

# AS102 - Prof. Dan Clemens - Spring 2014

**Course Catalog Summary:** The birth and death of stars. Red giants, white dwarfs, black holes. Our galaxy, the Milky Way, and other galaxies. The Big Bang and other cosmological theories of our expanding universe.

**Instructor:** Professor Dan Clemens (Office: CAS 417); 617.353.6140; clemens@bu.edu

**Teaching Assistant:** Ms. Ren Cashman (lcashman@bu.edu), Office CAS 417, phone 617.353.0030

**Office Hours:** Professor Clemens: Mondays 9-10, Tuesdays 2-3, Thursdays 1-2, Fridays 1-2, and by appointment

Ms. Cashman : Tuesdays 10-11, Wednesdays 1:30 - 2:30, Thursdays 3:30 - 4:30, and by appointment

**Lecture Times:** Tuesdays and Thursdays, from 11-12:30, in CAS 326.

**Daytime Laboratory Section Times:** (all take place in CAS B4)

A2 - Tuesdays 12:30-2:00

A3 - Mondays 2:00-3:30

A4 - Thursdays 2:00-3:30

A5 - Wednesdays 2:30-4:00

**Nighttime Laboratory Times:**

Every clear Monday, Tuesday, and Thursday beginning January 21st, on the roof of the CAS building, starting at 8:30pm.

**Text:** see Textbook link at left

**Laboratory Exercises:** Written instructions and worksheets for the labs in this course are to be downloaded, printed, and brought to lab. A link to the lab download page is on the Blackboard navigation panel at left. Note that all written materials are in PDF format.

**Grading:** The course grade will be computed by weighting your performance in the following areas by the percentages listed:

**Component Weight** (but, see caveats below)

Laboratory (6 day labs, 2 night labs) [will drop lowest score of the 8]	15%
Homework (5-6 assignments) [will drop lowest score]	8%
Group Project (1)	8%
Midterm Exams (2)	42%
Final Exam	27%
Total	100%

**Synopsis of Course:** This course is intended to be an introduction to Astronomy, and the physical sciences in general, for the non-major (Astronomy and Astronomy-and-Physics majors should be enrolled in AS203). We will show that from a few simple physical laws and principles many of the seemingly complex phenomena in stars, the galaxy, and the universe can be understood by almost everyone. This course has no prerequisites and we assume no prior knowledge of physics, astronomy, chemistry, or math. We will present all of the basic foundation needed to understand why stars shine, how galaxies age, and how old and how big the universe is today. The realm of this course is space beyond our solar system. We will spend only a little time discussing the planets or Earth (these are covered in detail in AS101, which is NOT a prerequisite for this class). Through the lectures and labs in this course, we hope that you will come to appreciate that the finest telescope is really the human mind, where imagination and understanding triumph over mathematical ability. This course is primarily one which compounds idea on idea and new knowledge on old. The application of the scientific method in the physical sciences allows us to separate ideas, which can be tested and verified, from opinions, which cannot. The compounding of reliably tested ideas allows us to build a mental picture of the universe in which we understand much of its nature.

This course is composed of lectures, daytime laboratory work, nighttime laboratory work, in-class midterms exams, laboratory reports, homework, and a final exam. The lab work is a very important element of this course. It consists of daytime laboratory section meetings with the TAs, and two visits to the rooftop observatory during the semester. In the labs, you will gain experience in using the physical tools of astronomy and a practical knowledge of the night sky. Although the lab only makes up 15% of your course grade, there is a caveat to that percentage: **I will not pass anyone who fails the lab portion of this class.** That is, if your midterm exams and final exams are solid "A" work, but you decided you had better things to

do than go to the lab sections, I will give you an "F" grade! But the opposite is also true - if your exam grades are suffering, doing well in the lab could bring your course grade up.

The weekly daytime lab section meetings will consist of a set of six laboratory exercises, intended to illuminate the concepts that will be discussed in the lectures, as well as times reserved for discussion of astronomical concepts. The exercises are described in a set of downloadable pages. Lab reports are due generally at the end of the second meeting for a particular lab exercise, but always by the dates indicated in the schedule.

In addition to the regular daytime laboratory section meetings, you are expected to complete two nighttime laboratory exercises based on observations conducted from the roof of the CAS building. The night labs will take place on Mondays, Tuesdays, and Thursdays when the weather is clear. You are free to attend any of the three nights each week. You do need to complete the first night lab exercise during the first half of the semester (January 21 through March 6) and the second night lab exercise during the second half of the semester. We will not be doing the first lab exercise after March 6, nor the second lab exercise before that date. The last night for the second night lab is April 29th.

Boston has terrible weather, so be sure you complete your night lab exercises EARLY in the given half-semester. If you wait until the last available night and it turns out to be cloudy, you will receive a zero for that lab exercise!

There is an answering machine with a recorded message telling whether for a given night the rooftop labs will be held or not. The phone number is **617.353.2630**, and the message is finalized at around 6pm. The weather can change quickly, however, and clear weather at 6pm may be gone by 8pm. Please use common sense (that translates to "look up!"), and do not argue with the TAs if you get to the roof and find the night lab cancelled - they are trying not to waste your time. Finally, rooftop observatories are cold, windy places - DRESS WARMLY!

The laboratory component will be computed based on the six daytime lab exercises and the two nighttime lab exercises. Passing the laboratory component consists of scoring at least 68% of the total points available. Failing the laboratory component, and hence failing the course, requires scoring less than 68% of the total lab points.

**Homework:** There will be five or six homework assignments, due on the dates listed in the schedule/calendar page. As for the lab component,

homework is a required component for passing this course. Students failing the homework component (ie., scoring under 40%) will also fail the course.

**Group Projects:** For this Spring 2014 semester, AS102 students will be involved in a new initiative intended to bring research tools and experiences into introductory courses. The class will be grouped into teams of up to 8 students each to design and execute small research projects and to report on those projects to the class. All group members will receive the same grade for their project, which will carry 8% of their total course grade.

**Exams:** There will be two in-class, closed book, Midterm exams. The first will be on Thursday, February 20th and the second on Thursday, April 3rd. Exams will be of 70 minutes duration and consist of multiple choice and true-false questions. There will be no short essay questions and no long mathematical proofs or detailed equations. Because each of the exams is a closed book exam, you will be asked to leave your books and backpacks, purses and hats at the front of the lecture hall during the exams.

Make-up exams will not normally be given to people with ordinary excuses (illness, family conflicts, plane tickets, etc.). Extraordinary excuses will be handled by oral exams. Oral exams will be of one hour duration, taken by appointment only, and must be completed within one week of the missed exam. Grading for oral exams is A, B, C, D, and F - there are no plus or minus grades for oral exams.

Although the written Midterm exams are composed of multiple choice and true-false questions, there is a wide range of difficulty level. There are many easy questions, several more difficult questions, and always a few questions to make even the best students confused. However, there is no extra penalty for guessing wrong - so never leave a question answer blank. Do your best to eliminate the impossible answers and guess after that. You would be surprised at how much good science is done by educated guesswork!

The exams are also unusual in that each student will receive a different exam. A computer is used to select questions and to scramble the answers, so that no two exams are the same. This means that "borrowing" the answers from someone sitting nearby will only hurt you - their exam questions and answers are different than yours! All of the students who have taken these exams agree that studying is much easier than cheating - so budget study time before the exams. In class, Professor Clemens will outline his proven method for achieving "A" grades.

It is also very hard to fail these exams. Each exam is graded on a curve,

with the fail level set to be just barely more than the score one would get by just selecting answers at random (the "monkey score," generally about 33% - the fail score is 40% or below). If you score at least a little better than the monkey, you will not fail an exam. If the monkey, randomly selecting answers, seems to show more knowledge of Astronomy than you, well ...

**Final Exam:** The final exam will be from 12:30-2:30pm on Tuesday, May 6th. It will be closed book and cover all the material in the course. Note that the final exam is not at the usual class meeting time or day of the week. The final exam time and date cannot be changed for anyone. If you have a known schedule conflict, change it now or see me to withdraw from the course.

**Attendance, Late Policy, Ethics:** Attendance at all lectures, exams, and daytime laboratory section meetings is mandatory. The Late Policy is simple: if you turn in an assignment late, it receives no credit. This applies to homework and laboratory exercises. It is important that students submit for evaluation work that is properly executed and attributed. I encourage you to study together, but to independently write up and submit your homework assignments. You may help each other to find how to solve a problem, but you must present your own discussion of the steps needed to achieve the solution. Do not copy from another student or from another student's work (including students not in this class). Students are reminded that their behavior is governed by the CAS Academic Conduct Code. Copies of the Code are available from the CAS Advising office at 100 Bay State Road. I am required to state that cases of suspected academic misconduct will be referred to the Dean's Office.

**Schedule/Calendar:** The lecture and lab schedule/calendars will follow the development in the textbook, though the emphasis will be somewhat different. The lecture material may be adjusted to different dates to accommodate a varying lecture rate. Exam dates will not be changed, though exam coverage may change slightly. Please take some time to become familiar with the schedule, and/or copy it into your own calendar.

**Add, Drop, and W-Grade Dates.** The last day to add a course is Wednesday, January 29th. The last day to drop AS102 (and not receive a "W" grade) is Thursday, February 20th. The last day to drop AS102 (with a "W" grade) is Friday, March 28th.