

# SYLLABUS

## VISIONS OF THE UNIVERSE

### ISP 205, SECTION 1, SPRING 2010

MWF, 11:30–12:20, Room 1410 Biomedical Physical Sciences Bldg.

The Integrative Studies courses are intended to illustrate and explore the methods, results, and limitations of scientific inquiry. ISP 205 uses astronomy as the science example. It takes non-science majors through an outline of what we do (and don't) know about the universe on size scales from planets on up, and of what sorts of thinking has led us to these concepts. Major topics will include the scientific method, the laws of physics (and what happens when you break them), the solar system, how stars work, galaxies, and cosmology (the overall structure and evolution of the universe). Simple algebraic equations will be used.

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Office hours: 2:00–3:00 Tuesday, 12:40–2:00 Friday, or by appointment.

**Text:** “*THE ESSENTIAL COSMIC PERSPECTIVE*” by Bennett, Donahue, Schneider & Voit. Either the 4<sup>th</sup> or 5<sup>th</sup> edition is fine.

**Angel:** Course announcements, a copy of this syllabus, your grades, and copies of the applets and movies shown in class can be accessed through the Angel page for this course, at [www.angel.msu.edu](http://www.angel.msu.edu). The Angel page will include a link to the course web site ([www.pa.msu.edu/courses/isp205/sec-1](http://www.pa.msu.edu/courses/isp205/sec-1)) which will contain some of the information.

**Clickers:** You must have an “i>Clicker” brand clicker. You should register your clicker ID number, *EITHER* by clicking on your name as it scrolls by on the screen at the front of the room at the start of each class during the first week; *OR*: go to the course Angel page, “Lessons” tab, click on “Register your clicker here”, follow the instructions given there to find and type in your clicker number. Then always bring the clicker to class with you.

**In-class questions:** You will use your clicker to answer occasional multiple-choice questions during class. The goals are to encourage you to pay attention and take decent notes, and for me to find out if I am getting the information across to you. You should always have a working clicker. You should use only your own clicker, and nobody else should use your clicker for you. It will *not* be possible to make up these questions if you miss the class in which they are asked, but I will drop the lowest 20% of your scores, plus sessions missed due to certified (note from doctor) medical emergencies, or for religious holidays for which you have given me advance notice.

**Homework.** Homework assignments will be announced in class from time to time. You will complete them using the web-based ANGEL system. I do not accept late homework assignments.

**Midterms:** 3 Midterms, each for the full class period, on Feb. 3, Mar. 3 and April 7.

**Final exam:** The final exam will be held at the assigned place and time for this course: 3–5 PM Wednesday, May 5 (**WARNING:** the time for this exam is given in the **COMMON FINAL EXAM SCHEDULE**, which appears at the *bottom* of the MSU final-exams web page). The location will be announced later in the semester. About 2/3 of the questions will be from the material covered after the third midterm, but the other 1/3 will revisit the earlier parts of the course.

**Grading system:** Homework: 5%. In-class questions: 5%. Each midterm: 20%. Final exam: 30%. **The following grade scale is guaranteed:** 0.0 - 0.0% to 47.5%, 1.0 - 47.5% to 55.0%, 1.5 - 55.0% to 62.0%, 2.0 - 62.0% to 68.0%, 2.5 - 68.0% to 76.0%, 3.0 - 76.0% to 83.0%, 3.5 - 83.0% to 90.0%, 4.0 - 90.0% and above. The actual scale may be curved downwards from these values, but the score needed for a particular grade will not be raised. For example, you are guaranteed to get a 4.0 if your score is above 90%, no matter what.

**Academic Integrity:** *Exams:* closed-book, closed-notes, no cell-phones, calculators or other electronic devices permitted, no talking, eyes on your own work only. Bring photo-ID to all exams. *Homework:* it's OK to get help from others, but it should be you sitting at your computer typing in the answers. *In-class Questions:* You are encouraged to talk with your neighbors about the answers, but nobody else is permitted to click in an answer for you. Nor you for anybody else. *Failure to meet these standards:* Grade 0.0 for assignment/exam in question, or possibly for entire course depending on the severity of the case.

# APPROXIMATE COURSE SCHEDULE

## VISIONS OF THE UNIVERSE

### ISP 205, SECTION 1, SPRING 2010

This schedule is subject to change.

Chapter numbers from the text are indicated in square brackets.... [8] means the material is covered in chapter 8 of the textbook, [2.4] means it is covered in section 2.4, etc. The midterms and final will be on the material actually covered in the lectures, but the lectures usually will include much of the material found in the textbook.

#### 1. Background: The Laws of Physics.

**Jan 11,13,15.** The size of the Universe. [1] The laws of motion: Epicycles [2.4]; Ptolemy, Copernicus, Kepler [3.1 → 3.3]. The scientific method, “laws” in physics [3.4].

**Jan 18. Martin Luther King Day. No class.**

**Jan 20, 22.** The laws of motion: Newton [4].

**Jan 25, 27, 29.** Radiation and spectra [5].

**Feb 1.** Telescopes [5]

**Feb 3. MIDTERM**

#### 2. The Solar System: Exploring the Planets.

**Feb 5.** The solar system. The formation of the Solar System [6.1 → 6.4]

**Feb 8, 10, 12.** Earth as a planet, The Moon, Mercury, Venus, Mars [7].

**Feb 15, 17, 19.** The giant planets (Jupiter, Saturn, Uranus, Neptune). Moons and rings [8].

**Feb 22, 24, 26.** Asteroids [9.1], Comets [9.2].

**Mar. 1.** Pluto [9.3], Cosmic Collisions [9.4].

**Mar 3. MIDTERM**

#### 3. How Stars Work, and Where the Chemical Elements Came From.

**Mar 5.** Planets around other stars [6.5]. Search for life elsewhere [bits of 18].

**Mar 8–12. Spring Break**

**Mar 15, 17, 19.** The Sun [10].

**Mar 22, 24, 26.** Analyzing starlight, the types of stars [11]. The evolution of stars [12].

**Mar 29, 31, Apr 2.** The death of stars. General Relativity and Black Holes. [13]

**Apr 5.** Black holes [13]

**Apr 7. MIDTERM**

#### 4. The Universe: Where Did It Come From & Where Is It Going?

**Apr 9, 12.** Our Galaxy (the Milky Way) [14]. Other galaxies [15.1]

**Apr 14, 16.** The expanding universe. [15.2] Evolution of galaxies, quasars [15.3, 15.4].

**Apr 19, 21, 23.** Cosmic Structure, Dark Matter and Dark Energy [16]. The Big Bang [17.1].

**Apr 26,28.** The Cosmic Microwave Background. Inflation [17.2, 17.3]. The future of the Universe.

**April 30.** Review.

**May 5 (Wednesday): FINAL EXAM, 3-5PM (see “Common Final Exam Schedule”)**