

Astronomy 123: Galaxies and Cosmology

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Friday 2-3**

Welcome to Astronomy 123! Do the following things before the first lecture!

1) Thoroughly read the syllabus (this page). Take the Syllabus quiz based on it ASAP ([click here](#) or see Quizzes or scroll down to link on class schedule below to access quiz)

2) Buy the required materials for the course! You will need...

- **An iclicker.** Register it on canvas. **You will need your iclicker for the first day of lecture!**
- **The required online text: *Astr 123: Cosmology and Life in the Universe by Greg Bothun*.** Go here <http://www.grtep.com> to purchase online text and create an account. Click on the button 'Click Here to Purchase'. Follow the links for this course. Costs approximately \$30

3) Put all due dates listed in the class schedule into a calendar or reminder app. This course doesn't have flexible due dates.

4) Memorize these special days. These are test days. You need to be here to take at least 1 of the 2 test days and for the final. Read my policy on make ups.

- **Test 1: February 7th Thursday**
- **Test 2: March 5th Tuesday**
- **Final: March 18th Monday 12:30pm**

About this course

Whether we are aware of it or not, many of us have our own understanding of how the Universe works and a lot of misconceptions about it. This is not surprising because it is difficult to explain these

phenomena as they can be nonintuitive. And frequently, well meaning teachers, TV presenters or journalists either get it wrong or can't accurately communicate the correct ideas even if they know it themselves.

After a brief few discussions in lecture on scientific method and the history of our cosmological understanding, we will delve right into the heady, interesting stuff like expanding spacetime, big bang, horizons. The only way to really correct any misconceptions is to have you all actively work on this stuff together in class. Our job will be to guide you and you think through ideas and questions given to you in class.



This is a science literacy course. SLP courses include General Education courses for non-science majors and courses for science majors taught by teams of faculty, graduate fellows, and undergraduate scholars, who will include opportunities during class time for you to engage with the class topics through a variety of activities. For more information about the program scilit.uoregon.edu

Course Goals

- **You will practice critical thinking and the scientific process by working on in-class questions and discussion activities to develop your understanding of the Universe.**
- **Discover how scientists have pieced together the present understanding of the Cosmos (no we don't just make it up)**
- **Practice communication skills by working together to solve problems <-- This is a fantastic skill for for everyone in any career.**

Course Learning Outcomes

Students will be able to:

- 1) Explain how cosmological expansion occurs when there is no center to the Universe
- 2) Describe the order of events occurring up to 20 minutes after the big bang
- 3) Describe our current cosmology including why we consider the existence of undetected entities: dark matter and dark energy
- 4) Describe the order of events that led to our present atmosphere and life on Earth
- 5) Use the Drake equation to explore the probability of other communicating civilizations existing in the galaxy.

Your responsibility

In order to achieve these goals, I need your participation and cooperation. You are responsible for the following:

- o **Read this syllabus and be aware of all my policies.**
- o **Always consult the Class Schedule (see below) and do necessary work prior to class.**
- o **Go to every lecture, pay attention, take notes, participate in discussions - this will be necessary for learning the material.**
- o **Always bring your iclicker to every lecture!**
- o **Pay attention to due dates - can't emphasize this enough.**
- o **Ask (relevant) questions during lecture if you have them.**
- o **Make at least one friend in case you miss lecture**
- o **Put thought into the homework. Don't just guess.**
- o **Do not wait until the last minute to do the quizzes in case the internet dies.**
- o **Give me feedback (email or office hours) if you are confused with a topic previously discussed or something doesn't work.**
- o **Pay attention to emails and announcements sent out**

Class Schedule

NOTE! The due dates are fixed but what is covered (reading and reading quizzes) is a work in progress and tentative.

Week	Tuesday	Thursday
Week 1	<p>1/8</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> • Introduction to the course! • Diagnostic quiz (not graded) <p>To do list for after class:</p> <ul style="list-style-type: none"> • Take syllabus quiz • Play with this interactive, scaleoftheuniverse • Read: GB text Module 1, 2.1-2.3, scientific notation page • Lecture Notes: L1A123w19.pdf 	<p>1/10</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> • Scientific Method • Scientific notation - very important for cosmology. • Anomaly leading to discoveries: Early Greeks • In-class discussion <p>To do list for after class:</p> <ul style="list-style-type: none"> • Read: 2.4-2.6 • Lecture Notes: L2A123win19.pdf <p>Saturday 1/12 is last day to drop class no 'W' recorded</p>
Week 2	<p>1/15</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> • TSP questions - bring iclicker! • Aristarchus, Copernicus, Galileo • Brahe's parallax test 	<p>1/17</p> <p>Syllabus Quiz DUE by 5 pm.</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> • In-class discussion • Gravity • cosmological principle

	<ul style="list-style-type: none"> Kepler's laws and a method to measure distances in the Solar System <p>To do list for after class:</p> <ul style="list-style-type: none"> Read: 2.7-2.8, The end quiz in the text is optional. It doesn't count towards your grade but I recommend it. 3.1-3.3, 3.5 Reading quiz: (Due Thursday 1/17 before 2pm) Lecture Notes: 	<ul style="list-style-type: none"> Curved spacetime <p>To do list for after class:</p> <ul style="list-style-type: none"> Read: 3.4, 3.6 light1, light2, light3, light4 Lecture Notes:
Week 3	<p>1/22</p> <p>Homework Quiz 1 Due by 5pm</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> TSP questions - bring iclicker! light - energy, wavelength and frequency $E=mc^2$ and gravitational redshift Oblser's paradox and cosmological constant doppler shift <p>To do list for after class:</p> <ul style="list-style-type: none"> Read: 3.7 Reading quiz: (Due Thursday 1/24 before 2pm) Lecture Notes: 	<p>1/24</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> In-class discussion Hubble diagram, spectra cepheid variables measuring expansion rate, H_0 <p>To do list for after class:</p> <ul style="list-style-type: none"> Read: 3.8-3.10 Optional Module Quiz, 4.1 Lecture Notes:
Week 4	<p>1/29</p> <p>Homework Quiz 2 Due by 5pm</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> TSP questions - bring iclicker! Cosmic Horizons Geometry of universe and it's future Ant Universe - the correct interpretation <p>To do list for after class:</p>	<p>1/31</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> In-class discussion look-back time Blackbody radiation CMB <p>To do list for after class:</p> <ul style="list-style-type: none"> Read: 4.4 Lecture Notes: Study Guide

	<ul style="list-style-type: none"> • Read: 4.1-4.3 • Reading quiz: (Due Thursday 1/31 before 2pm) • • Lecture Notes: 	
Week 5	<p>2/5</p> <p>Homework Quiz 3 Due by 5pm</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> • TSP questions - bring iclicker! • evidence of hot early universe • Planck scale and the 4 forces • Particle creation/annihilation <p>To do list for after class:</p> <ul style="list-style-type: none"> • Read: study guide • Reading quiz: None. Study for Test 1 • Lecture Notes: 	<p>2/7 Test 1</p> <p>To do list for after class:</p> <ul style="list-style-type: none"> • Read: 4.5-4.6
Week 6	<p>2/12</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> • TSP questions - bring iclicker! • Go over Test1 • particle formation • particle conservation laws <p>To do list for after class:</p> <ul style="list-style-type: none"> • Read: 4.7 • Reading quiz: (Due Thursday 2/14 before 2pm) • Lecture Notes: 	<p>2/14</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> • In-class discussion • Big bang time line <p>To do list for after class:</p> <ul style="list-style-type: none"> • Read: 4.8-4.10 • Lecture Notes:
Week 7	<p>2/19</p> <p>Homework Quiz 4 Due by 5pm</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> • TSP questions - bring iclicker! 	<p>2/21</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> • In-class discussion • The beginning of the new epicycles: <ul style="list-style-type: none"> ◦ Galaxies and Dark Matter

	<ul style="list-style-type: none"> • Big bang timeline and helium abundance <p>To do list for after class:</p> <ul style="list-style-type: none"> • Read: 5.1-5.4 • Reading quiz: (Due Thursday 2/21 before 2pm) • Lecture Notes: 	<ul style="list-style-type: none"> • <p>To do list for after class:</p> <ul style="list-style-type: none"> • Read: 5.5-5.7 • Lecture Notes: <p>Sunday 2/24 is last day to drop class with 'W' recorded</p>
Week 8	<p>2/26</p> <p>Homework Quiz 5 Due by 5pm</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> • TSP questions - bring iclicker! • Inflation, dark energy <p>To do list for after class:</p> <ul style="list-style-type: none"> • Read: 6.1-6.4 • Reading quiz: (Due Thursday 2/28 before 2pm) • Lecture Notes: 	<p>2/28:</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> • In-class discussion • Star formation, life and death of stars <p>To do list for after class:</p> <ul style="list-style-type: none"> • Read: study guide • Study for test 2 • Lecture Notes:
Week 9	<p>3/5</p> <p>Homework Quiz 6 Due by 5pm</p> <ul style="list-style-type: none"> • Test 2 • Reading: 6.5 -6.8 • Reading Quiz: None 	<p>3/7</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> • Go over test • Formation of Life on Earth <p>To do list for after class:</p> <ul style="list-style-type: none"> • Read: 6.9-6.10, 7.1-7.2 • Lecture Notes:
Week 10	<p>3/12</p> <p>Homework Quiz 7 Due by 5pm</p> <p>Project Due by 5pm</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> • TSP questions - bring iclicker! • Failure points of forming life on Earth, Evolution <p>To do list for after class:</p>	<p>3/14 .</p> <p>Lecture Topics:</p> <ul style="list-style-type: none"> • In-class discussion • Fermi paradox and drake equation <p>To do list for after class:</p> <ul style="list-style-type: none"> • Lecture Notes: • Study for final

	<ul style="list-style-type: none"> • Read: 7.3-7.5 • Reading quiz: (Due Thursday 3/14 before 2pm) • • Lecture Notes: 	
Week 11	3/18 Final 12:30 Monday	

How you will be Evaluated

Most of your grade is based on tests and homework and much less so on in-class work because it is anticipated that most of you can not make every single lecture. However in terms of learning so that you do well on the tests, in-class work is vital to your success. So do not discount it! Here is the grade breakdown:

- **In-class work**
 - **In-class discussion work 8 %**
 - **Think Share Pair in-class questions 5%**
- **Out of class work**
 - **Reading assignment quizzes 8%**
 - **Homework canvas quizzes 18%**
 - **Project 8%**
 - **Supplemental Quizzes 1%**
- **Summative Assessments (all tests will be in Willamette 100)**
 - **Best score of 2 tests 24%**
 - **Final 28%**

Course Rules

There are over 200 of you and therefore inevitably some of you will have an issue arising that prevents you from attending class, completing homework, be here for tests, discussions etc. Accounting for this, I drop lowest scores of various assessments. See individual descriptions for a list of these. But beyond this, I can't do much. In no way I am discounting anyone's issues. Life can be hard and/or extremely busy, I get it. But understand that it is difficult to accommodate special requests and needs beyond AEC/Dean of Student issues given a class this size. The harsh truth is that this is college and you have to work with the time constraints and schedules given to you from your profs, we can't or won't change our schedule to fit your schedule. Thus I have a set of rules to keep all of us, mostly me, sane. **Here they are - know them, memorize them, accept them.**

~~~~~ Class rules ~~~~~

1. I do not accept late reading or homework quizzes. DO NOT email me an excuse or ask for an extension. No exceptions!!

YOU are responsible for managing your success in this class. This means keeping aware of dates and times of all deadlines, grades, bringing your iclicker, etc. Instead of traditional homework, you have quizzes as well as short reading quizzes. Both types of quizzes are open book can be done anywhere as long as you have internet access and do them before the due date. Thus do not wait

until the last minute to do a quiz in case the "internet is broken". Also there might be simulations that you need to run on your computer to do the quiz or understand the material. Not all browsers run flash animation therefore you need to check this at least a half a day before a quiz goes offline. **If traveling for academic, athletic or personal reasons you are expected to either do a quiz ahead of time or do it while out of town if due while gone. Not finding access to the internet is not an acceptable excuse, so I recommend doing the quizzes before you go on travel if unsure.** The lecture slides will be available within a few hours after each class on Canvas. **If you need accommodation and are working with a University agency (e.g AEC), see rule 3.**

2. **All test dates are immutable so DO NOT email me about rescheduling a test** for you unless you have official U of Oregon reasons (sports, band, etc) or your are in an enlisted service (e.g. army, etc). You can't take the final early or later unless you are taking it through the AEC and their are no other time slots. See section under Tests and Final for more information.

3. PLEASE READ THIS SEVERAL TIMES!! There will be in-class work every day except for the first and test days so attendance is necessary for this course. Due to the nature of this course and number of people, I'm not offering alternative make up points to accommodate travel, work, illness or class conflicts (e.g. meetings for course projects) or miscellaneous plans. This is a big one. Naturally, it is anticipated that you might miss a lecture or two, therefore your lowest in-class assignment is dropped as well as your lowest think-share pair quiz. **This is also true If you are working through a University agency (e.g Sports, AEC, Dean of Students).** *If you are going through a hardship that is documented through the dean of students (e.g. illness/death of immediate family member or personal trauma) and can't attend class for several days (2 weeks +) come and communicate with me as soon as possible. Together we might come up with a plan to get you back on track or at least see what is feasible.*

4. **Read this syllabus before you ask/email me a question about the course.** I don't respond to emails like 'where is your office?' etc which are answered in the syllabus. If you need clarification of something in the syllabus then please do email/ask.

5. Basic Courtesy:

- Refrain from texting in class unless an emergency.
- Don't listen to headphones during lecture or tests. Don't watch videos in class because it's distracting to others.
- Don't talk when I'm lecturing or others are asking/responding to questions.

Readings

Readings are posted on the schedule above so you know what to read and when. I might post other articles too that will help with some topics.

You may need to run some simulations for reading or homework. Most of these require flash. **you will need to enable flash on your browser.** Enable it for the sites I give you and these sites alone. It is easy to do, **just google the relevant instructions for your browser if flash isn't working.** **If you don't have flash, it will ask if you want to download and this file is dangerous. Don't download it!** If you are having trouble figuring it out, ask a friend, classmate, google it, or use another computer. You can ask me too but all I will do is google the instructions and show you what is needed to be done which is something you can do on your own. Remember you will need it for understanding the material so figure it out asap!

Reading Quizzes

You will have to complete very short, very simple quizzes prior to each **Thursday** discussion-lecture. The purpose is to motivate you to read the material before coming to class so you are prepared to work on it. Although you won't have quizzes due for Tuesdays lectures, you will have reading to do for class. The quizzes can be only taken four times and the highest score is kept. The first reading quiz is due just before Thursday 1/17/19 lecture at 2pm. Quizzes can be found on links in the class schedule grid above or if you simply click on 'Quizzes' in the side menu. The lowest reading quiz is dropped.

Lecture

I post all lecture notes in Canvas. They will be linked in the schedule above and located under 'Files' on the side menu and possibly in the Modules. You are not allowed to record my lectures with video or audio devices. If working with the AEC and this is a necessary thing for you, please tell me that you plan to do this. You cannot post the recordings online. Consider this a legal document in case I find an unauthorized recording of me.

Think Share Pair Questions and Iclickers

On Tuesdays, you will be quizzed through out class using iclickers in the form of Think-Share-Pair (TSP) questions. TSP questions are multiple choice conceptual questions. After a brief mini lecture, I will ask you a question. You will first answer the question on your own and then after I stop taking iclicker responses, you will turn to one of your neighbors and you will explain your answer and they will explain theirs. You will try to convince the other person that your answer is correct or in the case that neither person is confident, you will work together to find the correct answer. After which you will revote on the same question. The purpose of this exercise is to make you think logically through your response. When you have to explain something, you have a greater grasp of what you get and what you don't get.

Grading: These will be graded only on Tuesday lecture day. Most of the credit is participatory (80%), but a fraction of it is also based on correct answer (20%). Therefore you get credit for answering questions but if you answer the questions incorrectly, you won't get 100% for that day's TSP questions. There will be approximately 8 quizzes starting the 2nd week and all will be on Tuesdays. Lowest TSP score is dropped.

As mentioned in the yellow box above, **there are no make ups for TSP questions. I won't accept responses on paper for credit in case you forgot your iclicker.** In terms of total credit towards your grade for the course, they are worth very little. In terms of understanding the material and getting good test scores, they are worth much, much more. So if you do forget your iclicker or lost it, still come to class and work on these questions. **Please don't email me reasons why you can't make to class or doctors notes.** It's not that I don't care, it's just that there are too many of you and it takes too much time to respond to all the emails. Just come back to class as soon as you can.

Registering iclicker: If you just bought it you need to register it by going to the **i>clicker left menu item**. If you have already used it in a prior class, it should already be registered. If you are borrowing it from someone, they need to unregister it. Therefore you and a friend can't share an iclicker during the same term, even if they are not taking this class.

iClicker Frequency: This is set to **BB** unless there is some unseen conflict. If so, I will email everyone, update this page and remind you at the beginning of class. The only way to change it is when I have the iclicker receiver plugged in. Thus you can't change it outside of class. You hold down the power button for 2 seconds and the preset frequency flashes, prompting you to change it. The default is usually not **BB**, so be sure to change it each time you come to class if you use it in another class this term.

What if I don't receive quiz credit and I was in class?:

Always check your grades to see if you received credit for that day. I post scores the same day, usually within an hour after class. If you have a 0 and you were in class using your iclicker then either...

- **You haven't registered your iclicker** If you haven't registered it, do so now and email me your iclicker number so I can give you the points.
- **You were using the wrong frequency (must be BB) or your batteries died.** I can't do anything for either reason.
- **You accidentally used someone else's iclicker.** This happens and it's fixable. Just email me their iclicker number and I'll give you credit.

In-Class Discussions

In-class discussions are somewhat like a tutorial or short lab. The purpose behind in-class discussions is to have you think through concepts together without confining answers to multiple choice. You will be given worksheets in class where you will be working on questions or doing exercises with one other person and writing out responses. Each topic on a worksheet will be addressed in a mini-lecture prior to you working in pairs to think through the responses, but it will help you to read ahead and do the quiz so you will have seen the material twice. **Each person will turn in their own set of responses at the end of class, no later. If you forget to turn it in then, you are out of luck. This means even if slip it under my door 5-10 minutes after class I won't accept it.** You will still need your iclicker so I know whether or not you are understanding things, but you won't be graded on your iclicker responses. Your grade will be based on completing the discussions and quality of your attempt to answer the questions, this means showing work if a calculation or reasoning. These will be done only on Thursdays. You can't make up in-class discussions but your lowest grade is dropped. If you do miss it the discussion, I recommend still going over the questions or exercise. I'll have extra worksheets in my office so you can pick one up.

After we grade your discussion, you can come by my office during office hours to pick it up. Unfortunately, we don't have an easy way to return work and I'm not allowed to leave them outside my office unattended. I recommend that you take a picture of your work before you turn it in at the end of class.

If you must leave early, hand it to William or Fehmi, preferably when I stop lecture and when everyone else is working through the problems. This ensures that it doesn't get lost and you get some credit!

You will be graded on a scale of 0 to 4.

You are not graded on correct answer but you are graded on effort. You must attempt each section to get full credit and show work (calculations or reasoning). I might not have time to cover material for all activities on worksheet. Obviously, we won't expect you to complete these sections.

Homework Quizzes

About: Homework is in the form of online canvas quizzes using the quiz interface. These are multiple choice quizzes. Instructions (if necessary) for each will be posted for each. Material is drawn from the readings and lecture material. Since these are effectively open-book quizzes, most of the questions will be a little more than just looking up stuff in the reading. You will have to apply your knowledge and think about it. Lowest homework score is dropped.

Grading: You have 2 attempts for each homework quiz. Your grade will be the highest scored attempt. After each attempt, you can see which ones you got wrong and which you got correct. **I strongly advise you not to guess since you only have 2 attempts. Be sure to write down the answers you got correct and NOT JUST THE LETTERS! before you take the next attempt.** Canvas doesn't save them and the multiple choice answers are scrambled after each attempt.

Late policy: No late assignments are accepted. See class rules.

Due dates: All homework quizzes are due by 5pm on Tuesdays. Each quiz will be available about a week prior to the due date.

Dropping lowest score: You will be graded on the best 6 out of 7 homework quizzes. Each is worth the same amount of points. Canvas automatically takes care of this so no need to tell me which quiz you wish dropped.

Class Project

You will complete one project due the Thursday of the 10th week of classes (3/14). The project is simple, fun and your opportunity to actually "do" science. See this page [Course Project](#) or click on 'Pages' in the side menu which will have the Course Project listed.

Supplemental Quizzes

This is a catch-all phrase for extra quizzes or surveys when necessary. These could be extra questions that didn't make the cut for homework or quizzes that pertain to things we didn't get to in lecture, yet I want you to know. These will most likely be easier than the homework quizzes and see your results immediately. They can be taken multiple times so you can take them until you get a perfect score. Each quiz is weighted depending on the number of problems. Canvas will keep your highest score, so you can retake these quizzes without risk of reducing your score. Presently, I don't know how many supplemental quizzes will be added. At the time of this writing there are two supplemental quizzes, the syllabus quiz and an in class survey for the first day.

Tests and Final

About: All tests will cover material discussed in lecture, in-class work, in reading quizzes, and in the homework. You will not be tested on some arcane fact if it wasn't in one of the aforementioned items. The tests will most likely be a blend of multiple choice, true/false, matching, fill in the blank and a few written answer questions. **The final will be a similar format but longer and cumulative. I will hand out study guides. These will be linked on the class schedule above and found under 'Files'. You will need to bring your student ID for each exam**

What to bring for test days:

- writing utensil
- Student ID

I will hand out scratch paper if you need it. **These are all closed-book exams.**

Tests: You will be given 2 tests- one **during week 5 (2/7/19) and one during week 9 (3/5/19)**. Your **test grade is based on the highest grade of either test**. You are only required to take one. **You can take both, especially if you want the chance to improve your grade. I strongly recommend that all of you take the first test** unless you are sick. You will most likely be busy with other classes when the 2nd test comes around or burned out. Usually the average on the 2nd test is much lower. Test 1 and test 2 are not cumulative.

The reason for "best of two" exams as opposed to one midterm or having both tests count is that inevitably, there will be a fair number of you who either get sick or can't make a test date for whatever reason and need to take a make up exam. In a small class, it's not a big deal to give make up exams but in a class of over 100 students, it's a time suck. Therefore I have the "best of two" policy with the idea that you can make at least one. You can think of the 2nd test as a makeup test if you miss the first one. I don't give separate make up exams (outside of the regular test dates) unless you missed both tests due to an extreme reason or the university is making you do something. **My make up exams tend to be harder than the in-class test and they are written answer (not multiple choice).**

Test make ups: Okay, so what are valid reasons for a make up exam outside of the two test dates?

- Even though I offer the best of two exams, I am bound by the University to offer make ups to students who have a U of O related duty (sports, band, etc) at the time of the exam. You must provide me with the relevant documentation and you can make up a test.
- If you missed the first test and you are either extremely ill beyond your average cold/flu or have some debilitating issue or a major crisis (e.g. you've been assaulted, your family was in a natural disaster) please come talk to me or email me, provide relevant documentation and I'll give you a make up.

You cannot make up a test due to vacation, cold, work, obligated travel (e.g. family emergency, funeral - unless it's immediate family, another class meeting for a group project), house arrest, small personal crises (e.g. stress, breaking up with significant other) etc. due to the number of students in this class and potential number of rescheduled test times. I am not discounting these reasons as something not significant but it becomes an unmanageable issue if I give make ups for these reasons. It takes time for me to write a new exam and usually students don't perform well because they either haven't had time to study or they are trying to cope with other issues. Thus if you fall into one of these categories and it's prior to the 2nd test and after the 1st test, just take the 2nd test. If you have already taken the first, then you have test grade. Make it easy for yourself.

If you can't make either test due to foreseen conflicts then you should reconsider taking the course.

Final: The final is cumulative. I will hand out a study guide. It will be a slightly longer version of the tests. You must be here for the exam unless you are working with the AEC.

Final Test Date: The test will be offered at the scheduled time (**12:30 pm Monday 3/18/2019**) in Willamette 100. You can't take it earlier or later (I prefer closest to scheduled time for AEC as well), so make your vacation/work plans accordingly. According to school policy, if you have **more than 3** (read 4) finals in one day you can reschedule the final. If this is the case for you, and you asked your other professors first and you have proof of having 4 finals (copy of schedule) then I will reschedule the test for you only.

Before I forget, here are my general policies on cheating and copying.

Academic Dishonesty

- **Copying:** You are free to study and discuss the course work with others, but **if you and your study partner have identical essay answers or even just switch a few words or sentences around in any graded work, this is considered copying and each results in zero credit** for all similar answers. Even in a class this size, it is easy to catch so don't do it! I am brutal about this. You won't have essays on homework quizzes, however your projects must be unique work and you must use your own words.
- **Cheating:** If you are caught cheating looking at your neighbor's test or with notes either on your phone, any electronic device, a piece of paper, hat, arm, water bottle or whatever, you get an automatic 0 on the test. Therefore, no headphones, sunglasses, or phones during test time. If I suspect you looking at your neighbor's test, I will ask you to move. ***Just so you know, it's incredibly obvious when someone is looking at another person's test because they tend to move their head a lot and keep looking at the instructor to make sure they aren't caught. This is really easy to spot when everyone is else is focusing on their test.***
- **Avoiding Plagiarism:** Again, this will mainly apply to your course project. Don't cut and paste text from sources to answer questions where relevant - even if you use quotes and cite sources. Quotes are never used in science papers unless it's a book about a scientist. If you cut and paste text, change a few words and don't cite sources this is considered plagiarism and very very bad! Some professors make it a mission to go after students by notifying administrators and professors of the suspected plagiarist.
- **Iclicker Misuse:** Handing your iclicker over to another student to use and give you credit in the event that you can't make class is considered dishonest. It will result in the loss of all your iclicker points for the term if caught as well as the person covering for you. If they aren't registered for this course, then there will be disciplinary action.

In case you are asked to look up information on other websites: You are to respond to these questions by writing the answer in your own words. **Do cite sources (a link to the website is just fine), but don't use quotes from the articles to answer the question.**

Students can find more complete information about the University of Oregon's Policy on Academic Dishonesty in the University of Oregon *Student Handbook*.

Canvas Interface and Grades

The way Canvas calculates the total grade can and has been totally misleading for those who are not familiar how weights and percentages work. For instance, if you have submitted a total of 3 out of 6 assignments it will base your grade on those three assignments not 6. So if you got 100% on all 3 assignments but didn't submit three of them then your grade will read 100% and not 50%. Sometimes I forget to enter a zero for non-submissions and people are surprised when their grade goes down. Now you know.

Math

It is extremely light in this course because the actual math is well beyond most astrophysics undergraduates. Equations will be taught at a conceptual level. I want you to understand what the equation is calculating, the variables involved, and what it means physically when a quantity is altered. I will use a number or two to help explain these equations but that's it. In fact anything involving an equation or numbers will be worked through as a group. Thus unless you miss class, you will never go at it alone!

You may see some fairly complex equations in the readings and notes. Do not panic. You will not have to know or use these equations. If appropriate, I might do a derivation or two but most cosmology equations involve math well outside the scope of the course so you'll have to trust me that the equations work and that they come from valid logical reasoning. If you hate math, treat it and physics derivations as abstract performance art. You will not have to derive anything but sometimes its fun and instructive to show how scientists arrive at conclusions.

Astronomy Help

There are plenty of office hours for you to choose from. Use your resources! If you can't see me during regular office hours, please go see William and Fehmi. They can help you!

Campus resources to support your learning

Tutoring and Learning Center (TLC) Drop-in math and writing support in addition to tutoring, study skills support, and Class Encore. Located in the 4th Floor Knight Library (541) 346-3226, tlc@uoregon.edu

Counseling Center Call anytime to speak with a therapist who can provide support and connect you with resources. Located on the 2nd Floor of the Health Center(541)346-3227

Accessible Education Center The University of Oregon is working to create inclusive learning environments. If there are aspects of the instruction or design of this course that result in barriers to your participation, please let me know as soon as possible. I encourage you to contact the Accessible Education Center. If you are not a student with a documented disability, but you would like for us to know about class issues that will impact your ability to learn, we encourage you to come visit during office hours so that we can strategize how you can get the most out of this course. Located on the 1st Floor of Oregon Hall (541) 346-1155, uoaec@uoregon.edu

Note: If you need to record lectures, you must ask me first and you cannot post my recorded lectures on the web where they would be publicly accessible.

Center for Multicultural Academic Excellence (CMAE) mission is to promote student retention and persistence for historically underrepresented and underserved populations. They develop and implement programs and services that support retention, academic excellence, and success at the UO and beyond. They reaffirm our commitment to all students, including undocumented and tuition equity students. Located on the 1st Floor of Oregon Hall (541) 346-3479, cmae@uoregon.edu

Inclusiveness

Open inquiry, freedom of expression, and respect for difference are fundamental to a comprehensive and dynamic education. We are committed to upholding these ideals by encouraging the exploration, engagement, and expression of divergent perspectives and diverse identities.

Our Duty to Report

The graduate assistants and I are Student-Directed Employees. As such, **if you disclose sensitive information to us, we will respond to you with respect and kindness. We will listen to you and will be sensitive to your needs and desires. We will not judge you. We will support you.** We will direct students who disclose sexual harassment or sexual violence to resources that can help and **will only report the information shared to the university administration when the student requests that the information be reported.** As Student-Directed Employees, we can offer privacy because we are not required to report certain information to the university. However, we cannot be bound by confidentiality in the same way that a counselor or attorney is. Unless someone is in imminent risk of serious harm or is a minor, we will keep your disclosure private. Please note the differences between

confidential and private. For more information on reporting obligations of employees and specific details about confidentiality of information, visit titleix.uoregon.edu

Discrimination and Harassment Resources

Additional help and resources for any student who has experienced sexual assault, relationship violence, sex or gender-based bullying, stalking, and/or sexual harassment are available at **safe.uoregon.edu** or by calling the UO's 24-hour hotline 541-346-7244 [SAFE] or the non-confidential Title IX Coordinator at 541-346-8136.

Students experiencing any other form of prohibited discrimination or harassment can find information at **respect.uoregon.edu** or **aaeo.uoregon.edu** or contact the non-confidential AAEO office at 541-346-3123 or the Dean of Students Office at 541-346-3216.

Final Note from yours truly:

If you are struggling in this or any class, remember this: The real way to learn something new is to accept that struggle and failure are an essential part of the learning process. Seriously. I can't tell you how many times I have failed initially when solving new problems. It's rare that I or anyone else gets it right on the first try. But I must keep at it until I get the job done because no one else can do it for me. In some situations I have to find a solution because others are relying on me and I won't get paid. That's how real life works. Our society, particularly social media, focuses too much on the end product of awesome skills and forgets there was a struggle to get there. So don't give up or panic if you do bad on something. Just stick with it and see me for help until it makes sense.

By the way, do not tell yourself or me that you do not have a scientific or mathematical mind. That is BS. If anyone told you this, even if it's someone who cares about you, they are wrong. There might be people who get concepts faster than you but there is evidence that slow learners have a greater depth of understanding when they finally figure out a subject. In my unofficial study, it's simply a matter of wanting to learn it or not. This means putting time into figuring it out. Truth be told, all fields -scientific or not - require lots of practice and some amount of critical thinking. Otherwise we would all be skilled artists, poets, athletes etc.

I really want you to get something positive from the course - whether it's one topic that totally captures your imagination or just a general appreciation and new perspective of our place in the Universe. Let's make this a great term!

[TAKE THE SYLLABUS QUIZ!!!](#)