

PHY 115: Descriptive Astronomy Spring 2016

The seeds of great discoveries constantly float around us, but only take root in minds prepared to receive them- Joseph Henry

Text: *Pathways to Astronomy* (with Starry Night) 3rd ed, S. Schneider, T. Arny.

Instructor: Dr. Matt Marone Room 243 Science and Engineering Building

Phone 301-2597, e-mail: marone_mj@mercer.edu

Assistance outside of class: W 3:15-4:15, T 3:00-4:00 SEB243, also check experimental lab SEB 115, outside of these hours please make an appointment. You may email me your questions.

Lecture: MWF 11:00-11:50 Room 144 Science and Engineering Building

Lab: R 6:30PM-10:00 PM. Locations are Room 217 Science and Engineering Building, or observatory. Location depends on conditions or laboratory objectives. Labs will be 2 hours and 40 minutes. Starting time will depend on sunset and you will be notified of the starting time for that week.

Additional Equipment: A small **red** flashlight is required and must be purchased by the student. A low cost LED flashlight can be found at local discount and hardware stores. You will also need clothing and supplies appropriate for field work as described below. Hand and foot warmers such as ToastiToes are very helpful in the field.

Starry Night software is required.

<http://store.simulationcurriculum.com/collections/starry-night-education/products/starrynightcollege-student>

The bookstore should also have this software available for you to purchase.

General:

This is an introductory Astronomy class. Astronomy is the oldest of the observational sciences. Observing the sky is a very important part of this class. We will not only learn about current theories in astronomy but we will go out and observe the night sky. By the end of this class you will be familiar with astronomical terminology, theories, and be able to perform some simple calculations. You will also learn how to setup and properly use a telescope. There are 88 official constellations, not all of which can be seen in our location. You will, however be able to find some of the more common constellations, asterisms, and deep sky objects. Since this is a Physics class, we will discuss the physical principles behind the topics we cover.

We will have to travel off campus to dark sites for much of our viewing. You will need to provide your own transportation and help transport equipment. If you are transporting equipment, you must **arrive 30 minutes before the start of lab**. The best time to observe is on cold clear winter nights. These are also the least comfortable. You should be prepared for cold dark nights in remote locations away from lights and restrooms. Dr. Marone, the Physics Department and Mercer University will not be held responsible or liable for your safety. This is your own personal responsibility. To

participate in this class you must agree to this and other transportation and safety rules. If you cannot agree to be responsible for your own safety, please drop the class immediately.

This class fulfills requirements in the Natural World Block of Mercer's General Education program. We will pursue our study of physics guided by the overarching principles of the Natural World Block which are as follows:

1. Generate a hypothesis to explain natural phenomena
2. Collect and organize experimental data in a format appropriate to a scientific field;
3. Analyze data through the use of quantitative and/or qualitative scientific reasoning;
4. Interpret a hypothesis in light of experimental evidence;
5. Accurately communicate scientific knowledge, observations, analyses, and/or conclusions.

Some of these principles will be addressed in lecture and some fit more naturally in the laboratory portion of this class.

Grades:

A (90 and above), B+ (85-89), B (80-84), C+ (75-79), C (70-74), D (60-69) F (below 60)
Your Final class grade will be derived from the following percentages **less** any deductions from you final average.

Tests (40%)

In-class Quiz (10%)

Final Exam (15%)

Homework (5%)

Labs (30%)

You will **not** be graded on a “**curve**”.

Extra Credit will only be available on in class exams, **if** available at all.

Deductions: Our observing sessions are not parties or social events. For some reason students become very “chatty” when out in the field. Setting up the telescopes and finding objects can be difficult and we need to concentrate. You need to be fully engaged and not standing around with you hands in you pockets complaining about how cold it is. We are not interested in your alcohol capacity, romances or the latest gossip. If you bring your “significant other” to lab as a visitor, please understand that public displays of affection (PDA) are considered to be distractions. Please refrain from this type of activity. If I feel you are causing any type of distraction, you will be warned. After a warning you will receive 3 point deductions from your final average for each incident. It is very easy to lower your grade by one letter or more.

Observing Sessions: You are required to be at the observing site on time. Please allow yourself enough time to travel to the site. If you are more than 15 minutes late to a session, you will have points deducted from you grade for that lab. You will loose points at a rate of **2 points per minute after the 15 minute grace period**. You are required to **sign in and out** of the observing session. Observing the sky is a very important part of

this class. The weather does not always cooperate with our intentions. There are some nights that we may be clouded or rained out. This is common in astronomy. When lab is not held at the observing site, we will meet in the lab room (214 SEB). Some nights we will work with computer simulations and there will be no observing session. I will try to e-mail the class if there is a change in plans. If it is obviously raining, just come to the lab room. It is important that you check your e-mail for any schedule changes. Many students do not use their Mercer e-mail. I must have an e-mail address that you check on a regular basis. **Please e-mail me as soon as possible**, so that I can create an e-mail list for the class. Some instructors will require you to attend special evening events. According to the Dean of our college; your lab class has priority over such events if the exact dates are not listed in the syllabus for that class. If there is a conflict between this lab class and a scheduled class event you must try to resolve the conflict with your instructor. If you are unable to resolve the conflict, please let me know.

You are allowed to miss two lab classes without penalty. If you miss part of a lab assignment that runs over multiple lab sessions, you are responsible for making up the missed work. If you miss an observing session for a valid excuse (as Defined by the University Handbook) you can make up the credit by one of three ways. You may attend a public observing session at the Macon Museum of Arts and Sciences. These sessions are held on clear Friday nights. You should call the museum for exact times. You can also make up the credit by attending an observing session with the Middle Georgia Astronomical Society. Their observing schedule can be found at <http://www.mgas.org/>. One final way to make up the credit is to attend an observing session with the Mercer Astronomy Club. Students often meet on the weekends at the same location we use. In all cases you will be required to document you make up session. I will provide you with the necessary form, which must be signed by the session leader.

The best indicator of observing conditions is the “Clear Sky Clock” which can be found at on the astronomy class web page.

Homework: You will turn in homework electronically via the WebAssign system. You must register and **pay a fee** to use this system. I will provide you with a special registration code. It is your responsibility to self-enroll in WebAssign. These problems are not group work. You must work them out on your own. Feel free to ask me for help

Electronic Submission of Assignments:

Students bear sole responsibility for ensuring that papers or assignments submitted electronically to a professor are received in a timely manner and in the electronic format(s) specified by the professor. Students are therefore obliged to have their e-mail client issue a receipt verifying that the document has been received. Students are also strongly advised to retain a copy of the dated submission on a separate disk. Faculty members are encouraged, but not required, to acknowledge receipt of the assignment

Tests: Make-up exams will only be given to students with valid excuses as defined by the university handbook (illness, emergency, class trips with prior notification). The make-up exam may be harder or easier than the regular in-class exam. Any disputes concerning

a test grade must be resolved within one week from the time the tests are returned or from the time the grades are made known to the class. Partial credit will be awarded depending how many steps were done correctly in a multi-step problem. The amount of credit will be at the discretion of the instructor. **No equation sheets are permitted.** A list of useful equations and constants will be provided with the test. Tests will also include sky charts and questions related to observing sessions/techniques. Students will be responsible for identifying various stars planets and constellations. Tests and quizzes will start on time. If you are late to class and arrive while the quiz is in progress you will have only the remaining time to complete your quiz. If you come in after the quiz, you will not have the opportunity to make it up. Do not be late!

Quizzes: There will be a 5-10 minute quiz every week. This quiz will cover any material discussed in class up to that point of time. Make-up quizzes are subject to the same conditions as make-up tests. The Quiz will usually be on Friday. It may be necessary to change the day and the change will be announced. Tests and quizzes will start on time. If you are late to class and arrive while the quiz is in progress you will have only the remaining time to complete your quiz. If you come in after the quiz, you will not have the opportunity to make it up. Do not be late!

Final Exam: The final exam is cumulative and may include **any** material discussed in class. Make-up exams will be subject to the same conditions as make-up tests.

Laboratory reports: You will write a lab report for each lab session. I will collect observation lab reports every two weeks. Due dates for non-observational labs will be given in class. Sometimes these reports will cover an indoor exercise and sometimes they will cover outdoor observing. The format for the reports varies. I will give you instructions concerning the format in lab class. Reports will be graded on a scale of 0-4, with 4 being a very good report. Think of this as the 4 point scale used for GPA. You may write group lab reports or individual reports. For a group report, all members of the group will receive the same grade.

Illness: If you are ill and will miss class please contact me. We can make arrangements to make up the missed work and I can inform you what material you need to read. If you are ill, please do not come to class. Students are advised to call or email the Student Health Center (301-2696 or shcmacon@mercer.edu) to report influenza-like symptoms. Students judged to have influenza-like symptoms will be instructed that they should not attend class, avoid contact with others as much as possible, and return to their normal schedule after they are free of fever (100°F or 37.8°C), or signs of a fever without the use of fever-reducing medications.

Honor code: You are bound by the Mercer honor code. The College's academic misconduct policy will be followed. All work, for which a grade is received, must be the **original** work of the **student** without aid or assistance of another party, or any printed

and or electronic data/information. Academic misconduct cases will be referred to the honor council and the student will automatically receive a grade of incomplete (IC) pending a ruling by the honor council.

Cell Phone and Calculator use: Out of courtesy for all those participating in the learning experience, all cell phones and pagers must be turned off before entering any classroom, lab, or formal academic or performance event. Cell phones are not to be used as calculators. You must use a device whose sole function is to be a calculator not a device that runs a calculator app or calculator simulation.

Classroom etiquette: You are expected to conduct yourself as a mature student, respectful of your classmates and instructor. You may be asked to leave the room if your behavior is disturbing the instructor or your fellow students.

Documented Disability Statement: Students with a documented disability should inform the instructor at the close of the first class meeting or as soon as possible. If you are not registered with Disability Services, the instructor will refer you to the Student Support Services office for consultation regarding documentation of your disability and eligibility for accommodations under the ADA/504. In order to receive accommodations, eligible students must provide each instructor with a Faculty Accommodation Form from Disability Services. Students must return the completed and signed form to the Disability Services office on the 3rd floor of the Connell Student Center. Students with a documented disability who do not wish to use accommodations are strongly encouraged to register with Disability Services and complete a Faculty Accommodation Form each semester. For further information please contact Disability Services at 301-2778 or visit the website at http://www.mercer.edu/stu_support/swd.htm.

Evaluation forms: In an ongoing effort to improve the quality of instruction, each student enrolled in this course is required to complete an end-of-semester course evaluation.

Important Dates:

January 9 First Day of Class

January 16 Holiday - Martin Luther King, Jr. Day

March 6-10 Spring Break

March 23 **Last Day for Course Withdrawal**

April 14 Holiday - Good Friday

April 28 Last Class Day

*****Final Examination, May 6, 2:00p.m. - 5:00 p.m.*****

Tentative List of Units to be Covered

Unit 1 Our Planetary Neighborhood

Unit 2 Beyond the Solar System
Unit 3 Astronomical Numbers
Unit 5 The Night Sky
Unit 10 Geometry of EMS
Unit 45 Jupiter and Saturn
Unit 47 Satellite Systems and Rings
*****Test 1 Feb 6 (M) *****

Unit 6 The Year
Unit 7 The time of Day
Unit 8 Lunar Cycles
Unit 39 Our Moon
Unit 12 Beginnings of Modern Astronomy
***** Test 2 Feb 27 (M) *****

Unit 21 The Dual Nature of Light and Matter
Unit 22 The Electromagnetic Spectrum
Unit 23 Thermal Radiation
Unit 24 Identifying Atoms by Their Spectra
Unit 25 The Doppler Shift
Unit 54 Surveying the Stars
*****Test 3 March 31*****

Unit 49 Comets
Unit 43 Asteroids
Unit 50 Impacts on Earth
Unit 55 Luminosities of Stars
Unit 56 Temperature and Composition of Stars
*****Test 4 April 21 (F) *****

Unit 59 The H-R Diagram
Unit 60 Stellar Evolution
Units 59,60 will only be tested on the final Exam which is cumulative.

Note: we will not cover every section of each chapter listed above. You will be informed of the relevant sections as we progress.

Field Work and Cautions

We will be outside for several hours at night. There are certain hazards associated with such activities. Our location is away from city lights because we need a dark sky. The observing area needs to remain dark so that we can see faint objects. You must not cause any light pollution with car headlights or flashlights. This presents a tripping hazard, since it is difficult to see where you are walking. Red light will preserve our night vision, so students must only use Red LED flashlights.

Since the weather will be cold in the winter, you should dress appropriately. Dress in layers and bring or wear the following items:

Jackets

Gloves

Long underwear

Blankets

A thermos with a warm drink is helpful

There are dangers associated with the local flora and fauna. Among these are poisonous plants, mosquitoes, ticks, and snakes. We will be near a lake so mosquitoes will be particularly troublesome in the spring. Some mosquitoes can carry West Nile virus and you should use repellent containing DEET. The Biology department has extensive information concerning field work and hazards which can be found at

http://bio-oak.mercer.edu/misc/field_work.htm

You are **required** to read and comply with the policies and suggestions found at the following links:

<http://bio-oak.mercer.edu/misc/tick.htm>

<http://bio-oak.mercer.edu/misc/mosquito.htm>

<http://bio-oak.mercer.edu/misc/transportation.htm>

http://bio-oak.mercer.edu/misc/field_work.htm

You will sign a statement that you read and understood these policies before you are allowed to attend the observing sessions.

The University will not provide transportation. You must provide your own transportation and travel at your own risk. You are expected to arrive at the observing site on time and we will not wait for you. Dr. Marone, the Physics Department and Mercer University will not be held responsible or liable for your safety. This is your own personal responsibility.

If you cannot comply with these requirements you must drop the class.

Directions to the Observatory Site in Crawford County

You should make your first visit to this site in the **daylight before our lab** so that you will not get lost.

- 1) Exit Campus from the South Campus Entry and turn Right (West) onto Mercer University Drive in the direction of the Mall
- 2) Drive about 0.7mi to Pio Nono Ave and Turn Left onto Pio Nono (GA 247 South)
- 3) Drive South on Pio Nono Ave for 0.8mi and turn Right onto Eisenhower Parkway
- 4) Continue West towards the Town of Lizella for about 16.7mi to Causey Rd. You will see Max Rd. on your right just 0.3mi before the intersection with Causey Rd.
- 5) Turn Left onto Causey Rd. and continue about 3.4mi to the entrance. You will see a yellow house on the Left side of the street just before the entrance. The Entrance is a gravel road.
- 6) Follow the gravel road to the observatory site.



