first two exams** (30%), the final comprehensive exam (40%). 5% is given for active participation. A numerical score will be given for each piece of evaluated material. The final letter grade will reflect: the amount of work you did, the proficiency you attained in certain tasks, and the mastery of the subject matter. **There will be no curving of the final grade;** thus, it is possible, as frequently happens in upper division undergraduate and graduate courses, that the majority of the class receives a high grade (such as A's and B's).

The grade break up in this course is typically as follows: A:90-100; A-:85-90; B+:80-85; B:76-80; B-:72-76;C+:68-72; C:64-68; C-:60-64; D<59

Getting Help

The pace of the course is pretty quick. It's important that you don't fall behind. Talk to the instructor! He is readily available outside office hours. In addition there are the :

Physics Clinic: The Physics Clinic is located in room 104 South of the Physics Building. Hours are posted on the door (and at <http://www.phy.syr.edu/courses/>). The clinic is staffed by graduate Teaching Assistants who can help you with this course material.

Math Clinic: This course uses mathematics, including calculus, quite extensively. The Mathematics Department runs the Math Clinic in the Reading Room of Carnegie (hours are posted on the door) if you need assistance with math.

Special Needs

Students who are in need of disability-related academic accommodations must register with the Office of Disability Services (ODS), 804 University Avenue, Room 309, 315-443-4498. Students with authorized disability-related accommodations should provide a current Accommodation Authorization Letter from ODS to the instructor and review those accommodations with the instructor. Accommodations, such as exam administration, are not provided retroactively; therefore, planning for accommodations as early as possible is necessary.

Absence Policy

There will be no make-up exams.

Religious Observances Policy

SU's religious observances policy, found at http://supolicies.syr.edu/emp_ben/religious_observance.htm, recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holidays according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes. For fall and spring semesters, an online notification process is available through MySlice/Student Services/Enrollment/My Religious Observances from the first day of class until the end of the second week of class.