LINN BENTON COMMUNITY COLLEGE **SCIENCE DIVISION**

Winter Term 2020

Physics 104: Descriptive Astronomy

Course Number: **PH 104 CRN 31847**

Class Hours: **T Th 10:00am-12:20am MH 108**

Course Credits: 4

Texts:

Required: *Astronomy,* by Frankoni, Morrison, and Wolff, OpenStax. This is a free open educational resource, available at: https://openstax.org/details/books/astronomy

Instructor: Eric McPherren
Office Location: MH 111
Office Hours: **T Th** 1pm - 2pm or by appt
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Welcome to Astronomy!

In this course we will explore the forces inherent to our universe and how these forces arrange matter into celestial objects, including the familiar planets and stars, as well as the bizarre nature of dark matter and black holes. I truly hope this course helps you understand your place in the universe. This class is not about memorizing a ton of facts and data about planets and stars. Instead, it's about becoming familiar with the world in which we live by gaining a perspective that allows you to be confident in your observations and interpretations of that world.

Course Goals:

- To better understand the natural world. The knowledge you build in this course will encourage you to become more curious about how the universe works.
- To have a general knowledge of science so you can make more informed decisions as a contributing member to society.
- To develop and improve life-long skills such as problem solving, critical thinking, oral communication, and group work. I hope that the skills you learn and refine in this class will carry over into your other classes and your personal life.

Course Description

An introductory course covering the historical and cultural context of discoveries concerning planets and stars and their motion. Topics include models and the scientific method, astronomical tools, the solar system, star and stellar evolution, galaxies and cosmology. An accompanying laboratory is used for experiments, including outdoor observations. Prerequisite: Math 075. Counts as Physical Science Perspective for AS/OSU degrees and Science with Lab for AAOT degree.

Course Learning Outcomes

At the end of the course, a student will be able to:

- Solve scientific problems with quantitative methods.
- Describe the physical nature of the universe at the atomic, planetary, stellar, and galactic scales.
- Explain how light is used by astronomers to study the universe.
- Describe key events in the history of science, with particular emphasis on astronomy, and their impact on society.
- Describe and apply the process of scientific inquiry.

Learning Resources

- **Textbook:** Astronomy, by Frankoni, Morrison, and Wolff, OpenStax. This is a free open educational resource, available at: https://openstax.org/details/books/astronomy.

- **PH 104 Astronomy Course packet**, by LBCC. Please bring to lab days.
- **Moodle.** This is our online class hub: you will check grades, review syllabus and powerpoints, and submit homework assignments. Textbook and video links are also posted here.
- **Calculator.** A scientific calculator is needed for the class. No cell phone or graphing calculators allowed on exams. I will provide a set of calculators on exam days.

Grading (subject to change)

Category	Labs	Class Participation	Quizzes	Exams
Percentage of Final Grade	30%	10%	20%	40%

Grading Scale
A = 100-90%
B = 89-80%
C = 79-70%
D = 69-60%
F = 59% and below

Exams: All three exams will be administered as a 2-stage “pyramid” tests. You will have a set period of time to take the exam, turn it in, then retake the exam with a group of students in the class (graded 80% for the "solo" effort and 20% for the "group" effort). Your group score cannot lower your grade. If you know you will be absent on an exam day let me know ahead of time to schedule a make up. Once exams are returned they cannot be made up.

Final Exam: This exam is not cumulative, and will instead cover the last third of the courses material, it will have the same weight on your grade as the other two exams. The exam will take place March 16th at 8am to 9:50am in room MH108 (our regular classroom).

Lab exercises: Labs occur each week and are due at the beginning of the next class. Late labs are not accepted. Labs cannot be made up, but I drop your lowest score.

In-class activities: Each non-lab day will include a short (~20 minute) in-class activity. These activities are designed for you to interact and learn from other students about astronomy. Each group will submit one paper and each member will receive the same grade.

In-class quizzes. Most weeks we will have a short in-class quiz, covering previous material in class. These “low stakes” quizzes are designed to help you practice and prepare for the “higher stakes” exams. Your lowest quiz is dropped. If you know you will be absent on a quiz day, please let me know before taking the quiz to schedule a make up.

Campus Resources
Many resources such as the Library, Student Help Desk (for computers and software) Learning Center, the Writing Desk, and Family Connections, are available to you as a student. They are described on the LBCC website.

Any student who has difficulty affording groceries or food, or who lacks a safe and stable place to live, is urged to contact the **Roadrunner Resource Center (T-112):** www.linnbenton.edu/rcc. Furthermore, please talk with your instructor if you are comfortable doing so. This will enable them to provide any resources that they may have.

LBCC is committed to inclusiveness and equal access to higher education. If you have approved accommodations through the **Center for Accessibility Resources (CFAR)** and would like to use your accommodations in this class, please talk to your instructor as soon as possible to discuss your needs. If you believe you may need accommodation but are not yet registered with CFAR, please visit the CFAR website at www.linnbenton.edu/cfar for steps on how to apply for services or call 541-917-4789.

Statement of Inclusion

To promote academic excellence and learning environments that encourage multiple perspectives and the free exchange of ideas, all courses at LBCC will provide students the opportunity to interact with values, opinions, and/or beliefs different than their own in safe, positive and nurturing learning environments. LBCC is committed to producing culturally literate individuals capable of interacting, collaborating and problem-solving in an ever-changing community and diverse workforce. LBCC is an equal opportunity educator and employer.

Your responsibilities:

1. **Be prepared** for class by completing the reading and taking the quiz.
2. In class, **take notes by hand. Please, no electronics during lecture.** This means you must put away phones, laptops, and tablets. Numerous studies show that students learn more when taking notes by hand (i.e. Mueller and Oppenhiemer, 2014). If you have accommodations or concerns please see me. **If you miss lecture, please get notes from another student**, and do not just rely on lecture slides posted on Moodle.
3. **Actively participate** in class. I will make the effort to not subject you to long lectures. Instead, class time will focus on evidence based active learning that requires you to interact with others.
4. **Check the Moodle** website regularly to stay updated with current class information and due dates.
5. **Be on time**, stay for the entire class, listen, and contribute. If you are absent, please let me know.
6. **Honor Code Considerations:** This class is highly collaborative; however, there are expectations for individual work as well. If it is ever unclear to you, please ask. Any cheating, plagiarism, etc., may result in a zero and possible recommendation to the administration for further consequences.

My responsibility:

I am here to help you learn. I want each and every student to succeed in this class. Only you can do the learning, but expect me to be available for help during class and office hours and to facilitate the learning process.

Thanks, Eric

COURSE SCHEDULE (subject to change):

Wk	Tuesday	Read for Class	Thursday	Read For Class
1	Class Overview Scientific Inquiry **LAB**: **Black Box**	*1.1-1.5*	Seasons, Lunar Phases Eclipses	*4.2, 4.3, 4.5, 4.7*
2	**Quiz #1** Constellations History of Astronomy	*2.1, 2.2, 2.4*	Planetary Motion Gravity **LAB: Kepler's Laws**	*3.1-3.4, 4.6*
3	**Quiz #2** Light Spectroscopy	*5.1-5.3* **skip pg 160*	Telescopes **LAB: Spectral analysis**	*6.1-6.4*
4	**EXAM 1**		Solar System: Overview **LAB: The Solar System**	*7.1, 7.2*
5	**Quiz #3** Solar System: Planets	*8.3, 10.1, 10.3* *11.1, 11.2*	Solar System: Asteroids and Comets **LAB: Optics and telescopes**	*13.3, 14.1*
6	**Quiz #4** Solar System: Rings, Moons Exoplanets	*9.1, 9.2,* *12.1-12.3* *21.4, 21.5*	The Sun **LAB**: **Parallax**	*15.1-15.3* *16.2, 16.3*
7	**EXAM 2**		Measuring Stars **LAB: PHY. CHAR. OF STARS**	*17.1 *skip magnitude scale* *17.2, 18.4, 19.2*
8	**Quiz #5** Life and Death of Stars	*21.1, 22.1, 22.4,* *23.1*	Supernovae/Black holes/Neutron Stars **LAB: H-R Diagrams**	*23.2 – 23.4*
9	**Quiz #6** The Milky Way and other Galaxies	*24.1 – 24.5*	**LAB: Cepheid Variables**	
10	**Quiz #7** Cosmology, Extraterrestrial Life	*25.1, 25.3* *26.1, 26.2, 26.5*	**LAB: Expansion of the Universe**	*29.5* *30.3, 30.4*
11	**Final Exam (Mon March 16th)** **8am - 9:50am** **MH 108**			