

ASTR 340: The Origin of the Universe (Cosmology)

Time: Th 2:00-3:15 pm

Room: CSS 2400

Office Hours: Tu Th 1-2 & by appt.

Phone(s): (301) 405-6647; (301) 314-9476

TA: TBD

Course Website: www.astro.umd.edu/~peel/ASTR340 and also elms.umd.edu

Dates: 30 August – 11 December 2012

Lecturer: Dr. Alan Peel

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Textbook: see Textbook link on the website

Course Description

As a modern primate strolling around this planet, you likely (and without blame!) take much of existence for granted. Space, time, matter and energy; electricity, magnetism and nuclear forces holding your body together; gravity sticking you to a planet's surface while it hurls that planet around a star which is, itself, caught in a knife-edge battle between gravitational collapse and nuclear explosion. Who cares about all that if you're late for class?

And while you may (falsely, I claim!) believe that the physics, chemistry, biology and geology of all this drama is beyond your understanding, perhaps you have nonetheless occasionally stopped in your tracks and been hit with incredibly challenging questions which seem unanswerable:

- How big is the universe?
- How old is the universe? How can we know?
- Where did stuff come from?
- Did stuff change from primordial soup into rocks, trees and presidential candidates, or has it always been this way?
- Do other stars and planets resemble ours? Do other galaxies resemble ours?
- If the universe is expanding, what's it expanding *into*?
- Will the universe end with a bang or whimper?

[Hunh, that puts your "I'm late for class" into some perspective, right? Oho, just you wait; have we got perspective-twisters for you!]

This seems to be an area of inquiry frequently considered "navel-examining" philosophy and best left to liberal arts majors on recreational substances at 3 in the morning. But, with some serious help from nature which we'll talk about, the discipline of Cosmology has had huge successes in addressing some of these seemingly impossible questions, especially recently. By using advances in telescope technology, computer science and the basic tools of science, we can report that:

- The universe is about 3 Gigaparsecs across
- It's just shy of 14 billion years old
- It started out a very hot, primordial soup of particles which evolved into (mostly) dark matter (?!), hydrogen, helium, light and neutrinos. "Stuff" (the rest of the periodic table) came along later and was manufactured in stars
- The universe is surprisingly homogeneous and we expect stars like the ones in our own galaxy to be found in just about every other galaxy. Consequently, evidence points to loads of planets everywhere, too
- It's expanding *through* itself
- All bets are on a whimper first. Then possibly a new bang. But the jury is still out...

This course is intended primarily for juniors and seniors and ambitious sophomores who are **not** majoring in

Astronomy or Physics. While we do not currently require either ASTR 100 or ASTR 101 as prerequisites, there is no doubt that such previous knowledge will help greatly. We do require the CORE Distributive Studies Requirement in Mathematics. The course will provide a general scientific foundation to explain why we know the answers mentioned above (and more). In essence, we will not only teach you the best results and facts in Cosmology, we hope you leave understanding *how* cosmologists know what they know and what they're still working on.

This course will **not** delve deeply into ancient cosmogonies which simply tell us much more about our limited historical abilities to understand the universe and our fearful, if creative, inventions to cope with such. For that information, please consult mythology and religion classes.

We will use a little bit of mathematics in this course and a lot of physical reasoning. A fair amount of basic astronomy and physics will intrude into class but this is unavoidable if we are to explain *how* we know what we know. Your challenge will be to master the basic knowledge provided so you can develop a deeper appreciation of how far we have come as a species in understanding the universe on the largest (observable?) scales.

Grading

You are **STRONGLY** encouraged to keep track of your grades using [ELMS Blackboard](#) website as each homework and test gets graded. I grade on a point scale with different weights weighted as shown in this table:

ASSIGNMENT	Homework (4)	Tests (3)	Final Exam	Class Participation	Total
POINTS	400	300	200	100	1000

Letter grades will be assigned based upon your cumulative score, and I do not curve lightly. Having taught various classes for over five years (some multiple times), I have found these grading guidelines below to be about right. I reserve the right to adjust the following based on class averages. However, any adjustment will make it easier to get a given grade, never more difficult. Here is a **rough** guide as to how your points relate to your final grade:

Course Total	900-1000	800-899	680-799	550-679	0-549
Percentage	90%-100%	80%-89.9%	68%-79.9%	55%-67.9%	0%-54.9%
Letter Grade	A	B	C	D	F

As you can see, missing 100 points of the class participation can drop your grade a whole letter. So **DON'T SKIP THE LECTURES!** Let me know in person or by email as soon as possible if you are planning on missing lectures due to a religious holiday. Letting me know after the holiday will not work.

The point scale makes it possible for everyone in the class to do well. For example, if everyone scores above 80% in the course, you would all receive either a B or better letter grade. Unlikely as it may be, the entire class could potentially get A's. I **will** be using +/- modifiers for the final grade. Past experience has shown that my assignments and tests are pitched about right, to where the average total score in the class is in the 80% range of points, the B/B- range.

Class Participation

Within the first few weeks, I will know all your names and faces. In order for you to succeed in this course, I expect you to try to attend all lectures. This is very important! The homework assignments, tests and final are based upon the material covered in the lectures and text. The very few people that have ever earned bad grades from me had (not coincidentally) also had terrible attendance. The lectures are frequently punctuated with in-class exercises and discussions with your neighbors which many students find very helpful in reaching comprehension of the material. That said, the official University policy on how to deal with absences is [here](#).

If you do have to miss a lecture be sure to look at another student's notes and make sure that you understand what was covered or come to office hours. Essentially, you should assume that **EVERY LECTURE** during the semester will include a variety of discussion questions and while your responses (written down on index cards collected by me) don't have to be correct, you have to be present to get any credit!

This participatory discussion aspect of the course will be worth 100 points, which is 10% of your overall grade (see above table). Points are awarded for in-class questions (and graded extremely generously). With that said, please see me (in advance whenever possible) if you plan on missing lecture(s) for any reasons, including religious holidays so that your grade does not suffer.

The first bit of participation grade involves:

1. finish reading this syllabus page, either here online or the "printer friendly" pdf file linked in the header;
2. going online to the [ELMS Blackboard](#) site for this class and electronically "signing" that you've read the syllabus in "Participation #1";
3. and dropping by my [office](#) to check your name off a list. (Then I know that you know where my office is!)

NOTE: Failure to sign the syllabus acknowledgement or drop by my office to check your name off means you will lose 10 EASY points of your participation grade!

Tests and the Final Exam

A single midterm is a travesty of assessment; multiple quizzes would serve both you and me better. However, for time considerations there will be only three tests (call them midterms if you must, but only one is in the middle of the term). These are closed book with no notes and no calculators allowed (nor, as you'll discover, are they necessary). You'll be given the entire lecture time to take the test.

Each test will consist of short answer questions (true/false, multiple choice, short definition) and a few longer questions. These tests are incremental (i.e., non-cumulative) checkups on how well you have learned the material up to the lectures prior to the related homework. The [Lecture Schedule](#) (periodically check for updates!) shows what material will be covered on each test. If, for whatever reason, the University is **officially** closed on the test date, the test date shifts to the next lecture date.

The final exam is cumulative, i.e., it will cover *all* material discussed in this course. The final will include a mixture of short answer, long answer, and problem solving questions. This exam is also closed book with no notes and no calculators allowed.

PLEASE NOTE that many of the questions on the tests and final exam will NOT be exactly the same as homework questions but will challenge your comprehension of the material.

DSS students, see § **Disability Accommodation** below.

Missed Test Policy

If you are not able to take a test due to a VALID EXCUSE as outlined in the Academic Information section of the schedule of classes and you wish to take a full credit make-up test (which may be considerably harder than the original test and, for example, may consist only of essay questions), you must:

1. contact me by email or phone **before** you miss the regularly scheduled test if physically possible **and**
2. **submit a valid written excuse for your absence within one week after the regularly-scheduled test (by US Postal mail if necessary!).**

There is rarely an excuse for not being able to at least call me and leave a message. For the record, the official University policy on how to deal with absences is [here](#).

Homework Assignments

There are a total of four (content-related) homeworks in this course. Homework #1 will be online on the

[ELMS](#) site by the evening of the first day of class. If you have trouble with the first homework, consider it an ominous sign and consult with me as soon as possible! Future homeworks will be also become available on ELMS as the term progresses.

Although you are HEAVILY encouraged to discuss the homework problems with your friends, the final writeup **must be in your own words**. Copying from a friend's homework, copying from a book without citing, or allowing a friend to copy your homework is academic dishonesty and will not be tolerated in this class, and you may receive an "XF" on your transcript. If you consult a reference other than the course text, **including websites**, please acknowledge or cite it in your homework! (See Academic Integrity below.)

Deadline. You have two choices:

1. you may turn in a **paper** copy of your homework on the due date at the beginning of class **sharp**; or
2. if you miss that deadline, you may still, for full credit, submit a **pdf file no larger 3 MB** of your homework on ELMS by **midnight** on the due date.

The due dates are listed on the [Lecture Schedule](#). If you ever choose the 2nd option for one or more of your assignments, please be sure you know how to generate a pdf version of your homework that isn't absurdly large *well in advance*. Overly large (or multiple) files will not be graded.

DO NOT email me your homework under any circumstances.

There is no way to turn in late homework; that is what is meant by a "deadline."

Mac users take note! If you submit your homework online and have used the ever-convenient "click and drag" method to import pictures, scans, etc., they may not transfer with the document when you submit it on ELMS. Be sure to use the menu "Insert → picture → from file..." method instead.

Extra Credit?

There will be no extra credit.

Course Expectations (and Suggestions!)

Show up! You are expected to try to attend all lectures, and your grade depends (weakly and weekly) on participation.

Pure "lecturing" doesn't actually work that well. The advantages of attending lecture are to interact with students and ask questions: i.e., to be an active participant in your learning, not a passive, "empty vessel" awaiting the brilliant words of the professor to fill your head with knowledge. (Believe me, you'll be waiting a long time if you think that's the case.)

However (and this is where my contribution is priceless), attending lecture will help you gain important clues and caveats, especially if you don't understand the text. If you do understand everything, you'll have opportunities to share your unique perspective during lecture, so either way, be there! (See **§ Class Participation** above for more details.)

While many students bring laptops to take notes, it is extremely rude to surf on irrelevant websites during lecture as it can distract those around you. So, don't do it. **I will deduct participation points for those who cannot abide by this simple rule.**

Preparation: I expect you to be prepared to work. You will get more out of the participation during lecture if you preview the reading assignment (listed in the [Lecture Schedule](#) and updated during the semester). You'll also be more aware of what you don't understand and can come to class with useful questions. A more careful second reading is recommended after lecture. It is also good to peruse your class notes sometime before the next lecture to make sure that everything is clear. I STRONGLY encourage you to ask questions in class, during office hours, and on the ELMS Discussion Board for our class. The only dumb question is "Why didn't I ask in class when I had the chance?"

Study Habits: PLEASE ask for help if you need it. If you rely on cramming the night before any test, you are

not likely to do well. It is better (and easier) if you keep up with the material on a nearly daily basis. Make it a point to read the chapters in pace with (or even ahead of) the lectures; this is one of the best study habits you can have. If you have questions, please see me in office hours and/or post them on the [ELMS Discussion Board](#). I troll it frequently to make sure people aren't left hanging endlessly waiting for insight. BUT DO NOT WAIT until the day before an test!

Discussions! Sometimes the best way to understand something (or check that your understanding is correct!) is to try to explain it to someone else. I encourage collaboration (but not plagiarism!) and discussion inside and outside class and online on the [ELMS Discussion Board](#). I generally "troll" those boards to make sure questions are getting answered, so unless it's to remind me that I haven't trolled in a while, please avoid the temptation to email me directly: if you have a question, chances are a large number of other students have the same question and answering it on the discussion board is more efficient.

Other Classroom rules: No newspapers, mp3 players, etc. And *please* turn off all cell phones or risk ridicule by me. In short, show respect to your lecturer (me), your neighbors and yourself.

Disability Accommodation

Students with a documented disability who require academic accommodations should contact me as soon as possible. If you suspect you might require such in this class or any, please feel free to discuss this with me during office hours, or head straight to the [Disability Service Support office](#) for more information.

Academic Integrity

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 definitions and 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.shc.umd.edu/> or go straight to [the source](#).

Copyright Issues and Your Notes

Selling or distributing copies or modified copies of instructors' course materials or assisting another person or entity in selling or distributing those materials should be considered a violation of the University Code of Student Conduct, Part 9(k). In general, only some of the overhead presentations shown in class will be available on the web. They won't necessarily make a lot of sense by themselves, however, so don't use them in lieu of coming to class! (Besides, then you'd be missing out on easy points - see **§ Class Participation** above.) Students may always request a reviewing of them during office hours on a face to face basis.

Course Evaluations

CourseEvalUM will be open for students to complete their evaluations later in the semester. Students can go directly to the [website](#) to complete their evaluations. You will be alerted when the evaluation sites are ready closer to that time via your official University e-mail account.

Students who complete evaluations for all of their courses in the previous semester (excluding summer), can access the posted results via Testudo's CourseEvalUM Reporting link for any course on campus that has at least a 70% response rate. You can find more information, including periodic updates, at the [IRPA course evaluation website](#).

The expectation is that all students will complete these. This is YOUR chance to anonymously evaluate this class: please use this opportunity! I have altered courses before based on constructive criticism from students.