

Astronomy

Course Number: 468 (Elective- 11,12)

Purpose: This course is designed to acquaint the student with the basic concepts of Astronomy without the usual emphasis on mathematics.

Prerequisites: None

Course Objective: This course will integrate the assigned text, discussion and internet resources to provide students with a methodology for life long science learning.

Students will discover the dynamic nature of the night sky.

Students will develop an understanding of our solar system and use that understanding to explore.

Students will relate the study of Astronomy to the interaction of solar systems, stars, and related forces.

Students will practice the ability to recognize that which is pertinent and exclude the irrelevant.

Students will extend their personal experiences with current everyday topics as an opportunity to interrelate their experiences and thus unify the material.

Students will use classroom or library computer resources to research current topics in science and present a written or oral explanation of their research.

The student's expected outcome is the interpretation and application of principles as opposed to the rote memorization and assisted recall of scientific facts.

Content Objectives:

Introduction ...This Unit is designed to introduce the student to the primary objectives of the course. The teacher and student will discuss classroom procedures, homework assignments with deadlines, and course grading requirements. The principles of investigation using the scientific method will be introduced and each student will be expected to use the scientific method in modified form for all discussions and investigative work.

Unit 1 - Modern Astronomy.....This unit introduces the student to the study of Astronomy. The student discusses how astronomers study the universe and why they feel justified in believing the theories that are developed. The student will identify the importance of calculations in the understanding of “what you see”. A discussion of the role physical laws play in the organization of the universe will provide a framework for the student to understand the everyday aspects of “naked-eye” observations.

Unit 2 - The Stars..... This unit introduces the student to the staggering size of the universe by comparing the distances between stars. A study of parallax introduces the student to measuring stellar distances. Knowledge of a star’s brightness and distance allows the calculation of luminosities, and total energies per second. These calculations provide understanding for the introduction of stellar evolution. The student investigates the impact of mass on the ultimate fate of stars and discusses the formation and evolution of our sun.

Unit 3 - The Universe.....This unit introduces the Milky Way as a galaxy and provides the student with the make-up of a galaxy. The student discovers the numerous galaxies beyond the Milky Way and how the existence of these galaxies were confirmed by the period-luminosity law for Cepheid variables. The student ponders the life cycle of the universe and the possibility or probability of life-forms on distant planets orbiting other stars.

Unit 4 - The Solar System.....This unit examines the origin of the solar system and a survey of its contents. The student will discuss the individual personalities of each planet as a result of differences in size, chemical composition, rotation rate, atmosphere, and surface features. The formation and movement of moons, asteroids, meteoroids, and comets will be explored as a source of evidence or clues about the formation of the Solar System.

Astronomy - 468 Syllabus

Text Reference: Foundations of Astronomy (7th ED.), Seeds, Michael A., Brooks/Cole – Thomson Learning

Lesson Objectives: Upon completion of the lesson, the student will be able to identify & discuss:

Part 1 Exploring the Sky

Chapter 1 The Scale of the Cosmos

- Explain how astronomers study the universe
- Outline the steps of the scientific method

Chapter 2 The Sky

- The Stars
- The Sky and Its Motion
- The Cycles of the Sun
- The Motion of the Planets
- Astronomical Influences on Earth's Climate

Chapter 3 The Cycles of the Moon

- The Changeable Moon
- The Tides
- Lunar Eclipses
- Solar Eclipses
- Predicting Eclipses

Chapter 4 The Origins of Modern Astronomy

- The Roots of Astronomy
- The Copernican Revolution
- The Puzzle of Planetary Motion
- Modern Astronomy

Chapter 5 Newton, Einstein and Gravity

- Galileo & Newton
- Orbital Motion
- Einstein & Relativity

Chapter 6 Light and Telescopes

- Radiation: Information from Space
- Optical Telescopes
- Special Instruments
- Radio Telescopes
- Space Astronomy

Part 2 The Stars

Chapter 7 Starlight and Atoms

- Starlight
- Atoms
- The Interaction of Light & Matter
- Stellar Spectra

Chapter 8 The Sun – Our Star

- The Solar Atmosphere
- Solar Activity
- Nuclear Fusion in the Sun

Chapter 9 The Family of Stars

- Measuring the Distances to Stars
- Intrinsic Brightness
- The Diameters of Stars
- The Masses of Stars
- The Census of Stars

Chapter 10 The Interstellar Medium

- Visible-Wavelength Observations
- Long- & Short Wavelength Observations
- A Model of the Interstellar Medium

Chapter 11 The Formation of Stars

- Making Stars from the Interstellar Medium
- The Source of Stellar Energy
- Stellar Structure
- The Orion Nebula

Chapter 12 Stellar Evolution

- Main-Sequence Stars
- Post Main-Sequence Evolution
- Evidence of Evolution: Star Clusters

Chapter 13 The Death of Stars

- Lower Main-Sequence Stars
- The Evolution of Binary Stars
- The Death of Massive Stars

Chapter 14 Neutron Stars and Black Holes

- Neutron Stars
- Black Holes
- Compact Objects with Disks & Jets

Part 3 The Universe

Chapter 15 The Milky Way Galaxy

- The Nature of the Milky Way Galaxy
- The Origin of the Milky Way
- Spiral Arms
- The Nucleus

Chapter 16 Galaxies

- The Family of Galaxies
- Measuring the Properties of Galaxies
- The Lives of Galaxies

Chapter 17 Galaxies with Active Nuclei

- Active Galaxies
- Quasars

Chapter 18 Cosmology

- The Structure of the Universe
- The Big Bang
- Refining the Big Bang: Theory and Observation

Part 4 The Solar System

Chapter 19 The Origin of the Solar System

- The Great Chain of Origins
- A Survey of the Solar System
- The Story of Planet Building

Chapter 20 Planet Earth

- The Early History of Earth
- The Solid Earth
- The Atmosphere

Chapter 21 The Moon and Mercury: Airless Worlds

- The Moon
- Mercury

Chapter 22 Venus & Mars

- Venus
- Mars
- The Motion of Mars

Chapter 23 Jupiter & Saturn

- Jupiter
- Jupiter's Family of Moons
- Saturn
- Saturn's Moons

Chapter 24 Uranus, Neptune, and Pluto

- Uranus
- Neptune
- Pluto ("not so fast")

Chapter 25 Meteorites, Asteroids & Comets

- Asteroids
- Comets
- Impacts on Earth

Lesson Planning Guide
Semester Hours - 70

Ch	Subject	Class	Week	Quiz	Test
	UNIT I - Exploring the Sky				2
1	The Scale of the Cosmos	2	1		
2	The Sky	3	1		
3	The Cycles of the Moon	2	2		
4	The Origin of Modern Astronomy	3	2		
5	Newton, Einstein, and Gravity	2	3		
6	Light and Telescopes UNIT 2 – The Stars	3	3		2
7	Starlight and Atoms	2	4		
8	The Sun – Our Star	3	4		
9	The Family of Stars	2	5		
10	The Interstellar Medium	2	5		
11	The Formation of Stars	1	5		
12	Stellar Evolution	1	6		
13	The Deaths of Stars	2	6		
14	Neutron Stars & Black Holes UNIT 3 – The Universe	2	6		2
15	The Milky Way Galaxy	1	7		
16	Galaxies	2			
17	Galaxies with Active Nuclei	1			
18	Cosmology	1	7		
	UNIT 4 – The Solar System				2
19	The Origin of the Solar System	2	8		
20	Planet Earth	3	8		
21	The Moon & Mercury: Airless Worlds	2	9		
22	Venus & Mars	3	9		
23	Jupiter & Saturn	2	10		
24	Uranus, Neptune & “Pluto”	3	10		
25	Meteorites, Asteroids, & Comets	5	11		