

# ASTR 170 B1 – The Physical Universe - Section 05

## Spring 2014

**Class meets Tuesday and Thursday: 11:00 AM – 12:15 PM**

**Location: Steward Observatory Room N210**

**Instructor:** Prof. Edward Prather, Steward Observatory Room 207  
**E-mail:** eprather@email.arizona.edu Phone: 520-621-6530

**Office Hours and Teaching Assistant information to be announced.**

### Course Description

“The Physical Universe” presents the astronomical phenomena of the universe in the context of physical science. We will examine Newton's laws governing force and motion, the laws of thermodynamics governing temperature and energy, the role of electromagnetism in nature, and the atomic structure of matter, all in the context of current issues in space sciences. Additionally, we will take a historical approach to better understand the profound role that discoveries in science have made in advancing our quality of life and the prosperity of our society (3 credits).

### Required Text

*ASTR 170 B1: The Physical Universe, A Custom Edition for the University of Arizona.*, 5<sup>th</sup> Edition This custom published book contains *Lecture-Tutorials for Introductory Astronomy*, by Prather, Slater, Adams, and Brissenden, *as well as the course homework assignments and other critical course content* – **NOTE: BRING YOUR LECTURE-TUTORIAL BOOK TO CLASS EVERYDAY!**

### Instructional Philosophy of the Course

The overarching goal of this course is for you to understand the nature of science through the study of astronomy. This course also aims to help you develop your quantitative literacy, critical reasoning ability, and complex problem solving skills. By helping you improve your understanding of the big ideas in astronomy, we hope you will develop a lifelong interest in astronomy and current events surrounding astronomy. Additionally, we hope to connect key discoveries in science to your worldview so that you come to appreciate the incredibly valuable role that science plays in society. To meet these goals, the course instructors have carefully designed a sequence of learning tasks and assessment procedures as outlined on the following pages.

–**Active engagement with group activities occurs daily and is REQUIRED.** Research shows that humans typically learn a limited amount of information from lecture alone, no matter how clear or entertaining. Therefore, this course is composed of a series of mini-lectures that will be augmented by collaborative learning activities (Think-Pair-Share questions, Lecture-Tutorials (LT), and Ranking Tasks (RT)). These interactive learning activities target specific ideas that are known to be difficult for students to develop a robust understanding of from only lecture. These interactive learning activities are designed to be completed in-class by student pairs working collaboratively to develop their knowledge and skills about the topics under investigation. Through examining your ideas in collaboration with other students, and engaging in critical discourse with one another, you will develop your own understanding of course content at a level that far exceeds what is typically achieved from lecture alone. A significant emphasis in course homework and exams is placed on assessing how well you are able to explain your reasoning (both verbally and in writing) to the types of questions asked in these collaborative and active learning activities. You will not turn in the results of your in-class active learning activities for grading. However, since the questions of these activities are similar to the questions on course quizzes/exams, you will greatly benefit from working outside of class to be sure you fully understanding the answers and their reasoning. You should consider these activities as “ungraded homework” deserving of a significant amount of out-of-class study time. Many students find that working on their LTs, RTs, and Homework with course teaching assistants during help sessions outside of class to be extremely helpful in preparing them for course examinations.

**–Participation and Writing is REQUIRED.** Since this course is built around daily activities to accompany the lecture, your attendance and full participation at each class period will be an essential component of your success in the course. Periodically we will conduct “un-scheduled in-class writings” for participation points, these writings will be completed and collected during class. Additionally we will conduct “scheduled in-class writings”, which you will be responsible for researching and preparing for outside of class, but ultimately you will do the actually writing for these scheduled in-class writings during class times. All information about the schedule and content of the “scheduled in-class writings” will be communicated in-class through lecture, in the course Powerpoint slides (available on D2L), and through announcements posted on the course D2L webpage. You will not be allowed to make up any missed un-scheduled or scheduled in-class writings (unless you provide us with a Dean’s Excuse in advance of missing class). Therefore, to allow for the unavoidable periodic absences that naturally arise during the semester without heavily penalizing your overall course grade, **we will calculate your end of the semester participation and writing grade based on the following points/grading scheme:**

80% or more of participation and writing points – A

70% - 79% of participation and writing points – B

60% - 69% of participation and writing points – C

50% - 59% of participation and writing points – D

49% or less of participation and writing points – E

**This grading scheme is only for your participation and writing grade, not your overall end-of-semester grade (which is calculated from all components of class).**

**NOTE: YOU DO NOT NEED TO NOTIFY US WHEN YOU ARE ABSENT FROM CLASS** (unless you will be using a Dean’s Excuse).

**–Homework is REQUIRED.** – A large number of Homework problem sets have been provided in the course textbook. The purpose of these Homework problem sets is to help you access and strengthen your understanding of course material and to better prepare you for the course quizzes/exams. The content of EVERY Homework problem set will be emphasized on the corresponding quiz/exam. As a result it is expected that you will work through ALL of the Homework problem sets in sequence with the flow of content presented in the course (see the “In Class Activity Schedule” below). For the Homework portion of your overall end-of-semester course grade, you are required **to turn in your best 10 completed Homework problem sets**. You will submit these 10 Problem sets in a folder (do NOT use a three ring binder) with your name and Student ID number CLEARLY written on BOTH the FOLDER and EACH of the 10 Problem Sets. **The deadline to submit your Homework problem set binder/folder is Tuesday, May 6th, in class.** You may turn in your Homework problem set folder before this date as long as it contains 10 completed problem sets. **No late Homework problem sets will be accepted.**

**–Activities Outside of Class are REQUIRED.** During the semester you are required to participate in an evening of observing the universe using the Steward Observatory public telescope, **located in the courtyard of the Steward Observatory building on campus.** Observing times are available Monday – Thursday evenings starting at approximately 7:00 PM. You are required to sign up for your observing time before going to the telescope using the observing roster/sign-up sheets located in the main floor (lobby) of the Steward Observatory building. Bring the “*Observing Log*” sheet that is attached to the end of this syllabus with you to the telescope. **You must have the Observing Log stamped by the Telescope Operator.** See further details written on the Observing Log for more information on what to draw and what to write to complete your Observing Log. Note: the Steward Observatory telescope is only open at night, it cannot operate when it is cloudy, and there is a set number of people who can sign up for any given timeslot. Therefore, we recommend that you sign up early in the semester. Although we recommend that you submit your Observing Log very soon after completing your night of observing, they will also be accepted through **Tuesday, May 6th (In Class).** **No late Observing Logs will be accepted for ANY reason past Tuesday, May 6th.**

### **Quiz and Testing Circumstances**

There will be several quizzes given in-class during the semester, and one cumulative Final Exam given at the

end of the semester. All information about the schedule and content of the in-class quizzes will be communicated through lecture, in the course Powerpoint slides (available on D2L), and through announcements posted on the course D2L webpage. We will finalize the times of each in-class quiz as early as possible. **Please do not make any plans that interfere with quiz times once they have been scheduled, as there are no late or make-up quizzes given. If you need to miss a quiz, you will not be allowed to make up this quiz unless you have a prior approved Dean's Excuse. To avoid your being penalized for the possible event that you must miss a quiz, we drop your lowest quiz score when calculating your final course grade. You cannot be excused from the final exam and there are no opportunities to take it at a different time.**

The University has scheduled the time for the class final exam and this is the only time it is to be offered. During these closed-book, closed-note quizzes/exams, you **must bring a photo ID**, you are not allowed to wear headphones, or allowed to communicate with anyone in the classroom except for the course instructors and exam proctors. You are not allowed to take the quiz or exam outside of the classroom. You must turn in your quiz or exam immediately following completing it. Possession of course quizzes or exams outside of class will result in being failed from the course. If you have been certified as needing to take an exam under special circumstances, please make the necessary arrangements with the Disabilities Resource Services Center well in advance of the exam date (at least 10 days).

### **Final Course Grade Scheme**

Absolute grading (no curves, no competition, and **absolutely no extra credit** - it is in your best interest to help each other learn astronomy)

- |   |     |
|---|-----|
| 1. In-term Quizzes ( <i>drop lowest</i> ) | 40% |
| 2. Final Exam ( <i>cannot drop</i> )      | 20% |
| 3. Homework                               | 10% |
| 4. Participation and Writing              | 25% |
| 5. Observatory Visit/Log                  | 5%  |

|                                |   |
|--------------------------------|---|
| 90% – 100%                     | A |
| 80% – 89.9%                    | B |
| 70% – 79.9%                    | C |
| 60% – 69.9%                    | D |
| ≤59.9%                         | E |
| <i>No plus or minus grades</i> |   |

can be accessed via D2L. If you find a mistake with your posted scores, please contact your course TA as soon as possible. **It is your responsibility to discover and notify your TA of any errors on D2L. All scores to your work in the class are final 72 hours after they have been posted. Please make sure if you have any grading dispute that you contact your TA BEFORE this 72 hour period is over.**

### **Course Conduct**

**COME TO CLASS READY TO FULLY ENGAGE AND WORK COLLABORATIVELY EVERYDAY! RESPECT YOUR FELLOW CLASSMATES AND THEIR LEARNING! This class has a very specific and strongly-adhered-to course conduct policy: (1) You will not be allowed to use your cell phone at anytime during class (it should be kept in your bag, purse, or pocket on silent). (2) Laptops may only be used in the designated area of class and only to take notes or follow the course Powerpoint slides that are being presented at that time in class. (3) Your behavior in class must not disrupt the teaching of the class or the learning of other students in class. (4) You are expected to know and follow the University of Arizona Code of Academic Integrity. **Violation of the course conduct policy carries the following punitive actions: If you use your cell phone or it is visible, OR you choose to use your laptop for any reason other than for the purposes stated above, OR your behavior is determined by your professor or the course graduate teaching assistants to be disruptive to the learning of other students during class, you will be asked to provide your name and Student ID Number and you will lose one day of participation points. If your behavior is in violation of this course conduct policy more than twice during the semester, you will FAIL THE CLASS.****

We consider academic dishonesty, including cheating, plagiarism, and fabrication, as defined in the UA Code of Academic Integrity, to be a serious offense and the maximum punishments allowed will be pursued in all scenarios. This includes content on writing assignments, Homework assignments, or scantron forms. **If nearly (or totally) identical work is submitted by more than one student, all parties involved may receive the maximum punishment for plagiarism and/or cheating. Your work must be unique and original.** Again note that you should never take a quiz/exam or Scantron outside of the classroom for any reason. **Possession of course quizzes or exams outside of class will result in being failed from the course.**

| <u>Dates</u>           | <u>In-Class Activity Schedule</u>   |
|------------------------|---|
| 1/16                   | Introduction, Syllabus  |
| 1/21 – 1/23            | Seasons LT<br>Newton's Laws and Gravity LT  |
| 1/28 – 1/30            | Luminosity, Temperature and Size LT<br>Blackbody Radiation LT   |
| 2/4 – 2/6              | <b>Quiz #1 (tentatively)</b><br>Types of Spectra LT<br>Atoms and Light LT   |
| 2/11 – 2/13            | Molecules and Light LT<br>Sun Size LT   |
| 2/18 – 2/20            | Doppler Shift LT<br><b>Quiz #2 (tentatively)</b>  |
| 2/25 – 2/27            | Greenhouse Effect LT<br>Apparent and Absolute Magnitudes LT   |
| 3/4 – 3/6              | H-R Diagram LT<br>Stellar Evolution LT  |
| 3/11 – 3/13            | <b>Quiz #3 (tentatively)</b><br>Extrasolar Planets (Doppler) LT   |
| <b>3/15 – 3/23</b>     | <b>No Classes: Spring Break</b>   |
| 3/25 – 3/27            | Extrasolar Planets (Transit) LT<br>Milky Way Scales LT  |
| 4/1 – 4/3              | Galaxy Classification LT<br>Size and Scale RT   |
| 4/8 – 4/11             | <b>Quiz #4 (tentatively)</b><br>Looking at Distant Objects LT<br>Dark Matter LT   |
| 4/15 – 4/17            | Expansion of the Universe LT<br>Extrasolar Planets (Gravitational. Lensing.) LT   |
| 4/22 – 4/24            | Making Sense of the Universe LT<br>Hubble's Law LT  |
| 4/29 – 5/1             | Big Bang LTs<br><b>Quiz #5 (tentatively)</b>  |
| 5/6                    | Wrap up and Final Writing<br><b>Observing Logs Due Tuesday May 6th (In Class)</b><br><b>Homework Portfolio Due Tuesday May 6th (In Class)</b><br><b>LAST DAY of Class Tuesday May 6th</b> |
| <b>5/15 (Thursday)</b> | <b>FINAL EXAM Thursday May 15<sup>th</sup>, 10:30a.m. - 12:30 p.m.</b><br><b>In Room N210</b>   |

**Do not make travel arrangements that conflict with this Final Exam.**

**Exams are NOT given early.**

# *ASTR 170 B1 Observing Log*

Telescope Operator Stamp

Name: \_\_\_\_\_

Student ID: \_\_\_\_\_

Observing Date: \_\_\_\_\_

|                                 |  |
|---------------------------------|--|
| Drawing(s) of what you observed |  |
|                                 |  |

Use the space below AND the back of this page to provide a detailed description of the objects you viewed (as if you were describing what the objects looked like to a person who had his/her eyes closed). Include the time of your observation, the direction you were looking, important names and labels. Describe the appearance of the objects, including how they may have looked different than your expectations.

**ASTR 170 B1 – The Physical Universe**  
**SPRING 2013 STUDENT INFORMATION AND AGREEMENT SHEET**

Name \_\_\_\_\_

Student ID Number \_\_\_\_\_

Local Telephone Number \_\_\_\_\_

Email Address (*if checked regularly*) \_\_\_\_\_

By signing below, I acknowledge I understand that:

- (a) The policies, rules, regulations, dates and deadlines outlined within this course syllabus apply in all ways directly to me and my conduct in the course.
- (b) This course has scheduled in class examinations and a final examination as shown in the syllabus and listed in the University course/examination schedule, and I will not make plans that interfere with these scheduled examinations. In addition, I will bring my photo-student ID and a pencil to each examination and show my photo-student ID to a test administrator if asked.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date