

**Syllabus: AST 2010, Descriptive Astronomy**  
Course Reference Number 11005, Section 002

**Instructor:** Paul E. Karchin, Professor  
Office: 268 Physics Research Building  
Phone: 313-577-5424  
Email: karchin@wayne.edu

**Class Meetings:** MW, 12:30-2:10 pm, Room 334, State Hall

**Office Hours.** Students are welcome to meet with me after class or at another arranged time. I am happy to correspond by e-mail.

**Course Description:** Lecture course that introduces the concepts and methods of modern astronomy, the solar system, stars, galaxies, and cosmology; recent discoveries about planets, moons, the sun, pulsars, quasars, and black holes. Meets General Education Laboratory requirement only when taken with co-requisite AST 2011.

**Course Learning Outcomes** are listed at the end of the syllabus.

**Required Text:** "Astronomy: At Play In The Cosmos"; Author: Adam Frank; Edition:17; Publisher: Norton; ISBN: 9780393935226. Access to Norton Smartwork5 is required.

**Attendance and Class Participation** are recorded using iClicker.

**Homework** is available on-line in Blackboard using Smartwork5.

**Exams.** There will be three multiple-choice exams during the term and one multiple-choice exam during the final exam period. All exams have equal weight.

**Planetarium Presentations.** There are two presentations that will be offered at many times during the semester, to be listed at <http://physics.wayne.edu/~planetarium>.

**Grading.** The course grade has the following components:

75% - exams, after dropping the lowest-score (or missed) exam

10% - lecture attendance & participation starting 9/18, two missed classes are allowed

10% - homework (pass/fail) starting 9/16 – one missed assignment is allowed

5% - attendance at the two planetarium presentations

The course grade will be assigned according to the total number of percentage points as follows.

| A          | A-        | B+        | B         | B-        | C+        | C         | C-        | D+        | D         | D-        | F        |
|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|
| 90-<br>100 | 85-<br>89 | 80-<br>84 | 75-<br>79 | 70-<br>74 | 65-<br>69 | 60-<br>64 | 55-<br>59 | 50-<br>54 | 45-<br>49 | 40-<br>44 | 0-<br>39 |

**Policy on Missed Work.** There are no make-up exams. The grading scheme, dropping the lowest-score (or missed) exam will accommodate routine illness and personal contingencies.

Generally, if a student is registered for the course a regular grade will be given. A grade of incomplete (I) will be given only in exceptional cases (to accommodate illness or emergency) after consultation with Prof. Karchin before the end of the term.

### **Drop/Withdrawal Dates**

Last day to drop with 100% tuition cancellation: Wednesday 09/13/2017

Last day to drop with no grade reported (no refund): Wednesday 09/27/2017

Last day to withdraw: Sunday 11/12/2017

**Student Disability Services.** If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TTY: telecommunication device for the deaf; phone for hearing impaired students only).

Class Schedule

| Class Meeting Dates | Chapter(s) or Exam | HW Due Dates |
|---------------------|--------------------|--------------|
| 8/30                | 1                  | 9/4          |
| 9/6                 | 2                  | 9/9          |
| 9/11                | 3                  |              |
| 9/13                | 3, 4               | 9/16         |
| 9/18                | 4                  |              |
| 9/20                | Review             | 9/23         |
| 9/25                | Exam 1: Ch. 1-4    |              |
| 9/27                | 5                  | 9/30         |
| 10/2                | 5, 6               |              |
| 10/4                | 6, 7               | 10/7         |
| 10/9                | 7, 8               |              |
| 10/11               | 8, 9               | 10/14        |
| 10/16               | 9                  |              |
| 10/18               | Review             | 10/21        |
| 10/23               | Exam 2: Ch. 5-9    |              |
| 10/25               | 10                 | 10/28        |
| 10/30               | 11                 |              |
| 11/1                | 12                 | 11/4         |
| 11/6                | 13                 |              |
| 11/8                | 14                 | 11/11        |
| 11/13               | Review 10-14       |              |
| 11/15               | Exam 3: Ch. 10-14  |              |
| 11/20               | 15                 | 11/25        |
| 11/27               | 16                 |              |
| 11/29               | 17                 | 12/2         |
| 12/4                | 18                 |              |
| 12/6                | no class           | 12/9         |
| 12/11               | Review 15-18       |              |
| 12/13               | Exam 4: Ch. 15-18  |              |

## Learning Outcomes

After completing this class, you are expected to ...

- Understand the basic cycles experienced by humans
  - Why we have Day and Night
  - Why we have Seasons
  - Why we use a calendar based on 7 day weeks, and approximately 30 day months, and years
- Understand your place in the Universe and the basic hierarchy of the Universe and the various processes that take place within it.
  - Solar System:
    - Why we know the Earth revolves around the Sun
    - Understand the structure of the solar system, and know basic facts about the planets
    - Have basic knowledge of the basic principles that determine the formation of the solar system, and its evolution
    - Understand at a basic level the techniques used by scientists to estimate the age of the Earth at 4.5 billion years.
    - Know there are other solar systems, and understand at a basic level the methods used by astronomers to detect them.
  - Stars:
    - Understand the Sun is a medium size star among several billion others in our galaxy, the Milky Way.
    - Understand the basic classification of stars
    - Understand the basic steps in the birth, evolution, and death of stars
    - Be familiar with some exotic objects such as neutron stars, and black holes.
    - Understand that all elements heavier than helium were synthesized in stars or supernova explosions - which is why astronomers say we are “star dust”
  - Galaxies:
    - Be familiar with the basic steps involved in the discovery of galaxies
    - Be familiar with basic classifications of galaxies, their attributes, and evolution
    - Be familiar with the existence of larger structures known as clusters and super clusters.
  - Cosmology:
    - Be familiar with the notion that all galaxies are receding from one another and what it means
    - Understand at a basic level the evidence for a big bang
    - Understand at a basic level the techniques used by astronomers to estimate the age of the universe
    - Understand that the notion that the Universe is infinite in size but that we can only see the fraction within the cosmic horizon.
- The question of the origins
  - Have a basic understanding of the evidence for geological ages on Earth, and the biological evolution of species
  - Have a basic understanding of the origins of the Earth and the Solar System

- Have a basic understanding of the origins and evolution of stars and galaxies
  - Have a basic understanding of the evolution of the Universe since the big bang
- The Scientific Method
  - Understand the basic principles of the scientific method
  - Understand the notions of hypothesis, model, theory, law of nature
  - Understand at a basic level the process whereby scientists use facts, obtained by quantitative measurements of natural phenomena, to compare the merits of models, and formulate an increasingly more accurate model (theory) of nature.
- Basic Scientific Theories
  - Have basic familiarity with physics principles of velocity, acceleration, energy, potential energy, force, pressure.
  - Have basic familiarity with fundamental laws of nature including conservation of energy, conservation of momentum, conservation of angular momentum
  - Have basic familiarity with theories about the structure of matter and forces, including the structure of the atom, structure of the nucleus, existence of several classes of elementary particles, and the fundamental forces that rule them.
  - Have basic understanding of the nature of light and electromagnetic waves, and their properties, including the notions of wavelength, frequency, amplitude, and velocity.
  - Have basic familiarity with the four fundamental forces of gravity, electromagnetism, strong nuclear force, and weak nuclear force.