

ASTRONOMY 410: Radio Astronomy

Spring 2010

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Office Hours: by appointment or drop-by

Required Text:

Introduction to Radio Astronomy by Burke and Graham-Smith
Student's Guide to Fourier Transforms by James

Webpages:

<http://www.astro.umd.edu/~lgm/ASTR410>
ELMS webpage

1 Overview

Astronomical observations at radio wavelengths play a key role in the discovery and study of certain classes of astronomical objects and radio observations play a complementary roles in the study of nearly all objects in the Universe. Examples of the discovery role include pulsars, the cosmic background radiation, and complex molecules in space. More generally, radio wavelength observations provide insights into the very low temperature Universe (temperatures below 20 K), the highly obscured Universe (where dust obscures optical and even infrared wavelength emission) and the very high energy Universe of strong magnetic fields and relativistic particles associated with flares, neutron stars, and black holes.

This course is an introduction to radio astronomy covering the basic techniques, the types of measurements and telescopes, and the science. There is some focus on the basic physics and the mathematics of Fourier Transforms because there are so central to understanding radio astronomy. We expect a background knowledge of the physics of wave and mathematics at the level of calculus, vector analysis, and simple differential equation.

2 Course Structure

ASTR 410 has two weekly lectures, and approximately weekly homework sets. The classes will combine lecture, question/answer, and some class problem solving. The lectures present material and provide a forum for general questions. They will parallel the text where possible and supplement the text

where necessary. You will be responsible for all material covered in class; you are not responsible for material in the texts that is not covered in class.

It is expected that you will attend classes. There will be some inclass assignments which will count toward your grade.

3 Homework, Exams, and Grading

Homework will be assigned on Thursday of most weeks and is to be turned in at the beginning of class on the following Thursday. Homework turned in after the beginning of class on the due date will be considered late. Late homework may be turned in up to 1 week after the due date, at a penalty of 20% reduction in score. After one week, we will return graded homework and hand out solution sets; no homework is accepted after that. It is expected that each homework assignment will take 3-5 hours to complete if you are attending lecture and are up-to-date on your reading.

The **mid-term exam** is scheduled for Thursday March 11 – **the Thursday before Spring Break**. The exam will cover all material presented in lecture and notes up to that point. The exam will occur during the regular class lecture hour in the same room.

The **final exam** will be a cumulative exam covering on all material. The final will be given at the time, and in the room, listed in the University course schedule, **Friday May 18 at 1:30 pm**.

Your final grade will be based on the homework, in-class work, the mid-term exam, and the final exam. these factors will be combined in the following percentages to determine your class grade:

- 25% homework,
- 10% in-class work,
- 25% the mid-term exam;
- 40% the final exam.

Finally, a word to the wise, the grading structure of this class makes it mathematically impossible to get an ‘A’ grade for the course without doing reasonably well on the homework and in-class work. In my experience, students who do not do homework seldom get better than a ‘C’ course grade and often get a ‘D’ grade or worse; don’t count on being the exception.

4 Missed Exams and Homework

The University recognizes only three excuses for missing exams: religious holidays, University-approved travel, and illness. Except for sudden illness, you should provide a valid written excuse in advance of the scheduled exam. If you have an emergency, you must provide a valid written excuse (as defined in the University Handbook) within ONE WEEK after the midterm exam. Make-up exams will be scheduled at a mutually acceptable time and may be written or oral, at my discretion. If you do not have a valid written excuse, you will NOT be allowed to make-up the exam.

If you miss the *final exam*, a valid written excuse must be provided within two days after the missed final exam. In addition, you must arrange with me a time for a make-up exam within two days after the exam date listed in the University course schedule. This is fixed because course grades are due 48 hours after the final exam has been held.

If you miss a due date for a homework assignment and wish to receive full credit, you must present a valid excuse the next time that you are able attend class. You should be prepared to turn in the homework then or have a plan for when you will complete the work.

5 The Honor System

University academics operate on the basis of the Code of Academic Integrity. Acts of academic dishonesty include cheating, fabrication, facilitating academic dishonesty, and plagiarism. Specifically, activities such as cheating on exams or quizzes, copying homework, knowingly permitting your homework or exam to be copied, and submitting forged excuses for absences from exams or classes are violations of this code. All cases of suspected academic dishonesty will be turned over to the Student Honor Council to investigate and resolve. The normal sanction for academic dishonesty is a course grade of 'XF', denoting failure due to academic dishonesty. The Code of Academic Integrity is printed in full in the Undergraduate Catalog.

There are a couple of potential gray areas that naturally arise in this class so let's try to draw some dividing lines between right and wrong. For homework, you are permitted to work with other students in the class on the homework. This includes discussion of the problem and solution in a

cooperative, mutually contributing fashion. However, you should write out your answer in your own words. You should NOT, under any circumstance, simply copy someone's homework and call that "working together." You should NOT seek out or use "solution sets" from previous students. You may seek help on homework problems from the TA or myself.

If you have questions regarding what is appropriate and what is not, please talk to me.