

Physics 1403-A3
Stars and Galaxies
Blinn College – Bryan Campus
Course Information Sheet
Spring 2010

INSTRUCTOR: Dr. Dennis Utley, G 206

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OFFICE HOURS: MWF 10:30-11:30, T-Th 1:30-2:30 and any time the door is open
Immediately before class you should expect me to be busy.

CLASS TIMES: Section A3 TTh G 213 09:10-10:25 AM; G233: 10:35-11:50 AM

FINAL EXAM: Section A3 Thursday May 06: 10:15-12:15; G233

COURSE DESCRIPTION “This course is a survey of introductory astronomy sans solar system topics. Topics include a brief history, techniques and methods of modern astronomy, the stars, our galaxy and other galaxies, the large-scale structure of the universe, and cosmology (the origin and evolution of the universe). Also included are aspects and applications of spectroscopy, atomic structure, optics, mechanics, gravitation, and relativity. The class is mostly descriptive in nature, with a minimum of mathematics.”[Blinn Catalogue, p. 112]

PREREQUISITES

None.

COURSE OBJECTIVES After completing the course a student should be able to: recognize fundamental physics principles as applied to the field of astronomy, appreciate the changes in man’s understanding of his place in the universe, know the basic structure of stars, our galaxy and the universe. Students are expected to know the prevailing theories on the lifetimes of stars and the time evolution of the universe. Students are expected to know the instrumentation commonly used in astronomy and the use of the literature available.

This is a Core Course in the 42-Hour Core of Blinn College. As such, students will develop proficiency in the appropriate Intellectual Competencies, Exemplary Educational Objectives, and Perspectives.

www.blinn-col.edu/corecurriculum

REQUIRED MATERIALS

Text: Astronomy Today Stars and Galaxies, 6th Ed. , Eric Chaisson and Steve McMillian, Pearson Education, 2008

Mastering Astronomy Student Access Kit, My class ID is **UTLEYSASTROA3SP10 for A3**

Lab Book: Reprints by permission from Student Observation Guide with Laboratory Exercises, 2nd Ed., Michael Seeds and Joseph Holzinger, Prentice Hall, N.J., 1995. Available in the copy center
Scientific Calculator, Bring this to class each day.

RECOMMENDED MATERIALS

Graph paper and drawing materials

OUTLINE OF THE COURSE content is incorporated into the attached timeline. This schedule is also available on the website.

STUDENT LEARNING OUTCOMES

Expanded List

Lecture and laboratory work will focus on the following learning outcomes in which the student shall show competence:

Explain the concept of the celestial sphere; angular measurement conventions; the motions of the Earth, the Sun, the Moon and the stars; lunar and solar eclipses; and the simple geometric determination of distances and sizes of faraway objects.

Relate the early Earth-centered and modern Sun-centered solar system models. Describe history of astronomy from Renaissance science to the major contributions of Galileo, Kepler, and Newton. Be able to state the laws of Kepler and Newton and understand how they are useful in describing motion and measuring masses of astronomical bodies.

Have a basic understanding of electromagnetic (e-m) radiation, its sources and how it transfers energy and information through interstellar space. Describe the major regions of the e-m spectrum; continuous, emission, and absorption spectra; and the kinds of information that can be obtained by analyzing the spectra of astronomical objects.

Discuss basic optical telescope designs, the need for very large telescopes, atmospheric effects and modern technological improvements, the advantages and disadvantages of using radio and other non-visible radiation for astronomical observations.

Discuss the overall properties of the Sun, how energy is produced and travels from the core out into space. Name and describe the inner and outer regions, how the composition and temperatures are determined, and the various types of solar activity.

Discuss measurements of stellar distances and motions of stars. Discuss classification of stars by luminosity, brightness, colors, surface temperatures, spectral characteristics, mass and size. Describe an H-R diagram.

Discuss composition and properties of the interstellar medium, the nature of emission nebulae and dark interstellar clouds, and the techniques to determine these characteristics.

Summarize and discuss the stages of star formation, how it depends on mass, and the importance of star clusters. Explain and outline the events of stellar evolution off the main sequence. Contrast evolutionary histories of high-mass and low-mass stars.

Describe novae and supernovae events, how each are produced, the end products, and the origin of heavy elements. Describe the origin and properties of neutron stars, pulsars, and other strange stellar objects. Discuss the phenomena of black holes, their formation and effects on matter and radiation, and methods of detecting their presence.

Describe the Milky Way Galaxy: the overall structure, the different regions, importance of variable stars, explanations of spiral arms, size and mass, dark matter, and phenomena at the center.

Discuss normal and active galaxies, quasars, the large-scale distribution in the Universe, formation and evolution theories, distance-measurement techniques, and Hubble's Law.

State the cosmological principle and discuss the models of the origin and evolution of the Universe. Discuss the uncertainties and the observational evidence.

Laboratory work will be chosen to re-enforce the above lecture topics.

COURSE REQUIREMENTS include accepted classroom and laboratory etiquette as well as the following

grading requirements for the course.

GRADING:

Grades will be assigned as follows. Superior A: 90% up, Good B: 80%-89%, Average C: 70%-79%, Marginal D: 60%-69%, Unacceptable F: below 60%

I reserve the right to adjust these levels in a direction to benefit the students if in my judgment grading is not an accurate assessment of ability. Any adjustments will be for all students at the same performance level. I do not give extra credit assignments.

PLAN A

Major Components.....70%

Unit Exams (best 3 of 4) [See note#1], 35%

Comprehensive Final Exam, 20%

Service Project [See note #4], 15%

Test items requiring computation must have valid supporting work shown for credit.

Short discussion test items should be expected. These items will be scored for demonstrated skill in communication as well as scientific validity.

Other30%

Homework and laboratory grade; Class/video notes and some problems will be completed during class and will be a part of this component. Students should expect a grade to be taken at each class meeting. This fulfills the Blinn College policy on class participation. Each four to five video/class note grades will be averaged for a major lab grade. This component includes **Mastering Astronomy (10% of the 30%)**. Labs are generally scored as A(95), B(85), C(75), D(65), or F(60).

PLAN B

Service component 15% is assigned to the unit exams and the final exam making them worth 45% and 30% respectively.

Neatness and clarity will be a part of the grading criteria.

ADA Statement:

Students with physical or learning disabilities must present documentation from the Office of Disability Services (room 165, Science Bldg) to receive accommodation on exams and assignments. Accommodation is not retroactive.

NOTES

Attendance: Students are expected to attend class for the full time scheduled. A graded document will most days provide evidence of attendance. Oral roll calls or signature sheets may also be used to document attendance. You are considered absent for the day if you miss **any** of the day's attendance markers (missing either lab or lecture or both on a day counts as an absence). Any student leaving before class is dismissed without prior instructor approval will be counted absent. Blinn consequences: Students will be warned by email after accumulating one week equivalent of absences. Students will be dropped after a second week equivalent of absences. Notice illness is not an automatic excuse even with a doctor's note.

1. Students are given the option of make up exams or of dropping one exam grade. I will not do both. To qualify for a make up exam a written doctor's note is required. This note **must state specifically** that attending class would have placed the student or others at risk. Just being 'sick' is not enough. Realize insisting on make-ups disqualifies you from the dropped grade option.

2. No provision is made for lab make-ups. Missed labs are zeros when a grade is taken. When possible (and time permits) labs may be completed in a following meeting; however, a late penalty will be assessed unless a Doctor's note (see #1) is submitted and verified.

3. Optional viewing sessions may replace selected labs and/or poor lab grades. This will be discussed in class at the appropriate times.

4. Service component will require an outreach activity such as assisting in a major public viewing session, assisting in the Texas Science Olympiad, a teaching activity at a local public school/scout /boys' club meeting or similar activity. This project will require in the neighborhood of 6 hours outside of class.

Students representing Blinn College (or by extension,TAMU) at official events or students absent due to religious holidays are required to complete all work. You may not drop grades missed due to school related events or religious holidays. See me as soon as you know you must miss.

RULES AND REGULATIONS:

Dorothy, " Toto, we're not in Kansas anymore."

Adult behavior is expected. You are here by choice. This fact places additional responsibilities on both the student and the instructor. I require mutual RESPECT to be displayed by all parties for others and for themselves.

Civility Statement

" Members of the Blinn College community, which includes faculty, staff and students, are expected to act honestly and responsibly in all aspects of campus life. Blinn College holds all members accountable for their actions and words. Therefore, all members should commit themselves to behave in a manner that recognizes personal respect and demonstrates concern for the personal dignity, rights, and freedoms of every member of the College community, including respect for College property and the physical and intellectual property of others.

If a student is asked to leave the classroom because of uncivil behavior, the student may not return to that class until he or she arranges a conference with the instructor: It is the student's responsibility to arrange for this conference. " Blinn Policy.

Use of electronic devices (cell phones etc.) in class by nonemergency personnel is now classified by the Board as a violation of the civility protocol. Turn them off before entering class.

Specifically I have the following expectations:

1. Attendance. Roll will be taken each meeting, and all absences will be processed in accordance with existing school directives. See above. Qualifying signatures: Labs requiring more than one session to complete must be signed by me each day before you leave.

2. Conduct:

Be Safe.

Campus Policy prohibits food or drink in classrooms or laboratories. Careless or hazardous actions in the laboratory cannot be acceptable. The potential for injury is real. Any student failing to practice safe lab procedures (as discussed at the first lab meeting) will be asked to leave immediately. Everyone is responsible for a safe lab.

Be Courteous.

Late arrivals, talking out of turn, or other disruptive behavior has no place here. I will protect the investment (time and money) of the majority of students by removing obstacles to the learning environment.

Be Honest.

I have no use for either liars or for thieves; a cheat is both. Blinn has written policies for dealing with those caught cheating. Survivors will be prosecuted to the full extent the law.

3. Dress appropriate for the environment. This is not a nightclub or a bedroom. Don't dress in a manner you know your parents wouldn't like. A good guideline might be to visualize your parents in your clothing. Our

objective is to provide a learning environment free of excessive distractions.

Dr. Utley's Physics 1411: ASTRONOMY

Proposed Semester Timeline

We will attempt to keep the following schedule. Actual dates may need to be changed. You are expected to attend classes and be aware of any changes to the schedule. Optional viewing sessions will be announced as time and weather permit.

Check your Blinn email often for messages.

Version:01/08/10: TTh Class

Week Of	Mon	Tuesday	Thursday	Labs
January	18	Ch. 1	Ch.2	Video , "Star Charts",Ex1
	25	Ch. 2, 3	Ch.3,4	Ex 1, Ex. 2, Triangles"Dist to Planet"
February	01 ^a	Ch. 4	Ch. 5	Video, Ex 2, 4
	08	Ch. 5	Exam 1	Ex 4,5, 6
	15	Formation of Solar System Ch.16	Ch.17	Solar Viewing session, Video
	22	Ch. 18	Ch. 19	Ex 28, 29
March	01	Ch. 20	Ch. 21	Ex 30, 31
	08	Ch. 22	Exam 2	Ex 33, 34
	15	Spring Break	Spring Break	
	22	Ch. 23	Ch.24	Ex. 35, 39
	29	Ch. 25		Ex. 36, 37
April	05	Ch. 25	Exam 3	Ex. 40
	12 ^b	Ch. 25	Ch.26	Ex 41
	19	Ch. 27	Ch. 28	Ex. 42
	26	Solar System Survey	Exam 4	Videos
May	03	Closure	Final May 6 5:30PM G233	Videos

Notes: a. Feb.. 03, 12th class day, last day to drop with a full refund. b. April 16, Last day to drop with a "W".

Text Chapter	Title
1	Charting the Heavens: The Foundations of Astronomy
2	The Copernican Revolution: The Birth of Modern Science
3	Radiation: Information from the Cosmos
4	Spectroscopy: The Inner Workings of Atoms
5	Telescopes The Tools of Astronomy
16	The Sun: Our Parent Star
17	The Stars: Giants, Dwarfs, and the Main Sequence
18	The Interstellar Medium: Gas and Dust among the Stars
19	Star Formation: A Traumatic Birth
20	Stellar Evolution: The Life and Death of a Star
21	Stellar Explosions: Novae, Supernovae and the Formation of Elements
22	Neutron Stars and Black Holes: Strange States of Matter
23	The Milky Way Galaxy: A Spiral in Space
24	Galaxies: Building Blocks of the Universe
25	Galaxies and Dark Matter: The Large-Scale Structure of the Cosmos

26	Cosmology: The Big Bang and the Fate of the Universe
27	The Early Universe
28	Life in the Universe: Are We Alone?