

ASTR 111: The Dark Side of the Universe

Winter Session 2017

Evenings 6:00 – 9:20 pm, VVO 110

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Course Overview:

The physical world we experience is one of normal matter, energy, and – if one looks up at night – stars. But on larger scales, the universe has an exotic and much less-well understood side dominated by things we call dark matter, dark energy, and black holes. What are these mysterious components, and what is the relationship between them and the world that is familiar to us? The answers lie at the frontier of modern astrophysics. In this course, we explore the evidence for the existence of these dark components and the current debates regarding their nature and origin. In different ways, each of them has a vital role in the evolution of the universe and its ultimate fate.

Required text:

Your Cosmic Context, by T. Duncan & C. Tyler (Pearson Addison-Wesley).

Two copies are on 2-hour reserve at the Science Library.

Schedule:

Lectures: We will meet 12 times — 6 lectures in each week of the course with Sundays off.

Observing: Weather permitting, we will observe the night sky using the telescopes at VVO.

Detailed schedule:

Mon. 1/9:	.....	Lecture 1
Tue. 1/10:	.....	Lecture 2
Wed. 1/11:	.....	Lecture 3
Thu. 1/12:	.....	Lecture 4
Fri. 1/13:	.....	Lecture 5
Sat. 1/14:	.....	Lecture 6
Sun. 1/15:	.....	Off
Mon. 1/16:	.....	Lecture 7
Tue. 1/17:	.....	Lecture 8
Wed. 1/18:	.....	Lecture 9
Thu. 1/19:	.....	Lecture 10
Fri. 1/20:	.....	Lecture 11
Sat. 1/21:	.....	Lecture 12
Sun. 1/22:	.....	Reading period
Mon. 1/23:	.....	Reading period (optional review session at 2:00 pm)
Tue. 1/24:	.....	Final exam, 6:00 pm, VVO 110

General Requirements and Grading:

Reading (15%): The concepts in this course build vertically on each other, and because of the compressed format of this offering, it is crucial to complete most of the necessary reading prior to our first meeting. You may not fully grasp everything in the reading, but it is important that you be familiar with the concepts and how they fit together *before* they are presented in class. Roughly 10–12 reading assignments (~ 30 pages each, mainly from the textbook) will be given. These are to be completed in late December/early January. You will take running notes as you read; these notes must be handed in at the first lecture to receive credit.

Attendance (10%): The organization and content of the lectures, on which the final exam will be based, do not mirror the textbook exactly, so *your attendance in class is essential*. Those with no unexcused absences will receive the attendance credit.

An important aspect of attendance is **observing**. Everyone who takes an astronomy course should have an opportunity to see, with their own eyes, some of the phenomena discussed in the class. If the weather cooperates, we will view and take images of star clusters, nebulae, and galaxies. Hopefully, we will also be able to take data for an in-class project that will yield astronomically significant measurements that are directly related to the course material.

Assignments (40%): There will be four take-home assignments, which are designed to complement the lecture material. The first, a short writing assignment, is to be completed prior to the start of the course. The other three assignments will be due in class.

Question-of-the-day: (10%): From Lecture 2 onward, we will begin each class with a straightforward, one-question quiz based on a fundamental concept discussed in the previous lecture. This will let me know how well you are grasping the most important ideas, and will give you an indication of the format of the final exam and the types of questions that will appear on it.

Final Exam (25%): The course will conclude with a comprehensive final exam that focuses on the key concepts discussed in the lectures, both basic and complex.