

**ASTR 1401, Spring 2017, Course Syllabus**  
**Stellar astronomy: Stars, Galaxies, and Cosmology**  
Texas Tech University, Department of Physics and Astronomy

Instructor: Dr. Lennart van Haften                      Office: 019 Science Building  
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Class schedule: 11:00-11:50 am MWF                      Room: 107 Chemistry Building  
Office hours: 12:00-1:30 pm, Monday & Wednesday, or by appointment via  
[vanhaaften.youcanbook.me](http://vanhaaften.youcanbook.me)

Lab organization

Gwen Armstrong, 115 SC, [Gwen.Armstrong@ttu.edu](mailto:Gwen.Armstrong@ttu.edu), <http://www.phys.ttu.edu/~gwen/index.htm>

Textbook

Recommended: Chaisson & McMillan, *Astronomy Today*, Volume 2 (includes only the chapters needed for this course) or full book, 6th edition or later, Pearson. No software is required. You can also use any of the following texts: Bennett, *The Cosmic Perspective* (Vol. 2 or full book), Kay, *21st Century Astronomy* (Vol. 2 or full book). Openstax.org has an open source text that can be downloaded or viewed in a browser for free (<https://openstax.org/details/books/astronomy>). You don't necessarily need the most recent edition of any textbook, although publication dates of 2007 or later are preferred.

Lectures

Prepare for lectures by reading the material (listed in the weekly schedule below) beforehand. That will make it easier to follow the lectures. It is very important to **ask questions** about any material you don't understand, either during lectures or office hours. Keep in mind: students who regularly miss class usually perform poorly on exams.

Labs & Observing

In addition to lectures, there will be 11 labs in the classroom, and 2 observing sessions at the TTU Skyview Observatory. These are an integral part of the course and **enrollment is mandatory**. Gwen Armstrong will give a lab introduction on Wednesday January 25 during class and explain how to sign up. You will also receive an information sheet during your first lab session.

Course description

This course aims to give you an understanding and appreciation of the vast Universe that exists beyond the Earth and the solar system, and how astronomers have learned what we know today. Since ancient times, astronomers have made many discoveries about the nature and lives of stars, galaxies, and the Universe itself. This knowledge was, and still is, obtained using the scientific method. In addition to learning about astronomy, you will also become familiar with how science works, and how to think skeptically and analytically. These are important skills in modern society. There are no prerequisites. This course satisfies 50% of the TTU Life and Physical Sciences Core Curriculum requirements.

Learning outcomes for TTU Natural Sciences:

1. Demonstrate knowledge of the scientific method and to contrast it with other ways of understanding the world.
2. Demonstrate knowledge of the tools and methods used by scientists to study the natural world.
3. Explain some of the major theories in the Natural Sciences.
4. Describe how Natural Sciences research informs societal issues, including ethics.

Students graduating from TTU should be able to: explain some of the major concepts in the Natural Sciences and to demonstrate an understanding of scientific approaches to problem solving, including ethics.

Evaluation            The final course grade consists of:  
35% final exam,  
25% best midterm exam,  
25% labs,  
15% homework quizzes,  
0% worst midterm exam,  
rounded to the nearest integer. A failing grade on the lab component **is a failing grade for the course**.  
Passing final grades: A 90-100, B 78-89, C 66-77, D 54-65. Grades will be announced on blackboard.

Exams                Exams will mainly test understanding of concepts, and also include some calculations. **You cannot use notes or a calculator**, but no difficult computations will be asked. There will be two midterms and one final exam. The midterm dates will be announced at least two weeks in advance. Then you will also be informed which material will be examined, in terms of class dates and chapters. The midterm with the lowest grade will be dropped. For that reason there will be no make-ups for midterms, except if **both** midterms have a documented absence. The final exam covers material from the entire semester.

Homework quizzes    On Wednesdays, up to 12 homework questions will be distributed on blackboard. You **do not** turn in answers to all questions. Instead, on Friday the next week, you will be asked to answer **two** of the questions in a quiz during the last 10 minutes, **without using notes or a calculator**. You receive 100 points if both answers are correct, 60 if one is correct, and 20 if neither is correct but you still turned in the answer sheet. If you are not present, you will receive a 0 grade for that quiz. Normally there will be no make-ups, but the lowest two homework grades of the semester are dropped.

Classroom behavior    You may use a laptop or tablet computer to take notes, but take a seat in the back of the room as not to distract students sitting behind you. Any use of mobile phones during class is not permitted, and sounds should be turned off.

ADA policy            Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's office hours. Please note: instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, please contact Student Disability Services in West Hall or call 806-742-2405. (see TTU Operating Policy 34.22)

Academic integrity    It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and high standard of integrity. The attempt of students to present as their own any work not honestly performed is regarded by the faculty and administration as a most serious offense and renders the offenders liable to serious consequences, possibly suspension. (see TTU Operating Policy 34.12)

Religious holidays    A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence. (see TTU Operating Policy 34.19)

Reporting illness     In case of an illness that will require absence from class for more than one week, the student should notify his or her academic dean, who will inform the instructor. In case of class absences because of a brief illness, the student should inform the instructor directly.

## Weekly class schedule

This schedule is subject to change.

The **comprehensive** final exam will be on Monday May 15, 2017 at 1:30-4:00 pm in Chem 107.

**Midterm dates to be announced.** They are **tentatively** scheduled for Wednesday March 8 (covering chapters 1-5, 16 in Chaisson) and Wednesday April 19 (covering chapters 17-22 in Chaisson). The class before a midterm exam will be partially or fully dedicated to reviewing the material.

No class on Monday April 17 (Easter Monday).

Week of Monday	Topics	Textbook chapters			
		Chaisson 6-8 <sup>th</sup> eds.	Bennett 8 <sup>th</sup> ed.	Kay 5 <sup>th</sup> ed.	Openstax
Jan 16	<i>Course intro on Friday Jan 20 (first day of class)</i>				
Jan 23	Our place in the Universe	1, Ap 1	1, 2, Ap C	1, 2, Ap 1	1, 2, 4
Jan 30	History of astronomy, gravity	2	3, 4	3, 4	2, 3
Feb 6	Light, atoms, spectra	3, 4	5	5	5
Feb 13	Telescopes	5	6	6	6
Feb 20	Our star: the Sun	16	14	14	15, 16
Feb 27	Other stars: the HR diagram	17	15	13	17, 18, 19
Mar 6	The birth of stars, <i>Midterm 1</i>	18, 19	16	15	20, 21
Mar 13	<i>Spring break</i>				
Mar 20	The life and death of stars, formation of elements	20, 21	17	16, 17	22, 23
Mar 27	Neutron stars, binary stars, accretion	22	18	17, 18	23
Apr 3	Black holes, gravitational waves	22	18	18	24
Apr 10	Our galaxy: the Milky Way	23	19	20 <sup>^</sup>	25
Apr 17	Galaxies, <i>Midterm 2</i>	24	20	19 <sup>^</sup>	26
Apr 24	Dark matter, the expanding Universe	24, 25, 26	20, 21, 23*	21 <sup>^</sup> , 22, 23	26, 27, 28
May 1	The beginning of the Universe, life	27, 28	22*, 24	21 <sup>^</sup> , 24	29, 30
May 8	<i>Review on Monday May 8 (last day of class)</i>				
May 15	<i>Final exam on Monday May 15, 1:30 pm</i>				

Ap = Appendix

\* In Bennett, chapters 22 and 23 are swapped in the 6th and 7th editions.

<sup>^</sup> In Kay, chapters 19, 20, 21 are numbered 20, 21, 19, respectively, in the 4th edition.

Openstax chapters as of Jan 19, 2017.