Master Syllabus Department of Physics and Astronomy



ASTR 101 Astronomy Materials for the Teacher

Catalog Description

Fundamentals of astronomy including historical aspects and modern astronomy concepts. Emphasizes construction of models and experimentation appropriate to the classroom. Designed primarily for students in education programs. (3 credit hours)

Course Objectives

Students should be able to perform the following activities:

History

Compare and contrast Ptolemaic and Copernican cosmologies.

State and explain Kepler's laws of Planetary Motion.

Describe Galileo's contributions to our understanding of motion and list his telescopic observations.

State Newton's three laws of motion and be able to apply them to astronomical motions.

State and explain Newton's law of Universal Gravitation.

Optics and the Nature of Light

Sketch the path of light as it goes through a telescope.

State and define the different parts of a reflection telescope.

State and define the different parts of a refraction telescope.

Describe the quantitative properties of electromagnetic radiation.

State Kirchoff's laws of spectral analysis and describe the physical conditions indicated by

each law. Identify examples of each type of light source.

Explain how absorption lines and emission lines are produced in the Bohr model of the atom

and how they relate to chemical composition and motion.

State the inverse square law of light and describe quantitatively how brightness of a light

source changes with distance.

Earth - Moon system

Describe the motions of the Earth.

Discuss the phases of the moon and how they occur.

Explain and discuss how an eclipse occurs.

Explain the origin of tides.

The Solar System: Classification and Interpretation

Compare and contrast the characteristics of each planet.

Discuss each planet and its moons.

Compare and contrast the different theories of the origin of the Solar System.

Sun

Know the parts of the Sun.

Explain the makeup and the source of power for the Sun.

Know several characteristics of the Sun's surface features.

Stars

Describe the observations necessary for the determination of basic physical properties of stars such as mass, temperature, luminosity, chemical composition, sizes and motions.

Draw and describe the H-R diagram and its value for displaying physical properties of stars and in expanding our knowledge about stellar sizes and distances.

List the classes of binary stars and state the criteria for determining membership in each.

Draw, label, and describe the mass-luminosity relation and specify limitations on its applicability.

Identify the physical property normally thought to control the life cycles of stars and planets.

Stellar Evolution

Be able to use a HR diagram to discuss the evolution of a star.

Know the general steps and the characteristics of each step in the evolution of a Sun type star and a very massive star.

Be able to describe the theory of a black hole.

Galaxies

Describe the characteristics of a galaxy

Characterize the Milky Way galaxy.

Be familiar with the different classifications of galaxies.

Cosmology

Discuss and compare the different theories of the origin of the universe.

Examine the evidence and theories of life as we know it.

Flight and rockets

Be familiar with the history of space exploration.

Know the basics of the physics of flight.

Course Rationale

Required of all students pursuing a science concentration in Elementary Education.

The future teacher will 'surf the web' and develop a set of CONTENT notes to cover the following:

Course Content, Format and Bibliography

Content

Constellations: maps of the heavens.

History: how astronomical theories evolved

Astrophysics: physics laws that explain why

Optics: telescopes and spectrum

Earth - moon: eclipses, moon, phases, tides, why life on earth?

Solar system: the planets

Sun: an average star

Stellar distances: what do we know about stars and how did we find out.

Stars: makeup

Stellar evolution: birth and death

Galaxies: island universes

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Cosmology: where did we come from and where are we going

UFO'S: life on other worlds?

Rockets: space the last frontier

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<u>LAB</u>	TITLE
1	Introduction to the Night Sky
2	Planetary motion
3	Observational instruments
4	Gravity
5	Optics - telescopes
6	The Nature of Light
7	Constellations
8	Astronomy Resources
9	Earth - Moon
10	Misconceptions and Astrology
11	Models of the Solar System
12	Sun and Stars
13	Model rockets
14	Physics of Flight

Toys in Space