PS 301 – Astronomy
Embry-Riddle University
Summer A 2008

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Required text: *The Cosmic Perspective*, 5th edition, by Bennett et al.
Recommended: any recent astronomy textbook, choose one you like
Recommended online: *Astronomy Picture of the Day*

Point system:

1 final exam	200 points	200
3 tests	200 points each	600
15 vocabulary lists	2 points each	30
25 short reports	4 points each	100
100 online problems	1 point each	100
2 reports	20 points each	40
challenge problems	4 points each	

Grading scale:

A	900 –
B	750 – 899
C	600 – 749
D	500 – 599

IMPORTANT NOTE

Listening to lectures is not enough (*you retain only 10% of what you hear* …). All processes of learning are somehow connected to active participation, and the learning of physics is no exception. Therefore, it is imperative that you work diligently at your own desk (… *80% of what you practice* …). However, this does not mean that you should only work alone. I encourage you to form study groups and collaborate with your classmates (… *and 90% of what you teach to others!*).

Course Description: A descriptive course dealing with the structure and evolution of the physical universe. Topics include the solar system (Earth, Moon, Sun and other planets), stars, black holes, galaxies, quasars, cosmology and exobiology. Planetarium trips and nighttime observing sessions optional. **Prerequisite:** PS102 or PS103 or PS150 or PS215

Prerequisite Knowledge:

1. Basic working knowledge of algebra, geometry and trigonometry.
2. A familiarity of Newtonian mechanics including a basic understanding of gravity.

Learning Outcomes:

1. Review ancient cosmologies and trace the development of astronomy from antiquity, through the Renaissance to modern times.
2. Recognize the basic physical processes operating in the astronomical environment, and apply the basic laws and equations of physics to explain the workings of the universe on the grandest scales.
3. Discuss the properties of a telescope and the important features of telescope (ground and space- based) design, as related to the various wavelengths (e.g. x-ray, UV, optical, IR, radio) in the electromagnetic spectrum.
4. Describe the general plan of the solar system, and discuss the properties (interior, surface, and atmosphere) of solar system bodies including the sun, planets, satellites, and minor members (comets, asteroids, and meteorites).
5. Recognize the appearance of the night sky, accounting for any diurnal, seasonal, annual, and secular changes.
6. Describe the various techniques used by astronomers to determine the distance to and the size, mass, motion, composition, age, and other important parameters of astronomical objects (e.g. planets, stars, galaxies, etc.).
7. Discuss the life cycle of a star from birth (protostars) through "main sequence" middle age, to death (degenerate stars, supernovae, neutron stars, pulsars, and black holes).
8. Discuss the basic properties, structure, and evolution of galaxies, and compare quasars to the active, peculiar galaxies.
9. Describe the large scale structure of the universe and assess the various cosmological models (e.g. the "big bang").
10. Retrace the origin of life on earth, and describe efforts in the search for life elsewhere in the universe.
11. Solve a few basic quantitative problems dealing with various aspects of the course material (e.g. estimate relative distances to and motions of stars and galaxies, calculate surface temperatures, masses, sizes, luminosities, and ages of stars, etc.).
12. Assess the physical universe and our place in it.

RULES

1. Arrive on time; depart on time.
2. Take notes, and bring calculator to each class.
3. No eating, no cell phones.

Final Exam

Comprehensive; two-hour; closed book; closed notes.
Tools: pen or pencil, scientific calculator, 5x8 card (both sides) for equations/notes.
Date: Monday, 23 June, 8:00 am – 10:00 am.

Tests

One-hour; closed book; closed notes.
Tools: pen or pencil, scientific calculator.
Dates: Thu 22 May, Thu 5 June, Thu 19 June.
Final exam will make-up for one missed test.

Vocabulary lists

List of words and definitions from each chapter or assigned reading.
Handwritten. Due daily.

Short reports

One page report on the previous day's "Astronomy Picture of the Day."
Explore at least one topic not covered on the web site.
Handwritten, minimum 100 words. Due daily.

Online problems

Problems assigned on "Mastering Astronomy," associated with textbook.
Due twice weekly.
Course ID: "REYNOLDS301" Course Title: "PS 301 - Astronomy"

Reports

Two reports on assigned articles.
Due Dates: 30 May, 20 June.
Two pages, typed, single-spaced, minimum 1000 words; answer assigned questions.

Grading:		
	<1000 words	-2 point
	<600 words	-2 points
	1-4 grammatical errors	-2 point
	5 or more errors	-3 points
	Each question not answered	-2 point

Challenge Problems

Assigned in class. Due following class period.

All assignments are due at the *beginning* of class on the due date, after which they will be considered late and the score will be reduced by 50%. After the beginning of the *next* class period, they will not be accepted.

General study habits

Repetition is critical for creating long-term memories. A good method for learning is the following sequence: read, listen, write, re-read, re-write, practice, and review. The textbook should be read THREE times: read once before class, read deeply (at least) once after class, and once as a review. In addition, you do not read textbooks as you would the newspaper. You must work through the examples, all mathematical steps should be confirmed, and you should write notes in the margins (it is your book, you can write in it!).

Notes

Taking notes during lecture is important – but you must review and re-copy those notes after class (within a few hours) for them to be useful. Notes that are never reviewed are less than worthless: they give you a false sense of security. It is important that you get into the habit studying every day.

Problem Solving

Solving problems is **critical** to your success in this course. An excellent method to prepare for the exams is to attempt problems at home in an exam-type environment. That is, once you have solved a group of problems, put aside the solutions and pretend that they are questions on an exam – attempt to solve them again, but without any help. Solve problems according to the following rules of coherence and readability:

- Describe *briefly*, but in clear and complete sentences, the basic principles used to solve the problem and explain the basic equations that are used in the solution [DO NOT simply rewrite the question].
- If a physical situation is discussed in the problem, draw an appropriate diagram.
- Identify in words, or by clear references to the diagram, all the symbols you use.
- Work through the problem symbolically, getting a simplified symbolic answer, and only substitute numbers (if appropriate at all) at the very end.
- If you obtain an explicit numerical solution, comment on whether the value you get is reasonable.
- Put boxes around your final answers.
- Write up the problem sets neatly.

Study Groups

Do not simply copy another student's work, and do not simply copy from the solutions manual, but I recommend that you form study groups and work together. This can help you through difficult sections and problems. I encourage you to discuss, argue, arm-wrestle, and finally master the problems. However, I expect you to write up your solutions individually, showing your own insights.

"For most individuals, learning is most effectively carried out via social interactions."

- Ed Redish