Astronomy 100
Unveiling the Universe
Fall 2023
Section 1 - 5

Description:
An encounter with ideas concerning the physical universe, from earth to intergalactic space. 2 hours lecture, 2 hours lab per week

Text
Essential Cosmic Perspective 7th Edition by Bennett, available from the bookstore
Lab Manual material: Distributed on Canvas
Copies of Lectures, Lab Introductions, videos, and assignments and their solutions will make their way to Canvas

Lecture: M, W 1:00-1:50 D101 SCI

Lab:

Th	9:00 - 11:50 Section 4	B204 SCI
Th	1:00 - 2:50 Section 2	B204 SCI
Th	3:00 - 4:50 Section 5	B204 SCI
F	11:00 - 12:50 Section 3	B204 SCI
M	11:00 - 12:50 Section 1	B204 SCI

Instructor Info
Brad Hinaus :
Office: B107 Science
Cell Phone 715-254-5141
Email: bhinaus@uwsp.edu

Instructor Student Hours: B107 SCI
M 2-4
W 10-12
Th 12-1
F 10-11
By Zoom during above hours or by appointment

1. Send me a text on cell phone @7152545141
2. Click to link for meeting. https://wisconsin-edu.zoom.us/j/8496836849

Student Hours
Faculty are here to help you! I have student hours which are specific times set aside to assist students with their school work. They can be in my office, B107 SCI (one floor below lab) or on Zoom. If these times don't work, we can set up a separate meeting. During student 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. But I suspect most questions will be about lab and homework. Remember, if this stuff was easy, we would just give you a book and a test 15 weeks later, but it's not easy, so we are here to help you through it, that is why it is a college course.

Course Topics

Unit 1 – Motions in The Sky
Unit 2 – The Solar System and Planets
Unit 3 – The Sun and Stars
Unit 4 – Galaxies (shorter)

University General Education Program (GEP) Learning Outcomes

Below each GEP learning outcome is a bulleted sample list of items we will cover in the course. This list shows how this specific course is aligned with the GEP learning outcomes (in bold).

- **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
    - Death of a Star
    - 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 observer on earth and 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 (radius) 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 Solar System or Milky Way Galaxy?
  - What is the origin of the atoms in your body?
  - Explain why we have meteor showers?
  - When will the sun die?
  - How does carbon dioxide affect a planet's temperature?
  - What will happen to the Universe?
  - How do we know what we know?

My Teaching Philosophy

I think the college classroom should reflect basketball practice or music lessons. Mentally picture what basketball practice looks like or what individual music lessons look like. What do you see? It's active, people (the learners) are moving around and doing things. Players or instrumentalists don't spend 100% of their time watching their coach or teacher draw diagrams on a whiteboard and talk continuously. They spend a good portion of their time working on the skills with each. That is what I want us to do, work on our coding skills during class *with each other*. Will we eliminate the lecture? No, but I hope to reduce the amount of time in that mode so we can practice and ask questions. Most often, we will introduce a topic a lecture, then spend the next 1 or 2 lectures using it in coding.

Here is my philosophy on answering questions when you are working in lab or come to office hours. It is similar to the statement, "Give a person a fish, feed them for a day, teach them how to fish and feed them for a life." When a person asks, "How do I know if this galaxy contains old stars?", I will try to ask the person a question so **they can reason** out what the answer is. This will teach them to be a better thinker, understand their own thinking, and understand the reasoning better. Is it efficient? Not

in the time scale of class. Is it quicker to tell you the answer? Yes. But it is more efficient in the time scale of completing a major and getting a degree.

Inclusivity Statement

It is my intention that students from all backgrounds are well served in this course. Backgrounds can include gender, race, orientation, age, disability, religion, culture, and other ways a person identifies. Other backgrounds that give students various perspectives of this course are their current mathematical abilities, their developing problem-solving abilities, past courses, life experiences growing up, classroom environments they have experienced, preferred learning style and more. In this course, it is expected that each other's thoughts and comments be respectfully listened to and/or responded to during class, lab, and discussion. There are numerous ways to have a computer solve a problem. It is also expected during the course times that students work to assist each other in the learning process.

To help you with the difficulties of this class, I am available during scheduled office hours and meeting by appointment. In past semesters I have had standing 1-hour meetings with individual students each week. I am welcome to those if you would like to schedule on with me. If you would like to hear a different perspective, the STEM Drop-in tutoring is available in CBB 190 (see below). If you have suggestions for me on how to make this class more inclusive between instructor/student and student/student interactions or activities, please let me know.

Grading Overview

There are six areas for grading

1. Homework
2. Four Exams
3. Labs
4. Written Reflection
5. "Astronomy" Only
6. Observatory Visit

Summary of Grading Points

Written Reflection	20	3.0%
"Astronomy" Only	20	3.0%
Observatory Visit	20	3.0%
Homework	100	15.1%
Four Exams	400	60.6%
Labs	100	15.1%
Total	660 pts	

Grading Scale as a Percentage of Total Points

A	93-100
A-	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 (50-65 ish questions). 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). Exams will be given during class. Most questions are multiple choice. A few questions will require a written response or a drawing of a diagram.

Homework/Late Homework Policy

Homework will be given via Canvas. 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. You can work on the homework individually or with your classmates, but each person will submit their work individually (on Canvas). **Late Homework Policy: Homework** can be handed in late but with a penalty. The penalty is up to 25% of the maximum score and will be applied at the discretion of the instructor.

Laboratory

Each laboratory will be graded out of 20 points. The score will come from the work you perform with your group. The laboratory will be handed out at the beginning of each lab. There is nothing to prepare for lab, just show up. Your lowest lab score will be dropped. If you miss a lab because of illness, sporting event, or any other reason, you will receive a zero and that will count as your dropped lab. At the end of the semester, your final lab score will be scaled to 100 points.

Written Reflection

One of the General Education Programing Learning Outcomes is, "**Describe the relevance of some aspect of the natural science to their lives and society."** Your written assignment will be to "Describe the relevance of some aspect of astronomy to your life and/or society." Your reflection needs to be at least 200 words, about two paragraphs. Details will come later in the semester. The assignment will be worth 20 points. It will be due by the last day of the semester.

"Astronomy" Only

In the last few years, I have noticed more students using the word Astronomy interchangeably with Astrology. They are not the same thing. If you use the two words interchangeably while communicating with me, you will lose 10 points from your 20 points score each time. You cannot receive a grade below a zero.

1. Astronomy - **The science** of the universe in which the stars, planets, etc. are studied, including their origins, evolution, composition, motions, relative positions, sizes, etc.
2. Astrology - the divination of the supposed influences of the stars and planets on human affairs and terrestrial events by their positions and aspects

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 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 they are open and have clear skies from any by calling **(715) 346-2208** and selecting the observatory option (number 5) 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.

Various University and Course Policies

Attendance: Attendance is not taken. It is to your benefit to come to the lecture. During labs and exams, you will receive a grade. If you cannot take the exam on the day or attend lab (after your one dropped lab), you must have an excused absence or make prior arrangements with the instructor. 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. **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).

Understand When You May Drop or Withdraw from This Course
It is the student's responsibility to understand when they need to consider unenrolling from a course.

- **Dropping the Course**: You may drop the course on or **before Sept 14, 2023, with no grade on your official university transcript.** The date of the drop will appear. This is called a "clear drop
- **Withdrawing from the Course**: You may withdraw from this class on or **before Nov. 10, 2023. You will receive a grade of "W" on your transcript**. After the first two semesters of enrollment at UWSP, students are allowed a total of only four (4) "W" drops during the balance of their undergraduate career, including summer sessions.
- These dates are posted on the UWSP Academic Calendar. After the withdrawal date, a serious and compelling reason is required to drop from the course. Serious and compelling reasons includes: (1) documented and significant change in work hours, leaving student unable to attend class, or (2) documented and severe physical/mental illness/injury to the student or student's family.
- More Info from this University Link

Incomplete Policy
Under emergency/special circumstances, students may petition for an incomplete grade and make up a limited amount of work before a deadline. Link - University Policy on Incompletes

Inform Your Instructor of Any Accommodations Needed
If you have a documented disability and verification from the Disability Resource Center (DRC) and wish to discuss academic accommodations, please contact your instructor as soon as possible. It is the student's responsibility to provide documentation of disability to the DRC and meet with their counselor to request special accommodation *before* classes start. Three Steps to Apply for Accommodations.

The Disability Resource Center is in 108 Collins Classroom Center (CCC) and can be contacted by phone at 715-346-3365 (Voice) (715) 346-3362 (TDD only) or via email at datctr@uwsp.edu

Statement of Policy
UW-Stevens Point will modify academic program requirements as necessary to ensure that they do not discriminate against qualified applicants or students with disabilities. The modifications should not affect the substance of educational programs or compromise academic standards; nor should they intrude upon academic freedom. Examinations or other procedures used for evaluating students' academic achievements

may be adapted. The results of such evaluations must demonstrate the student's achievement in the academic activity, rather than describe his/her disability.

UWSP Academic Honesty Policy & Procedures

Student Academic Disciplinary Procedures

UWSP 14.01 Statement of principles

The board of regents, administrators, faculty, academic staff and students of the university of Wisconsin system believe that academic honesty and integrity are fundamental to the mission of higher education and of the university of Wisconsin system. The university has a responsibility to promote academic honesty and integrity and to develop procedures to deal effectively with instances of academic dishonesty. Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect of others' academic endeavors. Students who violate these standards must be confronted and must accept the consequences of their actions.

UWSP 14.03 Academic misconduct subject to disciplinary action.

(1) Academic misconduct is an act in which a student:

(a) **Seeks to claim credit for the work or efforts of another without authorization or citation**;

(b) Uses unauthorized materials or fabricated data in any academic exercise;

(c) Forges or falsifies academic documents or records;

(d) Intentionally impedes or damages the academic work of others;

(e) Engages in conduct aimed at making false representation of a student's academic performance; or

(f) Assists other students in any of these acts.

(2) Examples of academic misconduct include, but are not limited to: cheating on an examination; collaborating with others in work to be presented, contrary to the stated rules of the course; **submitting a paper or assignment as one's own work when a part or all of the paper or assignment is the work of another**; submitting a paper or assignment that contains ideas or research of others without appropriately identifying the sources of those ideas; stealing examinations or course materials; submitting, if contrary to the rules of a course, work previously presented in another course; tampering with the laboratory experiment or computer program of another student; knowingly and intentionally assisting another student in any of the above, including assistance in an arrangement whereby any work, classroom performance, examination or other activity is submitted or performed by a person other than the student under whose name the work is submitted or performed.

Religious Observances

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.

Tutoring

STEM Drop-In Tutoring Center Schedule

Tutors for STEM courses are available on a drop-in basis - no appointment needed! The STEM Drop-In Tutoring Center is located at CBB 190, right next to Starbucks. Click on the subject below to expand the section to view tutoring days and times. Tutors are students who have done well, A- or better, in classes, so they are knowledgeable about the subject. Drop-in Tutoring is FREE! The schedule will be posted at the following link shortly after the semester begins.
https://www3.uwsp.edu/tlc/Pages/dropInTutoring.aspx

Tentative Schedule

Wk.	Dates	Lecture Topic	Lab Titles for the Week Cycle **W, Th, F, M**
1	9/5	Syllabus	Lab 0: Intro/Planetarium
2	9/11	Ch. 2 Motions of the Stars/Rotating Earth Model	Lab 1: Motion of Stars
3	9/18	Ch. 2 Rotating Earth/Celestial Sphere	Lab 2: Phases of the Moon
4	9/25	Ch. 2 Ecliptic/ Tilt of the Earth	Lab 3: Consequences of a Tilted Earth/ Planetarium
5	10/2	Ch. 3Scientific Theories of the Solar System	Lab 4: Location from the Stars and When to View Your Zodiac
6	10/9	Ch. 3 Scientific Theories (**Exam on Wednesday**)	Lab 5: Mass of Jupiter
7	10/16	Ch. 6 & Ch. 10 Formation of the Solar System/Extra Soar Planets	Lab 6: Planetary Cratering
8	10/23	Ch. 7 Earth Interior/ Formation of Atmosphere/Interior Planets	Lab 7: Inner/ Outer Planets Video
9	10/30	Ch. 8 Outer Planets, Moons and Rings	Lab 8: Spectra and Light
10	11/06	Ch. 11Sun **(Exam on Wednesday)**	Lab 9: Stars and Nebula
11	11/13	Characterizing Stars Ch. 12	Lab 10: Star Video
12	11/20	Ch. 12HR Diagram (Thanksgiving Week)	Thanksgiving – No Lab (Th, F)
13	11/28	Ch. 13 &14 Stellar Evolution, Death of a Star	Lab 11: Morphology of Galaxies (M, Th, F)
14	12/05	Ch. 15Milky Way **(Exam Wednesday)**	Lab 12: Hubble's Law (M, Th, F)
15	12/12	Ch. 16 Galaxies	No Lab

Final Exam – 12:30-2:30 pm am Tuesday Dec 19, 2023 - Complete a 120-minute exam on this day (half unit exam, half cumulative, mostly multiple choice, review sheet given)

ASTR 100-01 (80754)	Unveiling the Universe (Lecture)	12/19/2023, Tuesday	12:30PM - 2:30PM	Science Building (SCI) D101	120

Squares