



### Introduction

Welcome to **Integrative Studies in the Physical Sciences (ISP) 205 – Visions of the Universe**. As the title suggests, in this course we shall study the discoveries of modern astronomy and their implications for our place in the cosmos. Within the past decade, humans have discovered new worlds around other stars and determined that the universe is expanding at an accelerating rate. You are lucky to be living in such an exciting time! These new discoveries also demonstrate how much we don't yet understand; in particular, the part of the universe that we see – stars, galaxies, gas and dust – is only a small fraction of all the matter in the universe.

*The above [image](#) is of the Sombrero Galaxy, 50 million light-years from Earth, in the direction of the constellation Virgo (Image credit: NASA/Hubble Heritage Team).*

### Instructor

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### Course goals

At the end of this course, students should

- I. Have a mental picture of the constituents, size and history of the universe
- II. Understand that Earth is part of the universe, and that celestial events affect our daily lives
- III. Appreciate that the universe is understandable, and that science is the process of seeking to understand the universe.

### Course policies

- **Homework** Homework will be done online using [LON-CAPA \(www.loncapa.msu.edu\)](http://www.loncapa.msu.edu) and is due Monday at 7:00 PM (see the schedule of homeworks on page 3). Late homeworks are not accepted. It is expected that you will have read the relevant sections of the text (see the schedule on the next page) **before** it is covered in class, and the homework is designed to focus your reading. You will need to have your browser allow pop-up windows in order to use LON-CAPA effectively. I will drop the lowest two homework scores.
- **Midterm Exams** There will be three midterm exams, of which your best two will count toward the final grade. There will be no makeup exams given and no exceptions to this rule. While each exam will focus on the new material from the past exam, about 10–20% will be devoted to material from previous exams. The material is cumulative, and keeping it fresh in your mind will help when taking the final.

- **In class** Within each class, there will be questions asked for which you will answer using the H-ITT clickers. Each questions receives 2/3 credit for participation and 1/3 credit for correctness. I will drop the lowest 8 class scores.
- **Final exam** Dec 12, 2005 8:00 10:00 PM Location TBD

The final is cumulative.

#### Grading

- Final 40%
- Midterm 20%×2 = 40% total
- Homework 10%
- Class 10%

**Grade scale** The following scale is used to determine the final grade. Grades are not curved. I reserve the right to adjust grades upward.

≥94%	4.0
86% 94%	3.5
78% 86%	3.0
70% 78%	2.5
62%-70%	2.0
54% 62%	1.5
46% 54%	1.0
38% 46%	0.5

#### Text and other materials

- Bennett, Donahue, Schneider & Voit, *The Essential Cosmic Perspective*, 3rd ed. (2005) Pearson Education, San Francisco.
- H-ITT clicker (available at bookstore; requires AAA or 9V batteries)
- Membership to *The Astronomy Place* (free with purchase of book) is recommended, but not required.

<b>Schedule (Tentative)</b>	Aug 30	Introduction, scale of the universe, astronomy as a science
	Sep 01	Movement of the stars, seasons, and the phases of the moon
	Sep 06	Motion of the planets. The great conservation laws.
	Sep 08	Gravitation and tides
	Sep 13	Light, the cosmic messenger: emission and absorption, spectra, thermal emission
	Sep 15	Tools of the trade – telescopes
	Sep 20	Our backyard – the solar system
	Sep 22	Midterm 1
	Sep 27	Formation of stars and planets, extrasolar planets

Sep 29	Terrestrial planets, geology
Oct 04	Weather, planetary atmospheres
Oct 06	Jovian planets
Oct 11	Comets, asteroids and impacts
Oct 13	Midterm 2
Oct 18	Our star – the sun, thermonuclear reactions
Oct 20	Types of stars, classifications
Oct 25	The life of a star
Oct 27	The origin of gold – stellar nucleosynthesis
Nov 01	Compact objects – white dwarfs, neutron stars and black holes
Nov 03	Binary stars, accretion power, high-energy astronomy
Nov 08	Our galaxy – the Milky Way
Nov 10	Midterm 3
Nov 15	Other galaxies
Nov 17	The curious expansion of the universe
Nov 22	MACHO's, WIMP's and all things dark
Nov 29	Space-time and gravity – Einstein rules!
Dec 01	The beginning of time
Dec 06	Are we alone?
Dec 08	Course/Final Review

Note that this schedule is only to provide a guide to what will be covered. The lectures do not follow the book verbatim, and what is emphasized in the lectures will be emphasized in the exams. This schedule is subject to revision during the semester.

<b>Schedule of homework</b>	Sep 05	Set 1
	Sep 12	Set 2
	Sep 19	Set 3
	Sep 26	Set 4
	Oct 3	Set 5
	Oct 10	Set 6
	Oct 17	Set 7
	Oct 24	Set 8
	Oct 31	Set 9
	Nov 7	Set 10
	Nov 14	Set 11
	Nov 21	Set 12
	Nov 28	Set 13
	Dec 5	Set 14