

Syllabus for
Astronomy 152
Stars, Galaxies, and Cosmology
Spring 2016 Semester

Course title	Astronomy 152: Stars, Galaxies, and Cosmology
Lecture Time	Tuesday, Thursday 2:10 – 3:25 PM
Lecture Location	Physics Nielsen 415
Professor	Soren P. Sorensen
Office	Science and Engineering Research Facility (SERF), room 607
Office Hours	Tuesday, Thursday 3:30 – 4:30 PM or by appointment
Email	sorensen@utk.edu
Required Textbook	“Astronomy Today”, by Eric Chaisson and Steve McMillan, 8 th edition (including Mastering Astronomy Access)
Required Clicker	The official UT clicker from Turning Point Technologies
Required Homework Access	www.MasteringAstronomy.com from Pearson Course Id: MASORENSEN66787

Text Assignments

Chapter	Title
1-16	Brief review of material from chapters 1-16 in order to understand chapters 17-28
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 the 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: Toward the Beginning of Time
28	Life in the Universe: Are We Alone?

Course Description:

Life and death of stars, exotic objects including white dwarfs, supernovae, neutron stars, pulsars, and black holes. Structure of galaxies, formation of large-scale structure in the universe, and cosmological issues such as the big bang, dark matter, dark energy, and the past, present, and projected future behavior of the universe in light of modern astrophysics and particle physics. Conditions for the existence of life in the universe and the possibility of extraterrestrial intelligence. A minimum of mathematical analysis.

Satisfies General Education Requirement (NS), and provides 3 Credit Hours

Credit Restriction: Students may not receive credit for both Astronomy 152 and Astronomy 218.

Learning objectives:

Students who successfully complete this course will be able to:

1. Understand the fundamental ideas of the scientific method as applied to astronomy.
2. Understand the how information about objects outside the Earth can be obtained.
3. Understand the structure and lifecycle of the different types of stars.
4. Understand the structure of galaxies.
5. Understand the large-scale structure of the universe, including the Big Bang theory

Lectures:

The purpose of the lectures will be to elucidate the most important aspects of the material covered in the textbook. This will be done through conventional lecturing as well as extensive usage of clicker interactions. *However, the most important way for you to learn the material contained in this course will be to carefully study the textbook and to try to solve as many homework problems as possible.* PowerPoint slides will in general be posted prior to each lecture.

Clickers:

Each student is required to have one of the officially UT approved “clickers” from Turning Technologies (QT Device). More information on the UT clickers can be found [here](#). They can be bought in the UT Bookstore. You are required to use the Turning Technologies Registration Tool in the Tools folder on Blackboard to register your clicker if this is the first course you are using it in. If you have previously registered your clicker in another course you should not need to register. Students with no registered clicker will receive emails requesting them to register their clicker. Any technical questions concerning clickers should be address to the OIT helpdesk.

The clickers will be used extensively in each lecture. Typically each correct answer will count 2 points, each incorrect answer will count 1 point, and no answer will of course receive no points. Participation in the clicker activities is therefore important. The final score for clickers will be calculated as a percentage of total points accumulated over the whole semester by the student out of the total number of point that can maximally be obtained. The clicker score will count 20% towards the final score. Students are required to have the clicker available at all lectures starting from the first lecture, but the answers will only count towards the final grade starting at the second lecture.

Please note: This course does not permit the use of personal device (smart phone) responses via the ResponseWare license.

CLICKER CHANNEL in Nielsen 415: **55**

Homework:

The homework problems for each chapter will be due at 11:59 PM on the day the last lecture on the particular chapter was held. A schedule of due dates is available in Blackboard in the *Homework* folder. Homework submitted after the deadline will receive no credit. All homework will be done online via the Mastering Astronomy website: www.MasteringAstronomy.com. Each student is required to purchase an student access code card to this web site, sign in at the site and register for the course (Course ID: MASORENSEN66787). Typically this access code will come with the textbook, but in can also be bought independently. Instructions for how to access the web site and how to register can be found on Blackboard. Failure to register will result in the student receiving no credit for homework.

Homework will be graded according to the grading scheme setup by Mastering Astronomy. The final score for homework will be calculated as a percentage of total points accumulated over the whole semester by the student out of the total number

of point that can maximally be obtained. The homework score will count 20% towards the final score.

Exams:

There will be given 3 tests, two during the semester and one final, comprehensive test at the end of the semester. Each test is counting 20% of the final.

In addition there will be a make-up test on the last day of classes for students missing one of the first two tests with a valid reason. In order to be allowed to participate in the make-up exam students should have communicated with me via email by the end of the day of the test (or earlier) the reasons for missing the test. If the reasons are accepted they will be allowed to participate in the make-up test.

There will be no make-up test for students missing the final test.

All tests are closed-book tests. During tests students are required to bring a pencil or a ball pen. No other material whatsoever will be allowed. During the test students are not allowed to communicate with anybody else, nor are they allowed to try to see the solutions of other students (the exams will be scrambled, so your neighbor will not solve the problems in the same sequence as you). Any violation of these exam rules will result in the student receiving a 0 (zero) score on the particular test and the final grade will be reduced by a letter grade (A- will be B- etc.). A second offense will lead to a grade of F for the course and a report to the Dean of Students and the Student Conduct and Community Standards offices.

Exam Schedule		
Test no.	Date & Time	Main content
<i>1</i>	<i>Thursday, October 1, 12:40 - 1:55 PM</i>	<i>Chapters 17-21</i>
<i>2</i>	<i>Thursday, November 19, 12:40 - 1:55 PM</i>	<i>Chapters 22-26</i>
<i>Make-up</i>	<i>Thursday, April 28, 2:10 – 3:25 PM</i>	<i>Chapters 17-26</i>
<i>Final</i>	<i>Thursday, May 5, 12:30 – 2:30 PM</i>	<i>Chapters 27-28 and 17-26</i>

Extra Credit:

The following options for [extra credit](#) are available:

1. Night observations (3 points per session, max 3 points)
2. Planetarium session (3 points per session, max 6 points)
3. Video viewing with detailed essay (3 point per session, max 3 points)
4. Excursion with Mr. Paul Lewis (3 points, max 3 points)

In total you can only obtain 9 points of extra credit.

Night telescope observation sessions are available from the roof of the Physics building (conducted by Mr. Paul Lewis). For evening sessions Mr. Lewis will discuss the various objects that are in the night sky. You meet on the roof of the Physics building, which is accessed through the door at the very top of the East stairwell (near the elevator doors).

The schedule for the planetarium sessions will be announced by Mr. Lewis on <http://www.phys.utk.edu/trdc/>. They will take place in the Planetarium on the first floor of the Nielsen Physics building (Nielsen 108).

If excursions for observations of meteorite showers, lunar eclipses etc. are organized, they will be announced by Mr. Lewis and on Blackboard

Mr. Lewis' office is on the first floor of the Nielsen Physics next to the elevator doors and his phone number/answering machine is at 974-9601. If it is raining, snowing, or overcast then there will be no viewings. If the night observation is canceled, usually a movie is shown. If you are in doubt that your session will be canceled due to weather call or email Mr. Lewis, gplewis@utk.edu, to check. Not showing up without a valid reason can get you barred from future sessions since you will have wasted a time slot that another student could have used. It is also very important that you try to do your observing as early as possible since bad weather usually causes many cancellations of the extra credit sessions. This causes many students to miss their chances for extra credit. Don't let it be you!

A stamped form from Mr. Lewis PLUS a one page (or 2-pages double-spaced) typed essay description of your observing trip should be handed in to me for you to get full credit.

Grading:

You final score will be calculated using the following weights:

Summary of weights for scores in the different components of the course	
<i>First test</i>	<i>20%</i>
<i>Second test</i>	<i>20%</i>
<i>Final exam</i>	<i>20%</i>
<i>Clicker questions</i>	<i>20%</i>
<i>Homework</i>	<i>20%</i>

Example: Lisa has received the following scores: Test 1 (45%), test 2 (65%), Final (83%), Homework (92%), clickers (79%). In addition she has received 6 points of extra credit. Her final score will therefore be: $0.2 \cdot 45\% + 0.2 \cdot 65\% + 0.2 \cdot 83\% + 0.2 \cdot 92\% + 0.2 \cdot 79\% + 6\% = 78.8\%$

The following grading scale will be used:

Grade when final score is	higher or equal to	and lower than
A	90%	
A-	87%	90%
B+	84%	87%
B	81%	84%
B-	78%	81%

C+	75%	78%
C	72%	75%
C-	69%	72%
D+	66%	69%
D	63%	66%
D-	60%	63%
F	0%	60%

In the example above Lisa will receive a grade of “B-“. Depending on the degree of difficulty of the tests I reserve the right to “curve” the above grading scale downward so the threshold for receiving a given grade will require a lower score.

You are welcome to discuss and/or complain about the grading of a given assignment up to a week after it has been returned to you. *After a week the score will not be changed.*

Honor Code, Collaboration and Plagiarism:

As a student in this class you are highly encouraged to interact with other students concerning understanding the material. However, this interaction has to be at a level where it increases your general knowledge of astronomy. It can never cross the level to actual plagiarism. If I judge you have copied other sources (online or other students) or you have aided others in plagiarizing your work, you will receive a 0 (zero) score on the particular assignment or test and your final grade will be reduced by a letter grade (A- will be B- etc.). A second offense will lead to a grade of F for the course and a report to the Dean of Students and the Student Conduct and Community Standards offices.

Email:

You are required to have an official UT email address (name@utk.edu or name@tennessee.edu) and read your email on a daily basis, since some of the needed information for this class that cannot be transmitted to you during the lectures or on

this web site will be given to you via email. In particular, issues like cancellation of classes or last minute changes in assignments. Please remember, that if you are using an existing non-UT email account (AOL, Yahoo, etc.) it is your own responsibility to re-route your UT email to your preferred account.

Disabled Students:

Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs. Please contact the Office of Disability Services at 865-974-6087 in 2227 Dunford Hall to coordinate reasonable accommodations for students with documented disabilities.