



**ASTRONOMY 301
INTRODUCTION TO ASTRONOMY
CLASS NOTES 1**

**David L. Lambert
Unique No: 46660**

Class Meetings:	TTH 8:00 a.m. – 9:30 a.m. WEL 3.502
Instructor:	David L. Lambert
Office:	RLM 16.316
Office Hours:	Tue, Wed, Thu 10:00 a.m. – 3:30 p.m.; Mon and Fri by appointment
Telephone:	512-471-7438 office; 512-502-9804 home
Teaching Assistants:	Nalin Vutisalchavakul Office Hours: TTH 4:00pm – 5:00pm RLM 15.310E Jinsong Liu Office Hours: T, 5:00pm – 7:00pm ECJ 3.402

Text: *Stars and Galaxies* by M.A. Seeds and Dana Backman, published by the Cengage Learning and available at the Co-Op. I shall use the 9th edition of the text but earlier editions may be used but note that page references may be different.

Class notes will be available on the web at:
<http://www.as.utexas.edu/astrometry/education/fall15/lambert/301.html>

Note! There is material in the text which will not be covered in class. Conversely, some topics discussed in class are not in the text.

Grades: Your grade will be based on your performance in the 3 in-class quizzes (Q), about 6 homework assignments (H), and the final exam (F). The scores will be weighted as follows:

F = 40%; Q = 35%; H = 25%

A numerical grade will be assigned to these components. The final conversion to a letter grade will be as follows:

A = 90% or greater
B+ = 89 – 84%, B = 83 – 79, B- = 78 – 74

C+ = 73 – 70%, C = 69 – 64, C- = 63 – 60
D = 59 – 45%
F = less than 44%

I reserve the right to make minor adjustments to the above scale. If you are taking this course on a pass/fail basis, University rules give the passing grade as equivalent to a D or higher.

Students with Disabilities:

Please notify me of any modification/adaptation you may require to accommodate a disability-related need. You will be requested to provide documentation to the Dean of Students' Office, in order that the most appropriate accommodations can be determined. Specialized services are available on campus through Services for Students with Disabilities.

Class Rules:

Homework assignments will be handed out for return in not less than 1 week. Each assignment will have a due date. Late assignments will not be accepted for grading unless I have been given and have accepted your reasons for requesting an extension **prior** to the due date. In no case will late homeworks be accepted after the graded homeworks have been returned and answers distributed.

For the final grade your numerical grade for the quizzes will be computed from the best 2 of the 3 individual quiz scores. Since we count only the best 2 of 3 quizzes in the final grade, there will be no make-up quizzes. On the syllabus page I list projected dates for the quizzes; **I reserve the right to make minor adjustments to these dates as the semester progresses.** The final grade for the homework assignments will be based on the best 4 of the 6 homeworks.

The final examination will be comprehensive. It will be held on the date scheduled by the University. There will be NO make-up scheduled before or after the final exam.

Note now the date and time: Monday, December 14, 9:00 – 12:00 noon

All work handed in for grading must be your own work. If you discuss the homework assignment with a friend, I urge you to use your own words and imagination in writing your answers. If you are puzzled by a question, do not copy out a friend's answer, but stop by the office and discuss the problem. If you wish, make an appointment for a regular discussion period. Don't be shy! I am here to help!

Copying during exams in a heinous crime for which the punishment will be an F for the exam at minimum to an F for the course at maximum. I shall not hesitate to report such cases to the Dean of Students.

University Rules:

The University's deadlines and rules regarding "dropping" the course will be strictly enforced. I shall assume that you are conversant with these deadlines and rules.

- 1. Adds/Drops before the 12th class day:** During the first four (1-4) class days, students may add and drop courses. During days five through twelve (5-12), students may drop courses online, but must go to the department offering the course to seek permission to add a course. Be advised that some departments do not allow adds/drops after the fourth class day. For those departments that do allow adds/drops, the add-transactions before the twelfth class day will be processed in the respective department. Students who wish to add a class after the twelfth class day will be required to see a counselor in the Student Division of the Dean's Office and provide justification for the proposed change. The student must have written permission and documentation of class attendance from the instructor.
- 2. Dropping a course during the open Q-drop period:** After the end of the fourth week of class, and until the deadline for dropping courses, a student wishing to drop a course will ask the instructor to complete a drop form that assigns a Q or an F. The symbol Q

indicates an average of C or better at the time of the drop, or that no grade has yet been assigned, or that due to the student's performance and the nature of the course, no academic penalty is in order, or that for documented non-academic reasons, no academic penalty is in order.

3. **Deadline for dropping a course without penalty:** The deadline for dropping courses is September 11, 2015, for the Fall semester. After the deadline, students are not allowed to drop or withdraw from school for academic reasons. If a student has compelling nonacademic reasons to drop or withdraw, a written appeal must be presented in the Student Division of the respective Dean's office.
4. **Courses taken on a pass/fail basis:** The University defines a D as a passing grade for undergraduate students. The instructor is obliged to assign a grade of CR (Credit) for a student registered on a pass/fail basis who has a D or better in the course. It is important that the roster indicate the student is registered for the course on a pass;/fail basis. Otherwise, a letter grade must be assigned. There is a time limit for students to change course from a grade basis to pass/fail basis and vice versa. It is the same as the final deadline for drop/withdrawal for academic reasons. After the deadline, students should see a Counselor in the Student Division of the Dean's Office. Students are allowed to change the status of any given course only one time during the pass/fail time period.

Help Sessions: If you find that a part of our syllabus is puzzling, please come and see me. I shall be happy to discuss the problems with you. The TA is also available for consultation. Review sessions will be scheduled prior to due dates for homeworks and quizzes. I have a selection of texts by other authors which are available for loan. A different text may offer a different insight into a tricky issue.

Miscellaneous: Astronomy is an observational science. In order to gather observations for my research and that of the students, visits to the University's McDonald Observatory in west Texas are necessary. If I have to miss a class for this (or another) reason, the class will meet as usual.

You may be interested to visit our Student Observatory on the roof of Painter Hall. This houses a 9-inch refractor. The general student night is Fridays 8:00-9:00 p.m., clear nights only! This is a simple telescope to use and students (you!) can be checked out to observe with it. Please see me for further information. You may also view the *Painter Hall Telescope Handbook* online at: <http://outreach.as.utexas.edu/students/painterbook.html>, which explains the check-out procedure and the use of the telescope.

Perhaps one of your reasons for taking AST 301 is that you have sensed through the media that exciting discoveries are made on an almost daily basis. That's true! One reason for this golden age of astronomy is the availability of wonderful new telescopes; very large telescopes here on Earth and in space. Access to unprecedented computing facilities is leading to greater understanding of observations both new and old.

While I hope to satisfy your curiosity about recent discoveries and quite possibly about a discovery or two announced in the course of the semester, my first goal is to discuss what can be learnt about the Universe from visual observations – no telescopes – just our eyes and brain. Remember telescopes were not introduced into astronomy until early in the 17th century. Astronomy was then an old science. Ideas about the stars, the planets, comets, the Sun, and the Universe abounded – some were correct and some were incorrect. My approach is to discuss visual astronomy as though WE were tackling the topic afresh. Perhaps, you have heard of the Copernican revolution which overthrew the old idea that the planets and the Sun moved around a stationary Earth (the Earth was the center of the Universe) and replaced it with the idea that the planets orbited the Sun. I hope to convince you that the latter idea is not one that you, a non-science major, have to accept on faith but one that is demanded by rational explanation of visual observations of the planets and the Sun.

To extend understanding beyond what can be gleaned from visual astronomy, we need to obtain more detailed views of what is up there in the sky. In short, we need telescopes and what can be learnt by analyzing the light they collect will form the second principal segment of the syllabus.

Then, we'll discuss the life and death of stars, the galaxies, and the form of the Universe as a whole for the remaining two-thirds of the semester. It is in this segment that recent discoveries will be discussed. Although there are parts of our discussion of stars, galaxies, and the Universe that you will have to take on faith (there are parts that I do!), much can be understood by us all with little effort. This is not a course in which memorization plays a very large part. With relatively few simple ideas, much can be understood.

You may find the UT Astronomy Course Schedule for the Fall of 2015 here:

<http://www.as.utexas.edu/astronomy/education/courses.html>

“Nothing that you will learn in the course of your studies will be the slightest possible use to you in after life – save only this – that if you work hard and diligently you should be able to detect *when a man is talking rot*, and that, in my view, is the main, if not sole purpose of education”

J.A. Smith
Professor of Moral Philosophy
University of Oxford, 1914.

“I have no doubt that in reality the future will be vastly more surprising than anything I can imagine. Now my own suspicion is that the universe is not only queerer than we suppose, but queerer than we can suppose.”

J.B.S. Haldane (1892 – 1964)

The following schedule is a guide to the topics we shall discuss. I expect to adhere closely but not rigidly to this outline. You are encouraged to read material in the text before it is covered in class.

AST 301 – Schedule for FALL 2015



Week 1		Thursday, August 27 Review of Handout 1. Chapter 1: Here and Now.
Week 2	Tuesday, September 1: Chapter 2 – A User’s Guide to the Sky	Thursday, September 3: Chapter 2 – Concluded Chapter 3 – Moon Phases and Eclipses
Week 3	Tuesday, September 8: Chapter 4 – Origins of Modern Astronomy	Thursday, September 10: Chapter 4 – Concluded
Week 4	Tuesday, September 15: Chapter 5 – Gravity	Thursday, September 17: Chapter 6 – Light and Telescopes
Week 5	Tuesday, September 22: Chapter 7 – Atoms and Spectra	Thursday, September 24: Quiz 1
Week 6	Tuesday, September 29: Chapter 7 - Concluded	Thursday, October 1: Chapter 8 – The Sun
Week 7	Tuesday, October 6: Chapter 9 – The Family of Stars	Thursday, October 8: Chapter 10 – The Interstellar Medium
Week 8	Tuesday, October 13: Chapter 11 – Formulation and Structure of Stars	Thursday, October 15: Chapter 11 - Concluded
Week 9	Tuesday, October 20: Chapter 12 – Stellar Evolution	Thursday, October 22: Chapter 12 - Concluded
Week 10	Tuesday, October 27: Chapter 13 – Deaths of Stars	Thursday, October 29: Quiz 2
Week 11	Tuesday, November 3: Chapter 14 – Neutron Stars and Black Holes	Thursday, November 5: Chapter 14 - Concluded
Week 12	Tuesday, November 10: Chapter 15 – The Milkyway Galaxy	Thursday, November 12: Chapter 16 - Galaxies

Week 13	Tuesday, November 17: Chapter 17 – Active Galaxies and Supermassive Blackholes	Thursday, November 19: Quiz 3
Week 14	Tuesday, November 24: Chapter 18 - Cosmology	Thursday, November 26: THANKSGIVING HOLIDAY
Week 15	Tuesday, December 1: Chapter 18 - Concluded	Thursday, December 3: Chapter 19 – Life Elsewhere?

Monday, December 14, 9:00 – 12:00 noon
FINAL EXAM

MEMO TO UNDERGRADUATE ASTRONOMY STUDENTS REGARDING ASTRONOMY COURSES

Welcome to this undergraduate Astronomy course. 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 note for AST 301 students: 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. We encourage you to consider our AST 307 course for science majors instead.
- 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 Learning Skills Center maintains a list of tutors, and runs sessions on general study techniques and math review. Many of their services are free. Go to JES A332A or phone 471- 3614.

Note that our undergraduate courses are taught by faculty members, who are also professional astronomers. In addition to their obligations to you and the other students in this and other courses, members of 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.

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 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/>)

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 departmental adds at the beginning of the semester.

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/>.

Upon request The University of Texas at Austin provides appropriate academic accommodations for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-4641 TTY.
