Astronomy 100

**Unveiling the Universe**

**Fall 2016**

**Lecture:** TR 8:00-8:50 D101 SCI

# Lab : B204 SCI

Sec 1: W 8-9:50

Sec 2 : M 9-10:50

Sec 3 : M 12-1:50

Sec 4: W 2-3:50

Brad Hinaus Office Hours:

Office: B207 Science M 12-1

Phone: 346-4872 T 10-11 R 9-11

Email: bhinaus@uwsp.edu Whenever my door is open

**Text**

Essential Cosmic Perspective 7th Edition by Bennett

Lab Manual material to be purchased at the bookstore -Lab lecture material will be on D2L

**Tutoring**

The Department of Physics and Astronomy has a tutoring room. It is located at A105 Science. About the second week of class a schedule will be posted on the door. This service is free of charge and by walk in. Feel free to use it as you wish. There will also be group tutoring which will be offered through the Learning Resource Center. There will be a representative coming to class to describe the details of the tutoring.

**Office Hours**

I have office hours. During office hours, I wait for questions. Feel free to come in and ask anything, including questions ranging from “I don’t get it,” to “How exactly does thermonuclear fusion work?” and everything in between. You are also free to ask questions about anything else you find interesting in science.

**University General Education Program (GEP) Learning Outcomes**

* **Explain major concepts, methods, or theories used in the natural sciences to investigate the physical world**.
	+ Explain how Astronomers scientifically determined the following:
		- Structure of the Solar System (Geocentric vs. Heliocentric)
		- Formation of the solar system/ moons
		- Composition and mass of the planets
		- Shape of the Milky Way Galaxy
		- Expansion of the Universe
* **Interpret information, solve problems, and make decisions by applying natural science concepts, methods, and quantitative techniques.**
	+ **Interpret information ….**
		- Observe the motion of celestial objects (stars, planets, moon and sun) in the sky and determine the general pattern of motions based on: a) latitude of the earth b.) season.
		- Determine the relative ages of neighboring planetary surfaces based both on cratering rate and the superposition of craters.
		- Describe how planets and moons are formed based upon their composition.
		- Explain how the carbon dioxide cycle helps determine the temperature of Earth, Venus, and Mars.
		- Use the HR diagram, and describe how a star’s luminosity varies with color, temperature, and spectral classification.
	+ **….solve problems and make decisions by applying natural science concepts, methods, and quantitative techniques**.
		- Use models to determine rise/set times of different objects (sun, moon, stars) and how the rise/set times vary by season or latitude, phase of the moon, or day by day variation.
		- Measure the mass of planet, star, or galaxy using Kepler’s 3rd Law
		- Determine the age of a planetary surface based on crater counts and calibrated cratering densities.
		- Determine the age of a cluster of stars.
		- Determine the relative sizes (radii) of stars based on luminosity and temperature.
		- Describe how a star’s size, color, temperature, and luminosity vary through its birth, time on the main sequence and it’s death
* **Describe the relevance of some aspect of the natural science to their lives and society.**
	+ How can you use the sun, moon, or stars to tell time, or your location on earth?
	+ Describe our place in the universe?
	+ What is the origin of the atoms in your body?
	+ Explain why we have meteor showers?
	+ When will the sun die?
	+ What will happen to the Universe?
	+ How do we know what we know?

Organization of Material

Unit 1 – Motions in The Sky

Unit 2 – The Solar System and Planets

Unit 3 – The Sun and Stars

Unit 4 – Galaxies

**Grading Overview**

There are four areas for grading

1. Homework
2. Four Exams
3. Labs
4. Observatory Visit

**Summary of Grading Points**

Observatory Visit 20

Homework 100

Four Exams 400

Labs 100

Total 620 pts

## Grading Scale as a Percentage of Total Points

A 93-100

1. 90-92.9

B+ 87-89.9

B 83-86.9

B- 80-82.9

C+ 77-79.9

C 73-76.9

C- 70-72.9

D 60-69.9

F 00-59.9

**Examinations**

Four examinations will be given during the semester. The dates of these exams have been listed on the tentative schedule. The midterm exams will each be worth 100 points. A small portion of the final exam will cover the material in the fourth section of the course and the majority will cover the main ideas from the entire course. The final exam will be worth 100 points. Missing any exam will earn a grade of 0 (zero).

**Homework**

Homework will be given in one of two ways. Some homework will be given to be finished at home. The other assignments will be in class assignments which you may work with your other classmates. These will be turned in at the end of the class and graded (mostly for effort). At the end of the semester, your homework score will be scaled to 100 points (which will be equivalent to the percentage of homework points earned). Note that homework is the easiest way to get 100 free points. **Late Homework Policy:** Homework can be handed in late but with a penalty. The penalty is usually 25% of the maximum score.

### Laboratory

Each laboratory will be graded out of 10 points. Part of the score will come from the work you perform with your group. The other part of your grade will come from your pre-lab assignments. At the end of the semester, your final lab score will be scaled to 100 points. **Since the course fulfills a lab requirement, if you fail the lab (less than 60%), you fail the course**.

Attendance: Attendance will not be kept. Attendance is not required for lecture or discussion, but **attendance is required when examinations are given. Attendance is required every time that you will be graded. That means you must attend all examinations and all laboratory periods.** Make up work will only be accepted for excused absences. Excused absences include a death in the immediate family, an illness with a note from a doctor, PA, NP, or Health Services, a conflict with religious observances, or an event where you officially represent the University of Wisconsin – Stevens Point (i.e. sporting events, artistic events) and the event directly conflicts with the test or lab. **All excused absences must be approved before the day missed with appropriate documenting materials.** All unexcused absences will automatically earn a grade of zero (0).

In accordance with the University of Wisconsin policy, any potential conflict between class work and religious observances must be made known to the instructor within the first two weeks of class. The student must notify the instructor of the specific days and dates of specific religious observances for which the student seeks relief from academic requirements.

UW-SP Observatory Visit

**Assignment:** Visit the UWSP Observatory one time during the semester to view objects through the telescope.

**What to hand in:** The observatory has photocopies of the “Observation Form” on site. You need to view **two** objects. On the “Observation Form,” you will need to draw a rough sketch of what you see through the viewfinder, write a brief description, and record some telescope information. **Be sure to have the observatory staff sign the form before you leave.**  Hand in the form in at any time during lab or lecture. If you live far from Stevens Point, see the instructor for an alternative assignment.

**When is it open:** Tuesday and Wednesday nights from 8:30 p.m. until 10:00 p.m. are used primarily by astronomy students but anyone is welcome. Public viewing runs from mid-September to mid-December then late-January through mid-May. **NOTE:  IF SKIES ARE CLOUDY THE OBSERVATORY WILL BE CLOSED.** The observatory can be contacted to determine if the we are open and have clear skies from any touch-tone phone by calling **(715) 346-2208** and selecting the observatory option (number 3) from the automated attendant.  We update our message about 7:30 p.m. to give visitors our best estimate of the probability of clear skies and the observatory being open.

**Location:** Access to the observatory is obtained by using the southwest stairwell in the Science Building and going to the fourth floor, room D402.  Located on the roof of the Science Building at the UWSP campus, the Observatory houses a new 0.4-m (16-inch) Meade, computer controlled telescope.

**In the winter, dress warmly** since the observatory temperature is the same as the outside temperature.

Tentative Schedule

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| --- | --- | --- | --- |
| Wk. | Dates | Lecture Topic  | Lab Cycle:  **Wednesday and the following Monday** |
| 1 | 9/6 | Intro | W – Intro/Planetarium |
| 2 | 9/12 | Motions of the Stars/Rotating Earth Model | M– Intro /PlanetariumW –Motion of Stars / Planetarium |
| 3 | 9/19 | Rotating Earth/Celestial Sphere | M –Motions of the Stars/ PlanetariumW –Phases of the Moon |
| 4 | 9/26 | Ecliptic/ Tilt of the Earth | M - Phases of the MoonW –Consequences of a Tilted Earth |
| 5 | 10/03 | Scientific Theories of the Solar System  | M – Consequences of a Tilted EarthW –Location from the Stars and Zodiac Viewing |
| 6 | 10/10 |  Scientific Theories(**Exam on Thursday**) | M -Location from the Stars and Zodiac ViewingW –Mass of Jupiter |
| 7 | 10/17 |  Formation of the Solar System/Extra Soar Planets | M - Mass of JupiterW –Cratering on Planetary Surfaces |
| 8 | 10/24 | Earth Interior/ Formation of Atmosphere/Interior Planets | M -Cratering on Planetary Surf.W –Inner/ Outer Planets Video |
| 9 | 10/31 | Outer Planets, Moons and Rings | M - Inner/Outer Planet VideoW –Telescopes |
| 10 | 11/07 | Sun (**Exam on Thursday)** | M - TelescopesW –Spectra and Light |
| 11 | 11/14 | Characterizing Stars  | M - Spectra and LightW –Stars and Nebula |
| 12 | 11/21 | HR Diagram (Thanksgiving Week) | M - Stars and NebulaW No Lab  |
| 13 | 11/28 | Stellar Evolution, Death of a Star  | M No LabW – Morphology of Galaxies |
| 14 | 12/05 | Galaxies **(Exam Thursday**) | M – Morphology of GalaxiesW –Hubble’s Law  |
| 15 | 12/12 | Milky Way  | M - Hubble’s LawW –No Lab |

Final Exam – Tuesday, December 20th 12:30-2:30

Squares