

Astronomy 309N: Lives and Deaths of Stars Spring 2016 — Unique Number 46895

- Meetings:** TTh 2–3:30 PM, in CMA 2.306
- Course Website:** <http://www.as.utexas.edu/astronomy/education/courses.html>
- Instructor:** Chris Sneden, RLM 17.206
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 website: <http://www.as.utexas.edu/~chris/>
 office hours: TTh 11:00–1:00
- TAs:** Mukul Bhattacharya
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 office hours: F 3:30–5:00
 John Pelletier
 Office: RLM 13.126
 Phone: 512-471-1309
 email: jpelletier@astro.as.utexas.edu
 office hours: MW 11:00–12:00
- Required Text:** *Stars: A Very Short Introduction*
 author: Andrew King
 available in paperback (Co-op) or Kindle
 cheap: \$5.19 – \$11.59
- Grading:** Five half-class-period tests
 Grade will be based on best 4 of 5 tests
 Probable exam cadence: every third Thursday
 Probable exam dates: Feb 4, Feb 25, Mar 24, Apr 14, May 5
- Other Notes:** Students with special needs may request appropriate accommodation; call UT's office of Services for Students with Disabilities, 471-6259.
 (<http://www.utexas.edu/diversity/ddce/ssd/>)
 Department Web Site: <http://www.as.utexas.edu/>
 Telescope Viewing: <http://outreach.as.utexas.edu/public/viewing.html>
 McDonald Observatory: <http://www.as.utexas.edu/mcdonald/mcdonald.html>
 Astronomy picture of the day: <http://apod.nasa.gov/apod/astropix.html>

Subject Matter, Goals, and Miscellaneous Comments

What is it? To whom am I speaking? Astronomy 309N is a special topics course on stars. It is intended for the non-science major who already has had some introductory astronomy course. It is a chance to devote some “quality time” to a bedrock topic of astronomy. Each AST 309N instructor puts an individual spin on this large area, and mine will be centered around the creation of elements. Warning: if you have a lot of math/physics background you probably should register for some other course. Indeed, Natural Science majors most likely cannot count AST 309N (probably even as an elective).

What are prerequisites and expectations of the students? You should have taken an introductory astronomy course: AST 301, 302, 303, or get “consent of instructor.” Just as in those courses, some math at the level of high school algebra will be required for the tests. We will expect you to practice and be comfortable with such things as scientific notation, and simple manipulation of basic astronomical formulas. Of course, if you are rusty in such math skills we will be happy to help you. The math level should in no way challenge anyone who has met the UT math requirement.

How will grades be determined? Approximately every three weeks there will be an in-class test that will last about half of the class time. Five of these tests in all will be given. Your final numeric score will be the average of four of the five tests. Because the option to neglect one score (for any reason) is available, there will be no makeup opportunities for the in-class tests. The final grades will utilize the full UT +/- grading system, that is, A, A-, B+, B,

Textbook & class notes? We will use the very short and easily read “Stars: A Very Short Introduction” to give you a narrative to follow. Happily, this book costs about the same as a very ordinary dinner out, and is available in paperback or Kindle on-line. The detailed development of topics will be contained in slide sets that will be regularly posted on-line for you.

Additional Comments We want you to do well in this course! To that end, a few points should be emphasized. *First*, we encourage you to ask questions in class. This is not always easy in a large classroom (and I often partially darken the lecture hall to project astronomical images, etc. If I don’t see your hand raised, feel free to speak up! *Second*, remember that the only truly stupid question is the unasked one. *Third*, use the class web site. Lecture slides and announcements are regularly posted on this site.

Your progress through this class will be greatly enhanced through interactions with us. Take advantage of the regular office hours that we have. My home telephone number is listed on the first syllabus page. Use it at any reasonable hour of the day or evening (<11 PM or so). See also my electronic mail address. However, I *GREATLY* prefer phone calls to emails, because I receive on average about 40-60 emails/day on various work-related matters, and email exhaustion simply sets in on some days. I would far rather talk to you in person or over the phone than go back and forth with emails.

A warning must be given, one that is generally applicable to all astronomy faculty members here. In our courses you interact with professional astronomers. The good part is that you get very close to current research, and that can be very exciting. The bad part is that we tend to travel a bit (most obviously to observatories in remote and exotic locales), and

probably I will need to excuse myself from class a couple of times during the semester. At present I have only one scheduled absence from class, when I am using a telescope at McDonald Observatory on the nights of March 20-25. This means that I will miss the classes on March 22 and 24. A substitute lecturer will pinch-hit for me in class on those occasions. All class meetings will occur as scheduled.

Preliminary Course Outline (subject to revision)

Stars create almost all elements through nuclear fusion. A few elements were created in the initial Big Bang that began our known Universe. The overriding question of our course is how can we use observations and theoretical models to give a coherent picture of how the elements of the Periodic Table were created. There are things we absolutely have sewed up, things we are sort-of sure about, and things where we still are pretty much guessing. All these will be discussed as we talk about stellar births, lives, and deaths of small-mass and big-mass stars. Here is a rough outline of the order of presentation of topics.

1. Introduction; the elements; chemical reactions, physical elements; reminder of some basic physical principles and units
2. All about our Sun; mostly BIG quantities like radius, temperature, luminosity, chemical composition
3. In the beginning; creation of hydrogen, helium, a trace of lithium (and why not creation of the rest of the elements); “first stars”
4. general properties of stars; HR diagram, other observed quantities; stellar spectra
5. Stellar evolution: wimpy stars
6. Stellar evolution: the heavyweights
7. Stellar births of all kinds
8. What can we figure out from studying Milky Way “populations”?
9. What can we figure out from studying nearby galaxies?
10. What can we figure out by going seriously back in time?

Memo to Undergraduate Astronomy Students Regarding Astronomy Courses

adapted from <http://www.as.utexas.edu/astronomy/education/memo.html>

To prevent misunderstandings, we wish to clarify the ground rules set by the Astronomy Department for our undergraduate courses. These courses operate with mutual responsibilities between faculty and students.

For each of our classes, a written syllabus will be handed out at the first class meeting containing a description of the course, the material that the course will cover, all requirements in the course, and an explanation of what fraction of your grade is derived from each activity. These requirements or percentages are not to be changed during the semester.

Special notes for AST 301: This course, although designed for non-science majors, is nevertheless a science course. You will be exposed to scientific reasoning in the course, which you will be required to use on tests and in solving homework problems. Only simple mathematics is used; the level varies from instructor to instructor. Students in the College of Natural Sciences should note that AST 301 and AST 309 courses do NOT count towards fulfilling your degree requirements. Consider our AST 307 course for science majors.

There will normally be help available outside of class at least once a week (more often in the larger sections); if you have too much trouble understanding the material, or other problems arise, such as illness, please let your instructor know as soon as possible. Don't let the problem continue until the end of the semester, for it may then be too late to find a solution. *You should not need to pay for any outside tutoring.* The outside help that is provided with the courses should be adequate. If you need extra help, please see your instructor first. He or she can probably arrange help at no cost. Should you still feel the need of a tutor, please remember that astronomy graduate students cannot tutor for money without special permission from their chair and college dean. The Sanger Learning Center maintains a list of tutors, and runs sessions on general study techniques and math review. Many of their services are free: JES A332A, phone 471-3614.

Note that our undergraduate courses are taught by faculty, who are also professional astronomers. In addition to their obligations to you and the other students in this and other courses, our faculty have responsibilities to their graduate students and to remain professionally competent through individual research. As a consequence, your instructor may occasionally need to be away conducting research or attending a scientific meeting. Usually a faculty member will conduct the class when the regular instructor is absent.

We expect, and usually find, honesty in our students. Your instructor will explain any special rules, such as the encouragement of genuine collaboration (not copying!) among students on homework assignments and projects. However, submission of another's work or cheating on examinations are automatically grounds for failure in the course and reporting to the Dean of Students.

For general questions about undergraduate courses, please consult Susy Graves in the Astronomy Student Office, RLM 15.204, sgraves@astro.as.utexas.edu. This office handles many student matters including adds at the beginning of the semester. If you have any complaints or problems, please try to work out a solution with your instructor first. If you and your instructor cannot find an amicable solution, then please see either: Milos Milosavljevic (Astronomy Undergraduate Studies Chair; Office, RLM 17.220; Phone 471-3397), or Shardha Jogee (Chair of the Astronomy Department; Office, RLM 15.218; Phone 471-3302).

If you are in some sort of crisis and need immediate assistance, please telephone the Office of the Dean of Students Emergency Staff: 512-471-5017. They can help you with a number of services, and may be able to contact your professors for you if you have an emergency that prevents you from attending class. (<http://deanofstudents.utexas.edu/emergency/>)

Finally, all students enrolled in undergraduate Astronomy courses are encouraged to attend our free Astronomy events (e.g. star parties, public lectures) and/or visit the 9-inch telescope on the roof of Painter Hall and the 16-inch one on the roof of RLM. For more information, read the flyers posted on the 4th floor of R.L. Moore Hall, call our Skywatchers' Report at 471-5007, or check the Astronomy Department webpages at <http://www.as.utexas.edu/>.