

SYLLABUS (Revised 25 April)
VISIONS OF THE UNIVERSE
ISP 205, SECTION 3, SPRING 2012
MWF 10:20–11:10 in BPS 1410

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, a bit about how stars work, galaxies, and cosmology (the overall structure and evolution of the universe). Simple algebraic equations will be used.

Instructor: Professor Jack Baldwin, Room 3270 Biomedical Physical Sciences Bldg. (BPS),
Phone (517) 884-5611 (baldwin@pa.msu.edu)
Office hours: Tuesday 2:00-3:00, or by appointment.

Teaching Assistant: Kristen Garofali (garofal4@msu.edu)
Office hours: Monday 3:00-4:00; Friday 11:10-12:10, both in BPS 1248 (the Strosacker Learning Center).

Text: “*THE ESSENTIAL COSMIC PERSPECTIVE*” by Bennett, Donahue, Schneider & Voit. Either the 5th or 6th edition is fine. You do *NOT* need either the “Mastering Astronomy” website access nor the Skygazer software that are add-ons to the basic textbook, so it is fine to buy a used book without them.

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. The Angel page will include a link to the course web site (www.pa.msu.edu/courses/isp205/sec-1) which will contain some of the information.

Midterms: 3 Midterms, each for the full class period, on Feb. 1, Feb. 29 and April 4. Each midterm counts for 22% of the course grade.

Final exam: The final exam will count for 34% of your grade. It will be held at the assigned place and time for this course: 10-12 AM Friday, May 4. The location will be the usual classroom – BPS 1410. 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.

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.

In-class extra credit questions: I will occasionally ask multiple-choice questions during class, which will count as extra credit. To answer these, you will need an “i>Clicker” brand clicker (either an older-style i>clicker or the new i>clicker2 model is OK). You should use only your own clicker, and nobody else should use your clicker for you, but you can use the same clicker in more than one class. Each question answered will result in a small amount of extra credit so that the total amount of extra credit if all are completed is 3%. A correct answer will receive full credit for the question, and any response will count as 2/3. But to get any points, you must 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.

Homework. There is no required homework. But to help you see how well you are following the material, short sets of questions will be posted each week with answer sheets posted a week later.

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. *In-class Extra-credit 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 (25 April revision)

VISIONS OF THE UNIVERSE ISP 205, SECTION 3, SPRING 2012

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. The references to the textbook are only suggestions for reading to supplement the lectures.

Jan 9,11,13. 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 16. Martin Luther King Day. No class.

Jan 18, 20. The laws of motion: Newton [4].

Jan 23, 25, 27. Radiation and spectra [5].

Jan 30. Telescopes [5]

WEDNESDAY Feb 1. MIDTERM 1 (22% of grade)

Feb 3. The solar system. The formation of the Solar System [6.1 → 6.4]

Feb 6, 8, 10. Earth as a planet, The Moon, Mercury, Venus, Mars [7].

Feb 13, 15, 17. The giant planets (Jupiter, Saturn, Uranus, Neptune). Moons and rings [8].

Feb 20, 22, 24. Asteroids [9.1], Comets [9.2].

Feb 27. Comets [9.2].

WEDNESDAY Feb 29. MIDTERM 2 (22% of grade)

Mar 2. Pluto [9.3]

Mar 5–9. Spring Break

Mar 12, 14. Planets around other stars [6.5]. Search for life elsewhere [bits of 18].

Mar 16, 19. The Sun [10].

Mar 21, 23. Analyzing starlight, the types of stars [11]. The evolution of stars [12].

Mar 26, 28, 30. The death of stars. General Relativity and Black Holes. [13]

Apr 2. Black holes [13]

WEDNESDAY Apr 4. MIDTERM 3 (22% of grade)

Apr 6, 9. Our Galaxy (the Milky Way) [14]. Other galaxies [15.1]

Apr 11, 13. The expanding universe. [15.2] Evolution of galaxies, quasars [15.3, 15.4].

Apr 16, 18, 20. Cosmic Structure, Dark Matter and Dark Energy [16]. The Big Bang [17.1].

Apr 23,25. The Cosmic Microwave Background. **The shape of the Universe** [17.2, 17.3].

April 27. **The future of the Universe.**

FRIDAY May 4, 10-12AM. FINAL EXAM (34% of grade) in BPS 1410

Addendums to Course Syllabus

The Online SIRS System.

Michigan State University takes seriously the opinion of students in the evaluation of the effectiveness of instruction, and has implemented the SIRS (Student Instructional Rating System) process to gather student feedback. This course utilizes the “online SIRS” system. You will receive an e-mail sometime during the last two weeks of class asking you to fill out the SIRS online form at your convenience. Please note the final grade for this course will not be accessible on STUINFO during the week following the submission of grades for this course unless the SIRS online form has been filled out. You will have the option on the online SIRS form to decline to participate in the evaluation of the course – we hope, however, that you will be willing to give us your frank and constructive feedback so that we may instruct students even better in the future.

MSU Liberal Learning Goals

<http://undergrad.msu.edu/msu-goals>

1) Analytical Thinking

The MSU graduate uses ways of knowing from mathematics, natural sciences, social sciences, humanities, and arts to access information and critically analyzes complex material in order to evaluate evidence, construct reasoned arguments, and communicate inferences and conclusions

- Acquires, analyzes, and evaluates information from multiple sources
- Synthesizes and applies the information within and across disciplines
- Identifies and applies, as appropriate, quantitative methods for defining and responding to problems
- Identifies the credibility, use and misuse of scientific, humanistic and artistic methods

2) Cultural Understanding

The MSU graduate comprehends global and cultural diversity within historical, artistic, and societal contexts

- Reflects on experiences with diversity to demonstrate knowledge and sensitivity
- Demonstrates awareness of how diversity emerges within and across cultures

3) Effective Citizenship

The MSU graduate participates as a member of local, national, and global communities and has the capacity to lead in an increasingly interdependent world

- Understands the structures of local, national, and global governance systems and acts effectively within those structures in both individual and collaborative ways
- Applies knowledge and abilities to solve societal problems in ethical ways

4) Effective Communication

The MSU graduate uses a variety of media to communicate effectively with diverse audiences

- Identifies how contexts affect communication strategies and practices
- Engages in effective communication practices in a variety of situations and with a variety of media

5) Integrated Reasoning

The MSU graduate integrates discipline-based knowledge to make informed decisions that reflect humane social, ethical, and aesthetic values

- Critically applies liberal arts knowledge in disciplinary contexts and disciplinary knowledge in liberal arts contexts
- Uses a variety of inquiry strategies incorporating multiple views to make value judgments, solve problems, answer questions, and generate new understandings

Goals for Student Learning In Integrative Studies-General Science

All ISB/ISP courses are a mixture of thematic and disciplinary approaches to knowledge of the physical and biological sciences. Completion of the required curricula will lead to the following four competencies:

1. **Scientific Knowledge:** *Students will be able to describe some of the major concepts in science and be able to use them to explain important natural phenomena.*
2. **Scientific Development:** *Students will be able to explain the contexts in which these concepts and results were developed and be aware of where these concepts may lead us in the future.*
3. **Scientific Practice:** *Students will be able to discriminate between ideas that do and do not constitute proper subjects for science, give examples of how scientific understanding itself constantly evolves, and be able to use scientific approaches to solving problems in the natural world.*
4. **Scientific Appreciation:** *Students will hopefully learn to value the efforts of physical and biological scientists as they continue to address practical needs and continue research into matters of fundamental and lasting importance.*