

**Astronomy 134**  
**Planetary Astronomy Laboratory**  
*Course Syllabus - Fall 2016*

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**Office:** CHCB 129 (inside the Physics/Astronomy dept. office)  
**Office Hours:** T 11-noon & 1-2, W 12:30-1:30, Th 2-3 in CHCB 129  
Please feel free to stop by or make an appointment for other times. Note: On Thursday from 2-3, if you don't find me in my office, come on up to CHCB 229.

**Moodle:** You have TWO Moodle listings for Astronomy 134.

**Astronomy 134 Common Area**

Important course announcements, **ALL LAB EXERCISES**, and very useful links and resources will be posted on Moodle in the Astronomy 134 Common Area. You will need to check the Common Area every week before lab to make sure you are up to date on the activities and resources for that week.

**Section specific Moodle site**

**QUIZZES** and all of your lab grades will be posted in the Moodle shell for your specific lab section.

**Required Supplies:** **LAB EXERCISES-** You **MUST** bring a hardcopy of each week's lab to class with you. You do not need to purchase a lab manual for this class. All labs will be posted in the Moodle Common Area. PLEASE NOTE: There will be a standard 10% reduction in your weekly lab grade if you come to class without the write-up.

You will also need a calculator capable of doing scientific notation and a headlamp or small flashlight for observing. Getting a good night sky app for your cell phone or pad is not required, but highly recommended!

## **ASTRONOMICAL OBSERVING**

Weather permitting, we will try to get in a number of evening observing sessions during the first part of the semester. These labs are really fun and provide a great opportunity for you to get familiar with the night sky. Sign-ups can be found on Moodle. Please sign up as early as possible for your favorite times. If you have a legitimate conflict with all possible nights for a given lab, please discuss alternatives with your instructor. Please note that the observing labs must often be rescheduled due to clouds or smoke.

### **Blue Mountain Observatory**

*Photo by David Podrasky*



### **Blue Mountain Observatory**

If weather permits, I will try to host a special observing night for Astronomy 131/134 students at the **Blue Mountain Observatory**. You can find detailed directions and general information about the observatory on the [Blue Mountain Observatory website](http://cas.umt.edu/physics/Blue_Mountain_Observatory):

[http://cas.umt.edu/physics/Blue Mountain Observatory](http://cas.umt.edu/physics/Blue_Mountain_Observatory).

Blue Mountain is a beautiful place to spend a clear, late summer evening! We'll point out constellations, tell star stories, and tour as much as we can of what's up in the sky- planets, star clusters, nebula, and distant galaxies. This is a great opportunity for you to use a telescope at a dark sky site and see first hand many of the things that we will talk about during the course. More information on possible dates will be discussed in class.

## Course Content

This course will give you an introduction to some of the METHODS astronomers use to study planetary systems. You will have a chance to see planets and deep-sky objects through a telescope, use modern computer software to explore the sky and model planetary motions, and gain a working knowledge of some of the many techniques astronomers use to study planetary systems- both our own, and the hundreds of other systems that have been discovered around distant stars.

By the time you finish this course you should

- know how to find your way around the night sky
- know where and how to look up information on any object in the sky you are curious about
- be able to observe, model, and predict the motions of celestial objects and understand why they appear to move the way they do
- have gained a fundamental knowledge of how astronomers use the properties of light to understand distant objects
- understand the role of gravity in the motion of planetary bodies
- have a working knowledge of basic telescope optics and know how to determine fundamental properties such as light gathering power, magnification, and resolution
- be able to explain how basic planet properties relate to planet mass and distance from star
- have a working knowledge of the methods astronomers use to discover and characterize the properties of distant exoplanets
- have gained experience with some of the *techniques* that have enabled us to discover some amazing things about the universe we live in!

Specific, detailed learning objectives for each laboratory exercise are given at the beginning of each lab write-up.

## Course Expectations

The labs will usually expand on material presented in Astronomy 131, so it is important that you attend the lectures and keep up with any readings or activities in that class before coming to lab. Most past students of the lab have found that the more in-depth, practical experience of the laboratory course really helps their understanding of the material presented in the lecture.

Throughout the course you will be expected to:

1. Read through the experiments (at least the introductory material in them) and complete any pre-lab reading required before coming to class. Make sure you understand the material from the lecture that relates to the lab.
2. Ask questions. Come prepared to enter into discussion. Try to ask questions that help you focus on the big picture, not just procedural details.
3. Do your own work. In short, always practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. If you have not read through the material at [http://www.umt.edu/vpsa/policies/student\\_conduct.php](http://www.umt.edu/vpsa/policies/student_conduct.php), do so now!

**IMPORTANT:** Specifically, in this course, academic honesty means that each student contributes equally to the completion and write-up of each lab. EVERY student working in a group is expected to be a thinking, questioning, contributing member! Lab quizzes are to be worked on **alone**.

I reserve the right to assign zero credit to students I suspect of relying on the work of others. The zero score may be replaced with a full credit grade by scheduling an oral interview that will cover the concepts of that particular lab. If you can convince me that you understand the material, I will grade you on the work you completed.

## Grading

This course consists of 13 graded labs. (If we are unable to do one or both of the observing labs due to weather, they will be dropped from the average.) Your grade for each lab, with the exception of the planetarium and

observing labs, will consist of two parts. 50% of your grade will be based on the satisfactory completion of your weekly lab in class. I will look through these at the end of your lab period, looking for completeness and careful thinking. We can go over any problems you had questions on. You should also feel free to come see me outside of class if you have additional questions you would like to clear up before taking the quiz. The remaining 50% of your grade will be based on a weekly quiz available on your section specific Astr. 134 Moodle site. Each quiz will test your understanding of the material presented in the lab and be open approximately one week (from 2 pm Thursday until noon the following Thursday). Once you access the quiz, you must complete all questions before you exit. Answers to quiz questions will be available once the quiz has closed. The observing labs will have no quizzes, so 100% of your grade for those will be based on your lab write-up. Each person must turn in a personal lab write-up for the Observing Labs. Your grade for the week we visit the Planetarium will be based solely on attendance.

**Note on missed labs:**

You can miss any one lab for any reason. Because of this, THERE ARE NO LAB MAKE-UPS. You can drop your lowest lab score AND your lowest quiz score, OR, your lowest observing or planetarium lab. (i.e. You can drop one week's worth of work with zero impact to your grade.) If you complete all labs and quizzes, you get to drop your *lowest* lab and quiz grades. If you know ahead of time that you will have to miss a lab for a legitimate reason, please get in touch. I may be able to fit you into another lab section that week. If you have a prolonged illness or emergency with appropriate documentation, definitely come see me and I will do my best to help you out. You do need to tell me BEFORE the start of lab if at all possible!

**Grading summary**

In class lab write-up: 50% of weekly grade

Before leaving lab you must submit your completed lab write-up for review and grading. I will use the following scale:

√+	100%	Everything complete and virtually everything correct
√	80%	Everything complete and mostly correct
√-	60%	Incomplete, hurried work and/or many major misconceptions

Lab quiz: 50% of weekly grade

- To be completed on your own.
- Covers concepts from that week's lab.
- Can be completed anytime during the week following your lab.

**Exceptions:**

Observing Labs

- Each person must hand in a write-up for grading. (I will grade these outside of class.)
- 100% of the grade for this lab will be based on your individual write-up.

Planetarium

- Grade based on attendance only.

**Course Grade:**

Each lab activity will be weighted equally. I will drop your lowest lab and lowest quiz, or missed observing lab, or planetarium lab at the end of the semester. Plan on grades being assigned based on the traditional grading scale: 90-100% A, 80-89% B, 70-79% C, etc. Since grades will be regularly posted on Moodle, you can easily track your progress throughout the semester.

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**EQUAL ACCESS:** A fair and inclusive learning environment benefits us all. I encourage students from different cultural backgrounds, students for whom English is not their native language, and/or any student who has a disability that may adversely affect their academic performance to contact me within the first few days of class to discuss appropriate accommodations. If you think you may have a disability and have not registered with DSS, please contact them in Lommasson 154, call (406) 243-2243, or view the [DSS website](http://www.umt.edu/dss) at www.umt.edu/dss. The folks at DSS are very helpful!

**ADD/DROPS:** The last day to add/drop on Cyber Bear is Monday, Sept. 19. The last day to drop with your instructor's and advisor's signature, is Monday, Oct. 31. A drop, or change of grading option after Monday, Oct. 31 requires the signature of the Dean and written documentation of exceptional circumstances. Doing poorly in the class does not constitute adequate reason to drop the class at the end of the semester!

## Astr. 134: FALL LAB SCHEDULE

WEEK	DATES	EXPERIMENT	LOCATION
1	Sept. 1,2	<b>Course introduction; Sky Simulation Programs</b> NOTE: If you would like to acquire some amazing sky simulation programs of your own, check out the many links listed under Week 1 in the Moodle Common Area. Most range in price from FREE to \$3.	CHCB 229
2	Sept. 8,9 - no Quiz -	<b>A visit to UM's Star Gazing Room</b>	Star Gazing Room PFNAC 013
3	Sept. 12,13 Mon.&Tues. - no Quiz -  <b>Backup dates</b> Oct. 10,11 (different times)	<b>Lunar Observing 8:30-9:30 or 9:30-10:30 p.m.</b> You must sign up for an observing time on Moodle (Common Area). If your section is cancelled due to weather, sign-up again as soon as possible for one of the back-up dates. For all nighttime observing labs, call 243-4299 <u>one hour before the start of your observing session</u> for an update on sky conditions and whether or not the lab will be held. Do not call more than one hour before the start of your lab as weather can change rapidly and we will not necessarily make a decision prior to that.	Skaggs Roof meet outside east entrance to Skaggs  Sign-ups will be posted on Moodle
3	Sept. 15,16	<b>Modeling the Sun/Earth/Moon System: Part I</b>	CHCB 229
4	Sept. 22,23	<b>Modeling the Sun/Earth/Moon System: Part II</b>	CHCB 229
5	Sept. 28,29 - no Quiz -  <b>Backup dates</b> Oct. 3,4	<b>Night Sky Observing 8:15-9:45 or 9:45-11:15 p.m.</b> You must sign up for an observing time on Moodle (Common Area). If your section is cancelled due to weather, sign-up again as soon as possible for one of the make-up dates. For all nighttime observing labs, call 243-4299 <u>one hour before the start of your observing session</u> for an update on sky conditions and whether or not the lab will be held. Do not call more than one hour before the start of your lab as weather can change rapidly and we will not necessarily make a decision prior to that.	Skaggs Roof meet outside east entrance to Skaggs  Sign-ups will be posted on Moodle
5	Sept. 29,30	<b>No in class labs this week.</b>	
6	Oct. 6,7	<b>Atomic Spectra</b>	CHCB 229
7	Oct. 13,14	<b>Telescopes</b>	CHCB 229
8	Oct. 20,21	<b>Exoplanets</b>	CHCB 229
9	Oct. 27,28	<b>Habitable Zones</b>	CHCB 229
10	Nov. 3,4	<b>Surface of Mars</b>	
11	Nov. 10,11	<b>Veteran's Day Holiday- No labs this week.</b>	CHCB 229
12	Nov. 17,18	<b>Atmospheric Retention</b>	CHCB 229
13	Nov. 24,25	<b>Thanksgiving Holiday- No labs this week.</b>	CHCB 229
14	Dec. 1,2	<b>Comparative Planetology</b>	CHCB 229
15	Dec. 8,9	<b>No labs this week.</b> (Don't forget to do the last quiz!)	
16	Dec. 14-20	<b>Finals week</b> NO final! Final course grades will be posted on Moodle.	