Astronomy 142: Elementary astrophysics

Spring 2013

In this course, we explore the physics of stars, interstellar gas and dust, galaxies, and the large-scale structure of the universe, making use of the physical, mathematical and astronomical tools you learned (or will be learning this semester) in Physics 121-123/141-143, Math 161-165/171-174, and Astronomy 111.

Professor: Dan Watson (B&L 418, 275-8576, dmw@pas.rochester.edu, www.pas.rochester.edu/~dmw).

Reference books: Barbara Ryden & Brad Peterson, Foundations of astrophysics, and Frank Shu, The physical universe (recommended). Both of these books are on two-hour reserve in the Physics-Optics-Astronomy library.

World Wide Web site: http://www.pas.rochester.edu/~dmw/ast142/. In these pages one will find complete lecture and recitation presentations, a calendar of class meetings and office hours, homework solutions, exam solutions, practice examinations, study aids, and links to other useful Web sites.

E-mail list server: ast142@mail.pas.rochester.edu. Messages sent to this address will be re-sent to everybody in the class. Use the list server to ask all questions about readings, lectures, homework problems and the like; the rest of the class will probably also be interested in your questions and the answers you’ll receive. (Dan will answer e-mail questions privately, too.)

Lectures: Tuesdays and Thursdays, 11:05-12:20 PM, in B&L 407, conducted by Dan. All students are expected to attend all of the lectures. Complete electronic copies of each lecture presentation can be found on our Web site, and can be downloaded and printed in a format that’s handy for taking additional lecture notes. The bulk of the course material will be introduced in lecture. Most of the formal derivations of useful physical formulas will be presented in lecture. So will many useful examples; the bulk of the key examples, though, will be presented in the…

Workshops: Fridays 2-4:40 PM, also conducted by Dan. All students are expected to attend all the workshops. Along with a brief review of the week’s material, the workshops will involve several sorts of activity: (1) practice problems to work out, in groups and with Dan's help, in preparation for the homework. These sorts of problems would otherwise be examples worked out for you in lecture; however, we have noticed that the key examples are much more effective if students are engaged actively in the solution, rather than just listening. (2) additional material that will not be discussed in lecture, but is important, is covered in the textbook, and include the sorts of subjects that are quite a bit less boring to work out from scratch than to listen to someone describe how to do it.

Homework assignments: ten problem sets, to be assigned at regular intervals during the semester. The problem sets count equally toward the final grade. Normally, detailed solutions to the homework problem sets will be distributed and posted on the Web site at the time they are due, which will make it difficult to accept late homework.

In our experience, most of your learning in Astronomy 142 will take place while doing the homework, and thus we will assign a lot of it. Lectures, and recitations with in-class practice problems, are designed to prepare you for the homework, and help outside of class is abundantly available as well. The problem sets will all be long, and will frequently be challenging. But homework weighs more in your grade in Astronomy 142 than it does in most courses.
Examinations: two midterms, given during the usual lecture times on 3/7/13 and 4/30/13, and a final exam, 8:30-11:30 AM, on Friday, 5/10/13. They will all take place in the lecture room, B&L 407. You must take all three tests in order to pass the course. If you miss an exam due to illness or emergency, a makeup exam may be scheduled by appointment. All makeups will be oral examinations, the same duration as the written exam, administered and graded by Dan.

To each exam you are allowed to bring only a writing instrument, a calculator, and one letter-size sheet (two, for the final exam) on which you have written as many notes, formulas, and physical constants as you like. No networked devices, computers, PDAs, telephones, or graphing calculators into which text and graphics may be downloaded, are allowed.

Grades: based 30% on the ten homework assignments, 20% for each midterm and 30% for the final exam. Final grades will be set by an absolute scale, rather than "by the curve." In terms of the maximum possible percentage score, the grading scale will be as follows:

<table>
<thead>
<tr>
<th>Percentage score</th>
<th>≥ 80</th>
<th>≥ 75</th>
<th>≥ 70</th>
<th>≥ 65</th>
<th>≥ 60</th>
<th>≥ 55</th>
<th>≥ 50</th>
<th>≥ 45</th>
<th>≥ 35</th>
<th>&lt; 35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final grade</td>
<td>A</td>
<td>A-</td>
<td>B+</td>
<td>B</td>
<td>B-</td>
<td>C+</td>
<td>C</td>
<td>C-</td>
<td>D</td>
<td>E</td>
</tr>
</tbody>
</table>

Again: past experience shows that students who don’t do, and turn in, the homework problem sets are unlikely to do well in the exams. Please see Dan immediately if you find yourself in this situation. Early action (and good planning) may help you improve your experience.

How to get an A: You learn best what you do. Work out as many problems as you can, either yourself or in groups no larger than 2-3. Ask Dan for help whenever you need it; ask him for more practice when you run out of problems. Consult the lecture notes and readings mostly when you get stuck on problems, rather than as a substitute for doing problems. And contribute a little bit to your exam cheat sheet every time you work out a workshop or homework problem.

For example: the best way to study for the examinations is to do the homework, to attend all of the lectures and recitations – working hard on the in-class problems supplied in the latter – and to work out the sample exams that are available (with solutions) in our World Wide Web pages, testing the cheat sheet you’ve been making all along in the act of taking the practice exam.

The worst way is to trust to reading and memorization of formulas shortly before the test, and to assemble a cheat sheet the night before. AST 142 exams are designed to reward those who understand the homework and in-class problems, and to punish those who hope to pick the right formula off a cheat sheet.

Academic honesty disclaimer: For our purposes, cheating consists of submission of homework, project reports or exam solutions that are not one’s own work, or submission of such work under someone else’s name. According to University rules, any detected act of cheating that is not the result of a simple misunderstanding must be handed over to the Board on Academic Honesty for investigation.

Extra help: Check out the class-meeting and office-hours calendar in the Astronomy 142 Web site to see where and when to find Dan most easily. Appointments can also be arranged. Please come in and see Dan frequently. He will also answer questions by e-mail, privately or through the list server. By any means he will be happy enough to answer any questions you have concerning the course, and even happier to help those who find the material or presentation sufficiently confusing that they’re not even sure what to ask.