

*The University of Western Ontario
Department of Physics and Astronomy*

**Astronomy 020
Introduction to Astronomy
2003-2004**

Description

This course provides a general introduction to the basic ideas of modern astronomy and astrophysics. A remarkable feature of the universe is our ability to describe it quantitatively using modern physics. Wherever possible our discussion will emphasize the application of physical and quantitative analysis rather than a descriptive approach.

Astronomy and astrophysics are fascinating fields of study since they provide, among other things: (1) valuable general knowledge about our surroundings, e.g., the Earth, the night sky, the solar system, and beyond; (2) insight into the development of the scientific method; (3) a connection with the history of mankind; (4) a wonderful set of phenomena for the testing and development of modern laws of physics; (5) valuable training in mathematical and computational methods; (6) a wealth of new research data and brilliant images from pioneering new observational instruments. We hope to communicate these features in this course.

Lectures: 215 Physics and Astronomy Building (PAB), MWF 9:00am.

Instructor

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Office hours: W 10:00am-11:00am, F 11:00am-12:00pm. Other meetings are by appointment.

Course Topics

Fall Term:

- I. The Scale of the Universe
- II. The Night Sky
- III. Introduction to Astronomy
- IV. Celestial Mechanics
- V. Dynamics of the Earth
- VI. Dynamics of the Earth-Moon System
- VII. Electromagnetic Radiation
- VIII. Atoms and Molecules
- IX. Equilibrium Properties of Matter and Radiation
- X. Telescopes and Detectors
- XI. The Solar System

Winter Term:

- I. The Sun
- II. Stars
- III. Binary Stars
- IV. Stellar Evolution
- V. Star Deaths
- VI. Variable Stars
- VII. Our Galaxy
- VIII. Interstellar Medium and Star Formation
- IX. Galactic Motions and Dynamics
- X. Galaxies
- XI. Hubble's Law and the Distance Scale
- XII. Large Scale Structure
- XIII. AGN's and Quasars
- XIV. Cosmology

Prerequisites

In order to take this course, you must also be taking (or have taken) two other courses:

1. A course in first-year calculus, either Calculus 050a/b, 051a/b, or equivalent.
2. A course in first-year physics, either Physics 020, 024, 025, or 026.

These assume you have already had OAC Calculus and OAC Algebra and Geometry, or equivalent.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

Textbook and Other Materials

Introductory Astronomy and Astrophysics, 4th edition, Zeilik, M., and Gregory, S. A. 1998
Harcourt Brace, ISBN 0-03-006228-4.

This book and another, “The Physical Universe”, by Frank Shu, are available in the Heavy Demand section of the Taylor Library in the Natural Sciences Centre. They may be borrowed for limited periods of time for use in the library.

Please note that you will need a calculator for problems, tests, and examinations.

Assignments/Exams/Grading

Problems will be assigned regularly, usually each Friday. Unless otherwise noted, they are to be handed in by 4:00 pm on the following Friday in the gray Astronomy assignment mailbox just outside room 213. Doing these homework problems is essential for keeping up with the course material and obtaining a satisfying final course grade. For your own sake, please do not fall behind. Some practice problems with answers will also be handed out.

There will be a weekly quiz on Fridays during the last ten minutes of class. The brief questions in the quiz will test your qualitative understanding of topics in that week’s lecture. Your lowest quiz score each term will not count toward your final grade.

There are also three observational projects, to be performed in September and October at Cronyn observatory and handed in there. No preparation is required.

An exam will be given at the end of the first term, during the university scheduled examination period in December. There will also be a three-hour final exam given during the university scheduled examination period in April. The final exam will cover material primarily from the second term.

You are considered responsible for all material presented in the lectures, whether it is in the textbook or not. Lecture material will appear in assignments, quizzes, and exams. A copy of the course notes will be available at the course website. However, note that some lecture material may be delivered on the blackboard. Please also be sure to read the relevant chapters in the textbook as we cover them during the year.

Your final grade will be calculated on the following basis:

Problem Sets	37%
Observing projects	3%
Quizzes	10%
December exam	20%
Final exam	30%

Note that regular attendance (including taking quizzes) and weekly work on the assignments and projects will earn 50% of your grade, as well as provide good preparation for the exams.

Other policies

1. Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar).
2. If illness (or some similar disruption) prevents you from writing a quiz or examination, or completing an assignment, you must contact the Physics and Astronomy department or myself *before* the exam or due date. If your affliction is sufficiently serious that other courses are affected, you should contact the office of the dean of your faculty. That office will coordinate documentation and notification of instructors. You must also contact me to arrange any possible make-up work.

HOW THE PROBLEMS ARE TO BE DONE

The problems are due on Fridays at 4:00 pm in the gray Astronomy Assignment Mail Box, just outside room 213, Physics and Astronomy Building. Do not give them to the department office or place them under the door of any office.

The sheets of paper with your problem solutions should be stapled at the upper left corner with a cover page that gives (1) your name, (2) your student number, (3) "Astronomy 020", (4) Problem Set #___ with the number given, and (5) the due date. For example, it would look like the following:

Staple	Nick Copernicus 314159
Astronomy 020 Problem Set #10	
December 5, 2003	

You should work out the problems on a scratch piece of paper first, by trying out various ideas. I do not want to see this work. When you have understood how to solve the problem correctly, or have spent as much effort on it as possible, please write out your solution in a neat and logical manner on the paper you will turn in to be marked. Remember that clarity is essential for getting partial or full credit for problems. Please show all steps leading to your final answer. Answer the questions in the order assigned. Finally, remember to include the appropriate units for any numerical answer.

STUDY GUIDE

Remember that Physics and Astronomy cannot be learned by rote. The best method is to read, ask questions, and work out problems. Discussing ideas with colleagues also helps in learning. In the end, it is far more satisfying to learn concepts than to memorize things. Here are some suggestions to help you through this and other courses.

1. Attend classes. The lectures are a very efficient learning time. Take notes during lecture. Don't be afraid to ask questions. If you are wondering about something, chances are someone else is as well.
2. After class, and before the next lecture, review your lecture notes. Look at the posted class notes on the A020 web page. This is also a good time to consult your textbook or do other outside reading.
3. Read your textbook. Follow the course outline, and read the relevant chapters once ahead of time. You need not follow all the details in this reading. After we have covered the material in class, read the chapter again more carefully. Make reading notes as you go. Consult any reserve books in the library if necessary.
4. Do the assignments. Take an active approach. Work out assigned problems, as well as practice problems. In addition, there are many unassigned problems in your textbook. Work as many problems as you can. This is the best way to learn Physics and Astronomy.
5. Utilize my office hours as well as the Astronomy Help Centre, Rm. 211 PAB. At the latter, you can get advice on assignments from a TA or professor at posted times, or meet with your colleagues for study sessions. Check the door to Rm. 211 for a Help Centre schedule.
6. Astronomy introduces many important qualitative ideas. Test your qualitative understanding by explaining ideas to your colleagues, whether they are in A020 or not.
7. Astronomy is currently characterized by a rapid rate of new discoveries. Try to keep track of these through the media, or through web sites such as Sky and Telescope magazine and Physlink. Both are accessible from the A020 web page.
8. Remember that you are here to get an education, and not just to make grades. Focusing on the former and learning as much as you can results in good grades as well. Learning is fun! Take advantage of the time available to do so while you are still a student.