

AST 301, Introduction to Astronomy
Course Description and Syllabus — Spring 2013

Instructor:	Dr. Edward L. Robinson Dept. of Astronomy, UT
Unique Number:	47915
Lecture Time	MWF 10 – 11 AM
Lecture Location:	WEL 3.502
Required Textbook:	“Astronomy Today, 7 th Edition” by Chaisson & McMillan
Course Email Address:	elr301@astro.as.utexas.edu
Course WEB Site:	http://www.as.utexas.edu/~elr/AST301-Spring
Teaching Assistant	John Jardel

Course Description: AST 301 is a one-semester introduction to astronomy for non-science majors. No previous course in astronomy is required. The main topics of the course are:

- The solar system – the planets and their moons, asteroids, comets.
- Stars and stellar evolution – star birth and the formation of planets, and star death, including neutron stars, black holes, supernovae.
- Galaxies – normal and not-so-normal galaxies, quasars and supermassive black holes, dark matter.
- Cosmology – the expansion of the universe, its origin in the Big Bang, dark energy and the future of the universe.

The course emphasizes the physical processes at work in the universe and the methods we use to learn about the universe.

The course often requires mathematics at the level of first-year algebra. If you are uncomfortable with this level of mathematics, you should consider a different section of AST 301.

Course Organization: The lectures and lecture notes are the primary source of course content. Attendance at the lectures is not required but you need attend them regularly anyway because (1) the lectures will sometimes cover material not in the textbook, there will be a 10-minute exam every Friday, and (3) there will be mini-quizzes during most of the other lectures. The mini-quizzes will not be announced beforehand, so the only way to insure that you take all of them is to attend all the lectures.

You will be responsible for all the material in the textbook unless specifically told otherwise. You must, therefore, buy or have access to the textbook. Many textbooks for introductory astronomy courses have been published. They are essentially interchangeable. If you would like to save some money by using an earlier, second-hand edition of our textbook or a different textbook altogether, go ahead; but check with us first to make sure the content is compatible with this course.

There is a web site for the course containing the following information:

- Important announcements.
- Organizational material for the course, including the course description and syllabus, and a list of office hours.
- The course calendar.
- Lecture notes and pdf versions of the powerpoint slides shown during lectures.
- Answers to homework problems.
- Answers to exam problems.

There are a variety of ways to get additional help in the course. (1) Both Dr. Robinson and a TA hold regularly scheduled office hours. You may visit us during office hours for any reason without an appointment. You can come at other times also, but make an appointment so that you can be sure to catch us. (2) You can contact us by email at the course email address. (3) We offer non-compulsory help sessions. These help sessions are smaller and have a much less formal environment than the lectures. They are unstructured but are usually devoted to help on the material covered in the lectures and textbook. It is impossible to give everyone as much personal attention during the regular lectures as they may need – the class is too large. The help sessions are the best place to get personal attention. The help sessions are also an excellent way to get help with the homework problems.

Dr. Robinson will miss some classes during the term because of travel to McDonald Observatory and to scientific meetings. Other instructors will teach the class during his absence and will cover the material he would have covered, but if having the same instructor throughout the term is important to you, you should consider switching to a different section of AST 301.

Finally, students with disabilities may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities, 471-6259.

Course Grade: Your course grade will be based on examinations, homeworks, and mini-quizzes.

Exams: There will be an exam every Friday and a comprehensive final exam during the regular final examination week. The Friday exams will generally consist of 10 multiple-choice questions covering material from the previous week and will last 10 minutes. The time of the final exam is set by the Registrar, not the course instructor, and is Friday, May 10 at 2:00 PM. You are not required to take the final exam! It serves as a combination make-up exam and second-chance exam. If you choose to take it, your score on the final will replace up to four of your worst scores on the Friday exams. There will be absolutely no other make-up exams, no matter how good your reason for missing the exam; the final-exam policy covers situations where exams are missed for legitimate reasons. Taken together the exams count for 70% of your final grade.

Homework: There will be a homework assignment every week, typically consisting of three problems. The homeworks will generally be assigned during Wednesday lectures and be due the following Wednesdays. Taken together they will count for 15% of your final grade. The homework score may not be dropped and replaced by the final exam score.

Mini-Quizzes: There will be a mini-quiz at the end of nearly every lecture. The mini-quizzes are open-book and everyone can work together on them, so ideally everyone should get good scores on the mini-quizzes. Together the mini-quizzes will count for 15% of your final grade. The mini-quiz score may not be dropped and replaced by the final exam score.

The letter grade will be assigned on the following absolute scale:

Numerical Grade (Percent)	Letter Grade	Numerical Grade (Percent)	Letter Grade
83.00 to 100.0	A	57.00 to 59.99	D+
80.00 to 82.99	A–	53.00 to 56.99	D
77.00 to 79.99	B+	50.00 to 52.99	D–
73.00 to 76.99	B	00.00 to 49.99	F
70.00 to 72.99	B–		
67.00 to 69.99	C+		
63.00 to 66.99	C		
60.00 to 62.99	C–		

In past years the average course grade has been mid- to low B.

Cheating, Plagiarizing, and Other Miss-Behavior: The penalty for cheating on an exam is a score of zero for the exam and the zero will be included as one of the four exam scores used to calculate your final grade.

**Astronomy 301 Course Syllabus
Spring Term 2013**

Section	Contents	Lecture Number	Tentative Date	Textbook Chapters
I.	Course Organization			
	a) course description	1	01/14/2013	1
	b) course syllabus			
	c) math review			
	d) course grade			
II.	Planetary Motion and Gravity			
	A) Scale of the Solar System	2	01/16/2013	2
	a) sizes and distances in the solar system			
	B) Overview of the Solar System	3	01/18/2013	6
	a) contents of the solar system			
	b) patterns in the properties of the planets			
	c) motions of the planets			
	C) Kepler's Laws of Planetary Motion	4	01/23/2013	2
	D) Newton's Law of Gravity	5	01/25/2013	2
	a) force, mass, weight			
	b) Newton's Law of Gravity			
	c) orbital motion			
	d) Kepler's third law revised			
III.	The Solar System			
	A) The Earth	6	01/28/2013	7 & 8
	a) interior of the Earth			
	b) tectonic activity			
	c) age of the Earth			
	d) Evolution of the Earth's Atmosphere			
	B) Mars	7	01/30/2013	10
	a) surface of Mars			
	b) water on Mars			
	c) atmosphere of Mars			
	d) life on Mars			
	C) Jupiter	8	02/01/2013	11
	a) interior of Jupiter			
	b) atmosphere of Jupiter			
	c) Galilean moons of Jupiter			
	D) Smaller Members of the Solar System	9	02/04/2013	14
	a) asteroids			
	b) comets			
	c) Kuiper belt and Oort cloud			
	d) things that hit the Earth			

Section	Contents	Lecture Number	Tentative Date	Textbook Chapters
IV.	The Properties of Stars			
	A) The Distances of Stars	10	02/06/2013	17
	a) annual parallax			
	b) other ways to measure distance			
	c) the nearest stars			
	d) the brightness and luminosity of stars			
	B) Waves	11	02/08/2013	3
	a) the wave nature of light			
	b) speed, wavelength, frequency			
	C) The Physics of Light	12	02/11/2013	3
	a) electromagnetic spectrum			
	b) temperature			
	c) black body radiation			
	D) The Hertzsprung-Russell Diagram	13	02/13/2013	17
	a) the temperatures of stars			
	b) the H-R diagram			
	c) the types of stars			
	d) the radii and densities of stars			
	E) The Chemical Composition of Stars	14, 15, 16	02/15/2013 to 02/20/2013	4 & 17
	a) the nature of atoms			
	b) the particle nature of light			
	c) Kirchhoff's laws			
	d) the spectra of stars			
	e) the composition of stars			
	F) The Masses of Stars	17	02/22/2013	3 & 17
	a) binary and multiple stars			
	b) the Doppler shift			
	c) spectroscopic and eclipsing binaries			
	c) the masses of stars			
	G) Variable Stars	18	02/25/2013	17
	a) eclipsing and spotted stars			
	b) pulsating variables			
	c) supernovae			
	d) pulsars and neutron stars			
	Review or Catch Up Day		02/27/2013	
V.	The Structure and Evolution of Stars			
	A) Physics of Stellar Interiors	19, 20	03/01/2013 and 03/04/2013	16
	a) nuclear energy; fission and fusion			
	b) important nuclear reactions in stars			
	c) gravity and pressure balance			
	d) energy flow and temperatures			
	e) the structure of main-sequence stars			
	B) The Sun – A Typical Main-Sequence Star	21	03/06/2013	16

Section	Contents	Lecture Number	Tentative Date	Textbook Chapters
V.	The Structure and Evolution of Stars (continued)			
	C) Interstellar Matter and Star Formation	22	03/08/2013	18 & 19
	a) interstellar gas and dust			
	b) star formation			
	c) open clusters and associations			
	D) The Origin of Planetary Systems	23	03/18/2013	15
	a) planets around other stars			
	b) origin and evolution of planets			
	E) The Evolution of Low Mass Stars	24, 25	03/20/2013 and 03/22/2013	20
	a) main-sequence evolution			
	b) evolution up the Giant Branch			
	c) evolution on the Horizontal Branch and the Asymptotic Giant Branch			
	d) planetary nebulae and white dwarfs			
	e) the H-R diagram of clusters			
	f) cluster ages			
	F) The Evolution of High-Mass Stars	26, 27, 28	03/25/2013 to 03/29/2013	21 & 22
	a) core-collapse supernovae and the formation of neutron stars			
	b) the origin of the heavy elements			
	c) relativity and black holes			
	d) the evolution of binary stars			
	e) black holes in binary stars			
	Review or Catch Up Day		04/01/2013	
VI.	Galaxies and Quasars			
	A) The Milky Way	29	04/03/2013	23
	a) the disk, halo, and spiral arms			
	b) rotation and mass of the Galaxy			
	c) history of the Galaxy: age, metallicity, and populations			
	B) Normal Galaxies	30, 31	04/05/2013 and 04/08/2013	24 & 25
	a) classification of galaxies			
	b) properties of elliptical galaxies			
	c) properties of spiral galaxies			
	d) evolution of galaxies			
	C) Peculiar Galaxies and Galaxy Clusters	32	04/10/2013	24 & 25
	c) dwarf and starburst galaxies			
	a) collisions and interactions			
	b) clusters and large scale structure			
	c) effect of environment on evolution			

Section	Contents	Lecture Number	Tentative Date	Textbook Chapters
VI.	Galaxies and Quasars (continued)			
	D) Distances and Hubble's Law	33	04/12/2013	24
	a) measurement of distances			
	b) the radial velocity of galaxies			
	c) Hubble's Law and its meaning			
	E) QSOs and Active Galactic Nuclei	34, 35	04/15/2013	24 & 25
	a) the observational properties of QSOs		and	
	b) the unified model for QSOs		04/17/2013	
	c) active galactic nuclei and QSO evolution			
	d) quiescent supermassive black holes			
VII.	Cosmology			
	A) Introduction to Cosmology	36	04/19/2013	26
	a) the basic properties of the universe			
	b) the expansion of the universe			
	c) the age of the universe			
	B) The Hot Big Bang model	37	04/22/2013	27
	a) the cosmic microwave background			
	b) the primordial chemical composition			
	C) Modern Cosmology	38, 39	04/24/2013	27
	a) inflation		and	
	b) formation of structure		04/26/2013	
	D) The Future of the Universe	40	04/29/2013	26
	a) the geometry of the universe			
	b) dark matter and dark energy			
	c) the future of the universe			
	Review or Catch Up Day		05/01/2013	
VIII.	The Current Limits of Astronomical Knowledge	41	05/03/2013	