

ASTR 300  
Stars and Stellar Systems  
Fall 2014                      Syllabus, V3 (minor modifications)

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## 1 Introduction

ASTR 300 Stars and Stellar Systems is a 3-credit course, primarily designed for non-science majors. To take this class, it is **required** that you have taken ASTR 100 or ASTR 101 (or see below for exceptions).

In ASTR 300, we begin by reviewing and expanding upon concepts involving gravitational force, orbits, and light that you (may have) studied in ASTR 100 or 101. During the second week, we will spend a great deal of time on the great revolutions from the early part of the twentieth century, in physics: quantum mechanics and relativity. These revolutions sprung from very basic, very arcane (not very fundable in the current budget climate) science, but now powers over 80% of the economy.

Then we will study the Sun in detail, since it is the only star that we can observe from close range. We will learn why the Sun emits so much light, what its interior is like, and how the amazing activity in its atmosphere is powered.

Then we begin exploring in detail exactly *how* astronomers determine properties of the distant stars. How do we know how far away they are? (even though we've never rolled out a tape measure to them) What they are made of? How big they are? How long do they live? What happens after they "die"? and so forth.

We will then apply what we have learned about the Sun and other stars to determine how they are formed and how they die. After stars die, they become one of several exotic types of objects: white dwarfs, neutron stars, or black holes, and we will study these objects in detail.

After the second midterm we will examine the Milky Way from the perspective of it being a huge collection of stars. Where in the Milky Way do stars form? How do they orbit in the Milky Way? Why do they make spiral arm patterns in our galaxy? The class will end with a whirlwind tour of galaxies and cosmology.

**Prerequisite:** ASTR100 or ASTR101; and completion of the CORE Distributive Studies requirement in Mathematics and Sciences or General Education Fundamental Studies requirement in Mathematics. Or permission of CMNS-Astronomy department. **Designed primarily for non-science majors.** Study of stars-types, properties, evolution, and distribution in space; supernovae, pulsars, black holes, galaxies and cosmology.

The math skills required are those you should possess upon entry to the university and completion of your core math requirement: some algebra, the use of scientific notation and units, and how to interpret graphs.

-If you are (un)happy about any aspect of this course, please let me, or our TA know.

-Please let me know if you find any errors in the Syllabus.

## 2 Class Hours

- Lectures: 2:00 - 3:15 pm, Tuesdays and Thursdays, CSS 2400.
- Final Exam: Thursday, Dec. 18, 10:30am - 12:30pm, 2014

## 3 Contact Information and Office Hours

Person	username	Office	Phone	Office Hours
Dr. Rob Olling	olling	CSS 0235	x5-3131	Tue: 10:00am -12:30pm Thu: 10:00pm -12:30pm
Mr. Ryan Felton	felton.ryan	CSS 1250	-	Tue: 3:20pm - 4:40pm Wed: 1:00pm - 2:00pm

To get my email address, append @astro.umd.edu to my username.  
To get Ryan's email address, append @gmail.com to his username.

Please feel free to email either me or the TA to arrange appointments at other times to discuss the class, especially if you have problems with the math. Please start well in advance of the homeworks to check for difficulties that you can discuss with your instructors.

## 4 Textbook

We will be using an **electronic (e-book)** "textbook" entitled "The Cosmic Perspective," 7<sup>th</sup> edition by Bennett, Donahue, Schneider & Voit. The website below offers two services: 1) to sign up for "Mastering Astronomy" (MA) only and 2) for MA *and* the ebook. The purchase of MA *part is mandatory* as you will be using it to do your homeworks. *The ebook part is not mandatory!*: most of the material on homeworks and exams will be covered in the lectures, and I will distribute lecture slides via ELMS.

Buying MA without the eText book costs: \$60.50 (mandatory for homework)  
Buying MA with the eText book costs: \$91.30

You might be able to purchase an earlier edition the the book somewhere else at a lower price. That earlier edition could work out just fine, but I can not guarantee that 100%.

**NOTE**, the UMD Bookstore lists the **WRONG** book to use. Disregard the Bookstore's info!  
You can purchase the electronic version for by:

- 1) logging into <http://www.masteringastronomy.com/>
- 2) click the "students" tab
- 3) click on the "In USA or Canada" tab
- 4) Click on the "Yes, I have a Course ID" and fill in: MAOLLING33414  
and hit the "ENTER" key on your keyboard
- 5) then, click on the "next" tab
- 6) click the "No, I need to buy access" button
- 7) pick this one: "Bennett et al., The Cosmic Perspective, 7e"
- 8) click on the "next" tab
- 9) take the "OK" option: that is, use the eText if that is what you want
- 10) click on the "next" tab
- 11) "Accept" to the "License Agreement and Privacy Policy," if you agree
- 12) the paper work now awaits for you to pay 91.30 dollars
- 13) COURSE = ASTR300\_F14 and courseID = MAOLLING33414

If you have any problems, please contact me asap.

## 5 ASTR 300 Contract

Before you can receive credit for **ANY** homework, you must correctly complete the **ASTR 300 Contract**, handed out with the **FIRST HOMEWORK** (Lecture #4 on Thursday 9/11). The ASTR 300 syllabus is a contract between student and instructor which lists the guidelines, rules, and conditions for the class. The contract page with the first homework asks some simple questions that you can answer by reading the syllabus. **You must answer the questions correctly in order to begin receiving credit for the homeworks you turn in.** You may re-do the questions as many times as necessary in order to get them all right, but you will not receive credit for **ANY** homework until you do them all correctly.

If your contract is not completed correctly by the beginning of the final examination, you will receive zeros for all homework grades.

## 6 Class Website

This course will be using the Enterprise Learning Management System course environment this semester. Students can login to their course(s) by going to ELMS. When you login to, ELMS, GOTO the ASTR 300 class link. This website has all course handouts and information, including the syllabus, and possibly some homework assignments. All course announcements will be posted here, and lecture slides will be posted here one to two days before (or after) the lecture. You may also view your grades.

## 7 Homeworks

There will be **7 homework assignments** for the course. Homeworks will be based on both the lecture material and the material in the reading assignments. **Each homework counts towards about 8.3% of your course grade. Homeworks will be done via the MA website.** The due date/time will be implemented rigorously/electronically via the MA site, which imposes a **HARD DEADLINE**. **In special circumstances I can instate a later deadline for either individual students, or the whole class.**

A missed homework receives zero points. Course grading is explained below (§10). See §12 for missed assignment policy.

If the University is **officially** closed on the day a homework is due, the homework will be due in the next scheduled lecture. The same rules regarding lateness will apply.

**Each homework (and midterm) is “curved” separately.** Credit will only be given for those answers on the homeworks that answer the question asked. Partial credit will be given if the answer was on the right track but incomplete. You’ll get no credit for effort only.

## 8 Exit Cards

To stimulate you to attend the lectures (and pay attention), **there will be an assignment for each lecture** in the form of an “Exit Card” (EC). That is to say, at the end of each lecture you have 5 minutes (or less) to complete and hand in the assignment. **The combined grade for the ECs counts towards roughly 8.3% of your course grade** (see §10). That is to say, the combined grade for the ECs counts for as much as one homework. The ECs will be graded as either 5, 2 or 0 points. There are 26 “real” lectures: i.e., not introductory or midterm. Of these, the **highest 20** of your Exit Card scores will be used. The maximum attainable total score for these 20 highest ECs is thus  $20 \times 5 = 100$ .

The format of the Exit Cards is like a Brief Constructed Responses (BCRs; think back to high school). At the beginning of the lecture you will get one of two possible assignments: 1) summarize the lecture in **30 words or less**, 2) answer a question on today’s topic in **30 words or less**.

The purpose of the ECs and especially the 30 word limit is to stimulate you to be concise *and* to the point. Questions with a similar limit on the word count may be asked at HWs or exams.

When grading we will discard any word beyond the 30 word limit, and the degree to which you are to-the-point will determine your score (5, 2 or 0) per EC.

## 9 Exams

Credit will only be given for those answers on homeworks and exams that answer the question asked. Partial credit will be given if the answer was on the right track but incomplete. Credit will not be given simply for effort.

There will be **two midterms** and **one final**. All exams will be held in CSS 2400 .

The 1st midterm will be held during "lecture" #13 on **Tuesday, Oct. 14, 2014**.

The 2nd midterm will be held during "lecture" #22 on **Thursday, Nov. 13, 2014**.

The final exam will be held on **Thursday, Dec. 18, 10:30am - 12:30pm, 2014**

The tests will be based on material covered both in lecture and in the assigned readings. The 1st midterm will cover all material from the beginning of the course up to and including the lecture before the midterm. The 2nd midterm covers all material since the 1st midterm. The final examination will be cumulative, with an emphasis on new material since Midterm #2. I will retain the final examinations for one year after the final examination is completed.

On the exams, you will be allowed to use a calculator. **No cell phones, PDAs, computers, or other devices will be allowed.**

**If you are ill on the day of an exam and cannot attend the exam, you must contact me within 24 hours, preferably prior to the exam.** See the Absences section of the syllabus for more. If the University is officially closed on the day of a midterm exam, it will be held during the next regularly scheduled lecture.

## 10 Course Grade

Your course grade will be calculated as follows:

Type	Percentage of Course Grade
Homeworks + ECs	50%
Midterms	20%
Final	30%

Your **7 Homeworks** and your **1 Exit Card** grade will be grouped together. Of those eight assignments, *the six highest* will be used for your combined HW/EC grade, and together they contribute **50%** towards your course grade (i.e., **about 8.3% per assignment**).

Note: if your ASTR 300 contract is not completely correctly by the beginning of the final examination, you will receive zeros for all homework grades.

Letter Grade	Minimum Course Grade Percentage
A+	97.5%
A	92.5%
A-	90%
B+	87.5%
B	82.5%
B-	80%
C+	77.5%
C	72.5%
C-	70%
D+	67.5%
D	60%
D-	52.5%

I expect that an average student in this class will receive a B-. The scale for the letter grades above may be curved if the exams or assignments prove more difficult than expected. If that is the case, the minimum

grade percentages may be lowered; they will never be raised.

If you feel that you are not doing as well as you could be on the assignments, arrange to meet with the TA or me to discuss them before they are due. Don't wait until the end of the semester!

## 11 How to Do Well in This Course

The key to succeeding in this course is to budget your time so that you are able to keep up with the readings and complete the homework assignments. Reading the designated sections before class will allow you to connect the class material to the book and give you a greater understanding of the material.

Try to budget time to **start the homeworks well before the night before they are due**. In this way you will be able to identify any problems you may have and come to office hours to discuss those problems.

Since this is a 3-credit class, you should be spending 9 hours a week on it. Here is a suggested budget for your time on a weekly basis:

3 hours	Attending lecture
1 hour	Skimming reading assignments before lecture
5 hours	Reading assignments, doing homework and office hours

To excel in the course, you need to keep up with the work and the reading assignments. In particular, if you skim the reading assignments before lecture, you will know what material covered in the lecture you can read about in more depth in the textbook – that means you do not have to write down the lecture notes verbatim.

The final suggestion: **please come ask questions during office hours, or an other agreed upon time!** Topics that you are welcome to ask questions about:

- Homework problems (takes 2–4 hours of work)
- Material in the reading
- Math help
- Scientific notation help
- Life, the Universe and Everything

## 12 Absences

You are not *required* to attend any of the lectures. However, you will be graded according to the rules outlined above, which have requirements for handing in assignments at certain times. Also, not showing for midterms and/or the final is a pretty good way to get a low course grade. Thus, the rules listed below on the absences policy only apply to the midterms, the peer review session and the final. Typically, I will not allow any make ups for Exit Cards, since they are such a tiny fraction of the course grade.

University regulations for (un)excused absences apply: see <http://www.faculty.umd.edu/teach/attendance.html> and <http://www.umd.edu/catalog/index.cfm/show/content.section/c/27/ss/1584/s/1540> for a full description. According to this policy, the instructor is obligated to allow makeup work or provide alternate arrangements **only** for excused absences.

An excused absence is an absence that results from: “illness of the student, or illness of a dependent as defined by Board of Regents policy on family and medical leave; religious observance (where the nature of the observance prevents the student from being present during the class period); participation in university activities at the request of university authorities; and compelling circumstance beyond the students control.

Students claiming excused absence must apply in writing and furnish documentary support for their assertion that absence resulted from one of these causes. ” Note that a “compelling circumstance” is essentially an emergency.

- Examples of a “compelling circumstance”: a death in the immediate family, a serious car accident involving yourself or a family member, your house burning down, ...
- Some examples of incidents that are **not** emergencies: running out of gas for your car, your bike tire being flat, the bus being late, bad traffic on the highway. These are circumstances for which you need to plan ahead and allow yourself extra time daily to arrive on campus, just in case. If you experience one of these delays and it causes you to miss a homework deadline, remember that one homework is dropped.

**If the University is holding classes, you are expected to be here!** It is not acceptable to extend your weekend, vacation, or holiday into class time, and you will not be allowed to makeup anything you missed.

## 12.1 What to Do If You Have an Excused Absence

- **Unplanned Excused Absences.**
  - **If you miss an examination because of illness or a compelling circumstance...** you must contact me by phone (x5-3131) or email (olling@astro.umd.edu) **within 24 hours** (even on the weekend) - if you are too ill to get out of bed, get a friend or relative to contact me. You must be prepared to document how your absence fell under the University’s excused absence policy. Once you have contacted me, you must make up the activity or examination as soon as possible, but no later than one week after you return to your normal class schedule (because you have recovered or the emergency is over). The makeup examination may be in an alternate format.
  - **If you miss turning in a homework because of illness or a compelling circumstance...** you must contact me by phone or email **within 24 hours**. You must be prepared to document how your absence fell under the University’s excused absence policy. *At my discretion*, I will assign you an alternate homework to replace it, or accept your homework late. **DO NOT EMAIL HOMEWORK ASSIGNMENTS TO ME OR THE TA** - contact me for instructions.

## 12.2 What to Do If You Have an Unexcused Absence

- **Unplanned Unexcused Absences.** Examples of reasons for unexcused absences: traffic problems, oversleeping, forgetting the assignment was due, missing the bus.
  - **If you miss a regular lecture (no exam)** for an “unexcused” reason, you may not hand in an Exit Card. A homework due may be accepted at my discretion.
  - **If you miss a midterm exam** for an “unexcused” reason, contact me within 24 hours. *I have no obligation to allow you to take a make up exam.* I may allow you *at my discretion* to make up the exam. The makeup exam may be in a different format as the regular test.
- **Planned Unexcused Absences.** I realize that important events may occur at inconvenient times. Examples of important events that are not “compelling circumstances”: participating in a wedding, attending a major political event, participating in a field trip or conference relevant to your major/minor.
  - If you have an important event that will occur **on a homework due date**, contact me **prior to the due date** to make arrangements to turn in the homework at a time that is convenient for me (and you).
  - If you have an important event that will occur **on the date of a midterm exam**, contact me **at least one week before** and explain to me the nature of the event. **At my discretion**, I may allow you to take an examination **EARLY**. I may require documentation of your participation in the event (for example, a program with you listed as a participant). **No student may take an**

exam early more than once, and I am under no obligation to allow ANY student to take an exam early.

- You will miss the Exit Card of the missed lecture, excused or unexcused

If you have a number of such important events during the semester and will consequently miss a lot of class time, you will not do well in this class, and you should reconsider taking it.

### 12.3 No Excuses!

If the University is holding classes, you are expected to be here! It is not acceptable to extend your weekend, vacation, or holiday into class time (and getting academic credit for it).

## 13 Academic Integrity

The process of scientific inquiry and education depends on the integrity of all participants. The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit <http://www.president.umd.edu/policies/iii100a.html>

I encourage students to discuss the assignments. However, be very careful that when you write up the assignments, you do so **independently** and **do not copy** the work of a classmate, or from somebody who took the class before you. This is **plagiarism**. Also, be careful when writing up your assignments to avoid plagiarizing the book or a website. The **answers to the questions should be in your own words**. You should not quote more than a phrase from the textbook – if you do, make sure to indicate it is a quote.

## Plagiarism is not tolerated in this class!

If you plagiarize the majority of an assignment, your work will be sent to the Student Honor Council for evaluation and possible penalty – **the typical penalty for plagiarism is an XF for the class**. For minor plagiarism offenses (only affecting a small portion of an assignment), a “three-strike” policy will be followed:

- For the first offense, you will receive zeros for each problem you plagiarized.
- For the second offense, you will receive a zero for the entire assignment.
- For the third offense, your assignment will be sent to the Student Honor Council for evaluation and possible penalty – the typical penalty is an XF for the class.

I reserve the right to refer even “minor” cases of plagiarism to the Student Honor Council.

### 13.1 Working Together

I encourage students in the class to discuss the assignments. This means you **should**:

- Talk about the problem and where you might find the answer.
- Talk about what concepts or details should be emphasized in the answer.
- Work on example math problems on scratch paper or chalkboard.

These things are encouraged. However, be very careful that when you write up the assignments, you do so **independently**. That means there are things you **should not do**:

- Develop exact sentences and paragraphs for your answer with another student.
- Work out complete math problems for another student.
- Cut-and-paste or hand-copy work from one student to another, **even if you worked out the answer together.**

You must write your work up independently so that I and your TA know that you understand the problem. If you have identical work to that of another classmate, even if you worked on it jointly, you will be responsible for an act of **academic dishonesty** and the work of all students involved will be referred to the Student Honor Council. I have referred past incidents to the Honor Council and **all** of the students involved have been found responsible and been given XFs for the course.

### 13.2 Writing in Your Own Words

The bottom line is that in order for me and your TA to evaluate how well you understand the material on an assignment, you must write it in your own words. If you quote the majority of your answers from the textbook or other sources, **even if you properly attribute the material**, you will not receive full credit for the problem because we do not know that **you** understand it. Ultimately, writing the work in your own words will enhance your comprehension of the material, which will only help you on the exams.



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## 14 Schedule

The schedule of topics, readings, and due dates for assignments is on the next page. All readings are from the textbook *"The Cosmic Perspective"* and should be completed prior to class. Most readings are listed by chapter and section.

Lecture	Date	Topic	Reading	Due
1	Tu	9/ 2	Course introduction; our place in universe	Ch. 1,2,3
2	Thu	9/ 4	Motions; Newton's Laws; Conserv. Laws, Energy	Ch. 4.1-4.3
3	Tu	9/ 9	Univ.Law.Grav; Orbits, Tides, acceleration	Ch. 4.4, 4.5
4	Thu	9/11	Light&waves; Matter; Learning from Light	Ch. 5.1-5.3 HW1+Contract
5	Tu	9/16	Telescopes: Distances through angular size	Ch. 5.4 & 6
6	Thu	9/18	Space & Time, I, I+	Ch. S2.1-S2.3
7	Tu	9/23	Space & Time, I+,II; SpaceTime & Gravity I	Ch. S2.3-S3.2
8	Thu	9/25	Spacetime & Gravity, II	Ch. S3.2-S3.6 HW2
9	Tu	9/30	Quantum Revolution, I & II	Ch. S4.1-S4.2
10	Thu	10/ 2	Quantum Revolution, II	Ch S4.3-S4.4
11	Tu	10/ 7	Our Star, the Sun , I	Ch. 14.1-14.2
12	Thu	10/ 9	Our Sun, II	Ch. 14.3 HW3
13	Tu	10/14	<b>MIDTERM 1</b>	
14	Thu	10/16	Surveying the Stars, I	Ch. 15.1-15.2
15	Tu	10/21	Surveying the Stars, II; Star Clusters	Ch. 15.3
16	Thu	10/23	Star Formation, I	Ch. 16.1-16.2
17	Tu	10/28	Star Formation, II	Ch. 16.3 HW4
18	Thu	10/30	Star Stuff; Life as a Low-Mass Star	Ch. 17.1-17.2
19	Tu	11/ 4	Life as a High-Mass Star; Mass Exchange	Ch. 17.3
20	Thu	11/ 6	Stellar Graveyard; White Dwarfs; Neutron Stars	Ch. 18.1-18.2
21	Tu	11/11	Black Holes; Gamma Ray Bursts	Ch. 18.3 HW5
22	Thu	11/13	<b>MIDTERM 2</b>	
23	Th	11/18	Our Galaxy; Structure; Rotation Curve;	Ch. 19.1
24	Thu	11/20	Recycling; Milky Way Formation; Galactic Center	Ch. 19.2-19.3
25	Th	11/25	Galaxies & Cosmology	Ch. 20.1-20.2 HW6
-	Thu	11/27	<b>Thanksgiving: NO CLASSES</b>	
26	Th	12/ 2	Age of Universe	Ch. 20.3
27	Thu	12/ 4	Galaxy Evolution	Ch. 21.1-21.2
28	Tu	12/ 9	Birth of the Universe	Ch. 22
29	Thu	12/11	Dark Matter, Dark Energ; Fate of Universe	Ch. 23 HW7
<b>THU</b>	<b>12/18</b>	<b>FINAL EXAMINATION, 10:30am- 12:30pm</b>		<b>CSS2400</b>