Astronomy 134

Planetary Astronomy Laboratory

Course Syllabus - Fall 2019

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Office Hours: Tue: 11:00 AM--12:30 PM in CHCB 129
Wed: 11:00 AM—12:30 PM in CHCB 129
Please feel free to stop by or make an appointment for other times.

Course meets:

There are a total of 5 batches, which meets on Thursday and Friday at below mentioned timings for their lab coursework

1. Thursday from 12:00 noon to 02:00 PM at CHCB 229
2. Thursday from 03:00 PM to 05:00 PM at CHCB 229
3. Friday from 08:00 AM to 10:00 PM at CHCB 229
4. Friday from 10:00 AM to 12:00 noon at CHCB 229
5. Friday from 01:00 PM to 03:00 PM at 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
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 20% reduction in your weekly in-class lab grade if you come to class without the write-up.

You will also need a calculator capable of doing scientific notation and a small flashlight for observing. A good night sky app for your cell phone or pad is 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. 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.

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. Always bring a paper copy of the lab to class with you.
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/student-affairs/dean-of-students/default.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 10 graded labs plus a visit to UM's Star Gazing Room. (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, will consist of two parts. **70% 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 30% of your grade will be based on a weekly quiz. Each quiz will test your understanding of the material presented in the lab. You will be given hard copies of the quiz after the lab and you are supposed to complete and bring it in next week.

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.

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, one of the observing labs. (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: 70% 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: 30% 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 meeting
• Grade based on attendance.

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.

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 at www.umt.edu/dss. The folks at DSS are very helpful!

ADD/DROPS: The last day to add/drop on Cyber Bear is Sept. 16. The last day to drop with your instructor's and advisor's signature, is Oct 28—Dec 6. Doing poorly in the class does not constitute adequate reason to drop the class at the end of the semester

Aim:

1. Understand what you do in the lab
2. Why you do something mentioned – Question each step and procedure
3. What are you deriving or calculating and what measurements you need to have in hand for it
4. Can you do something better to reduce the error in your measurement
5. Measure the uncertainties in your measurements

The lab sessions are so designed to understand the concepts taught in the class through, observations, experimentation, and simulations. It is important to understand the underlying concept behind each topic.

Planetary Astronomy Lab Schedule- Fall 2019

Week	Lab No	Date	Topic
1		2019 Aug 29, 30	No Lab
2	1	2019 Sep 5, 6	Sky Simulation Program
3	2	2019 Sep 12, 13	UMs Star Gazing Room
4	3	2019 Sep 19, 20	Kepler's Law
5	4	2019 Sep 26, 27	Night Sky Observation
6		2019 Oct 3, 4	No Lab
7	5	2019 Oct 10, 11	Lunar Observation
8	6	2019 Oct 17, 18	Atomic Spectra
9	7	2019 Oct 24, 25	Telescopes
10	8	2019 Oct 31, Nov 1	Exoplanets
11	9	2019 Nov 7, 8	Surface of Mars
12		2019 Nov 14, 15	No Lab
13	10	2019 Nov 21, 22	Atmospheric Retention
14		2019 Nov 28, 29	No Lab, THANKS GIVING BREAK
15	11	2019 Dec 5, 6	Habitable Zone
16		2019 Dec 12, 13	No Lab, FINALS