

INTRODUCTION TO ASTRONOMY

Course Design

1999-2000

Course Information

Organization:	EASTERN ARIZONA COLLEGE
Division:	Science & Allied Health
Course Number:	PHY 103
Title:	INTRODUCTION TO ASTRONOMY
Credits:	4
Developed by:	BONNIE BRISCOE
Lecture/Lab Ratio:	3 hrs. lecture/ 3 hours lab per week
Transfer Status:	NAU U/A
Extended Registration Class:	No
CIP Code:	40.0201
Assessment Mode:	pre-post test (Questions = 100, Points = 100)
Awareness Course:	No
Intensive Writing Course:	No
Prerequisites:	1. None
Educational Value:	This course meets the lab/science general studies requirement for graduation and is part of the required curriculum for astronomy majors.
Goals:	1. to develop an understanding and appreciation of the laws of the Universe
Description:	A survey of modern astronomy covering topics about the solar system, galaxies, evolution of stars and methods used to explore these phenomena. Included with this course is a lab that introduces the student to astronomical observations with the use of a series of telescopes and lab exercises. PHY 103 is the same as PHY 101 and PHY 102 combined.
Textbooks:	Jay M. Pasachoff. <i>JOURNEY THROUGH THE UNIVERSE</i> . Saunders College Publishing, 1994. This textbook is required. ---. <i>SKY & TELESCOPE MAGAZINE</i> . current month & year. This textbook is not required. Source: newstand. excellent source for current topics in astronomy ---. <i>ASTRONOMY MAGAZINE</i> . current month & year. This textbook is not required. Source: newstand. excellent source for current topics in astronomy
Supplies:	None

Competencies and Performance Standards

1. Compare the contributions made in the past with the advanced methods used today in the field of astronomy		
<i>Domain--Cognitive</i>	<i>Level--Analysis</i>	<i>Importance--Essential</i> <i>Difficulty--Medium</i>
Criteria --Performance will be satisfactory when: <ul style="list-style-type: none"> * learner can describe the history of astronomy * learner can describe the modern approaches to astronomy 	Conditions --Competence will be demonstrated: <ul style="list-style-type: none"> * in objective/essay tests 	Learning Objectives: <ul style="list-style-type: none"> * Describe the historical contributions made by early astrologers and astronomers * Describe the difference between the geocentric and heliocentric theories * Explain electromagnetic radiation and the components of the spectrum * Explain the laws regarding motion, elliptical orbits and gravity * Describe the operation and function of the basic tools used for astronomical observations * Describe the current and future missions related to astronomy
2. Compare the composition and formation of our solar system with extrasolar planetary systems		
<i>Domain--Cognitive</i>	<i>Level--Analysis</i>	<i>Importance--Essential</i> <i>Difficulty--High</i>
Criteria --Performance will be satisfactory when: <ul style="list-style-type: none"> <input type="checkbox"/> learner can distinguish the differences and similarities among the planets and moons in our solar system <input type="checkbox"/> learner can specify the differences and similarities among the meteoroids, asteroids and comets within our solar system <input type="checkbox"/> learner can explain the differences between the Sun and the planets <input type="checkbox"/> learner can describe the properties of extrasolar planetary systems 	Conditions --Competence will be demonstrated: <ul style="list-style-type: none"> <input type="checkbox"/> in objective/ essay tests 	Learning Objectives: <ol style="list-style-type: none"> a. Compare the properties of each planet in our solar system b. Compare the properties of extrasolar planets c. Compare the properties of the meteoroids, asteroids and comets in our solar system d. Examine the properties of the Sun in our solar system e. Examine the properties of stars in extrasolar planetary systems

3. Compare the composition and formation of our Sun with other stellar objects			
<i>Domain--Cognitive</i>	<i>Level--Analysis</i>	<i>Importance--Essential</i>	<i>Difficulty--High</i>
Criteria-- Performance will be satisfactory when: <ul style="list-style-type: none"> * learner can describe the properties of the Sun * learner can explain the formation of the Sun * learner can describe the properties of other types of stars * learner can explain the formation of other types of stars 	Conditions-- Competence will be demonstrated: <ul style="list-style-type: none"> * in objective/essay tests 	Learning Objectives: <ul style="list-style-type: none"> * Identify properties of stars on the H/R Diagram * Identify the patterns of evolution of stars on the H/R Diagram 	
4. Compare the structure and formation of the Milky Way Galaxy with the other types of galaxies in our Universe			
<i>Domain--Cognitive</i>	<i>Level--Analysis</i>	<i>Importance--Essential</i>	<i>Difficulty--High</i>
Criteria-- Performance will be satisfactory when: <ul style="list-style-type: none"> * learner can describe the components within the Milky Way Galaxy * learner can describe the properties of other types of galaxies * learner can discuss theories regarding the formation and evolution of the various types of galaxies * learner can explain the distribution of the various galaxies 	Conditions-- Competence will be demonstrated: <ul style="list-style-type: none"> * in objective/essay tests 	Learning Objectives: <ul style="list-style-type: none"> * Measure the size, shape, mass and orbital motion of the Milky Way Galaxy * Identify the various stellar regions within the Milky Way Galaxy * Explain the formation of the Milky Way Galaxy * Explain Hubble's classification of galaxies * Describe the formation and evolution of the other types of galaxies * Describe the distribution of galaxy clusters and superclusters 	
5. Compare the theories regarding the formation of the Universe and its future			
<i>Domain--Cognitive</i>	<i>Level--Analysis</i>	<i>Importance--Essential</i>	<i>Difficulty--Medium</i>
Criteria-- Performance will be satisfactory when: <ul style="list-style-type: none"> * learner can discuss methods used to determine the age of the Universe * learner can summarize the order in which the Universe formed 	Conditions-- Competence will be demonstrated: <ul style="list-style-type: none"> * in objective/essay tests 	Learning Objectives: <ul style="list-style-type: none"> * Explain atomic structure * Explain the formation of compounds and molecules * Explain the doppler effect * Compare the pros and cons of various cosmological theories 	

6. Evaluate the search for extraterrestrial life in the Universe			
<i>Domain--Cognitive</i>	<i>Level--Evaluation</i>	<i>Importance--Essential</i>	<i>Difficulty--Medium</i>
<p>Criteria--Performance will be satisfactory when:</p> <ul style="list-style-type: none"> * learner can estimate the existence of extraterrestrial advanced civilizations * learner can discuss techniques used to search for and communicate with extraterrestrial civilizations 	<p>Conditions--Competence will be demonstrated:</p> <ul style="list-style-type: none"> * in objective/essay tests 	<p>Learning Objectives:</p> <ul style="list-style-type: none"> * Explain life as we know it * Explain the components of the Drake Equation * Explain the use of radio telescopes in the search for extraterrestrial life 	
7. Interpret a star chart			
<i>Domain--Cognitive</i>	<i>Level--Evaluation</i>	<i>Importance--Essential</i>	<i>Difficulty--High</i>
<p>Criteria--Performance will be satisfactory when:</p> <ul style="list-style-type: none"> * learner can identify major constellations and stars associated with a particular season of the year * learner can identify the motion of planets along the ecliptic * learner can identify deep-sky objects * learner can explain the properties of a moon * learner can locate celestial objects with various sets of coordinates * learner can identify the properties of stars 	<p>Conditions--Competence will be demonstrated:</p> <ul style="list-style-type: none"> * in lab activity reports and sky observations * in objective final exam 	<p>Learning Objectives:</p> <ul style="list-style-type: none"> * Locate constellations and stars in the sky with a star chart and observe their positions in the sky during a season * Plot the path of planets in the sky with the constellations * Identify the distance, size, composition and types of deep-sky objects in the sky * Identify the surface features and phases of our Moon * Identify the orbits of the moons of other planets * Identify the phases and configurations of the planets * Locate a celestial object with right ascension, declination azimuth and altitude coordinates * Compare the parallax, magnitude, size, temperature, age and evolutionary stage of major stars 	

Types of Instruction

lecture and class discussions
 lab experiments and demonstrations
student presentations
 night sky observations/star party participation

Grading Policy

Evaluation Methods: PRE-TEST - given first week of classes = (0%)

OBJECTIVE / ESSAY LECTURE CHAPTER TESTS = (58%)

LAB EXERCISES & SKY OBSERVATIONS= (30%)

SPECIAL REPORTS or FIELD TRIPS OF ASTRONOMICAL INTEREST THAT STUDENTS MAKE ON THEIR OWN or PARTICIPATION IN THE STAR PARTY = (extra credit points added to test scores)

ONE FINAL EXAM with POST-TEST (10%) (same as pre-test)= (12%)

Grading Scale:

Grade	Requirement
A	90-100%
B	80-89%
C	70-79%
D	60-69%

Learning Plans

Learning Plan 1-- History and Methods of Astronomy

Overview: Introduce the learner to ways in which the science of astronomy has developed through the ages to modern times.

Competency: 1. Compare the contributions made in the past with the advanced methods used today in the field of astronomy

Learning Activities:

- * Listen and take notes during lectures
- * Observe lecture demonstrations
- * Read text assignments
- * View and take notes on videos and slides
- * Ask questions during lectures and demonstrations
- * Participate in class and small group discussions

Performance Assessment Activities: * Complete objective/essay tests

Learning Plan 2-- Solar Systems

Overview: Introduce the learner to the structure of our solar system in order to compare it with extrasolar planetary systems.

Competency: 2. Compare the composition and formation of our solar system with extrasolar planetary systems

Learning Activities:

- * Listen and take notes during lectures
- * Observe lecture demonstrations
- * View and take notes on videos and slides
- * Read text assignments
- * View and take notes on videos and slides
- * Participate in class and small group discussions

Performance Assessment Activities: * Complete objective/essay tests

Learning Plan 3-- Sun and the Stars

Overview: Introduce the learner to the properties of our Sun and other stars.

Competency: 3. **Compare the composition and formation of our Sun with other stellar objects**

Learning Activities:

- * Ask questions during lectures and demonstrations
- * View and take notes on videos and slides
- * Read text assignments
- * Observe lecture demonstrations
- * Listen and take notes during lectures-
- * Participate in class and small group discussions

Performance Assessment Activities: * Complete objective/essay tests

Learning Plan 4-- Milky Way Galaxy and Other Galaxy Types

Overview: Introduce the learner to the structure of the Milky Way Galaxy in order to compare it with other galaxy types in the Universe.

Competency: 4. **Compare the structure and formation of the Milky Way Galaxy with the other types of galaxies in our Universe**

Learning Activities:

- * Listen and take notes during lectures
- * Observe lecture demonstrations
- * Read text assignments
- * View and take notes on videos and slides
- * Ask questions during lectures and demonstrations
- * Participate in class and small group discussions

Performance Assessment Activities: * Complete objective/essay tests

Learning Plan 5-- Cosmology

Overview: Introduce the learner to theories regarding the formation of our Universe; its past, present and future.

Competency: 5. Compare the theories regarding the formation of the Universe and its future

Learning Activities:

- * Read text assignments
- * Observe lecture demonstrations
- * Listen and take notes during lectures
- * View and take notes on videos and slides
- * Ask questions during lectures and demonstrations
- * Participate in class and small group discussions

Performance Assessment Activities: * Complete objective/essay tests

Learning Plan 6-- Extraterrestrial Life

Overview: Introduce the learner to the possibility of other advanced civilizations in the Universe and the methods used to search for them.

Competency: 6. Evaluate the search for extraterrestrial life in the Universe

Learning Activities:

- * Read text assignments
- * Observe lecture demonstrations
- * Listen and take notes during lectures
- * View and take notes on videos and slides
- * Ask questions during lectures and demonstrations
- * Participate in class and small group discussions

Performance Assessment Activities: * Complete objective/essay tests

Learning Plan 7-- Star Chart

Overview: Introduce the learner to information provided on a star chart.

Competency: 7. **Interpret a star chart**

Learning Activities:

- ___ 1. Read text assignments
- ___ 2. Observe lecture demonstrations
- ___ 3. Listen and take notes during lectures
- ___ 4. View and take notes on videos and slides
- ___ 5. Ask questions during lectures and demonstrations
- ___ 6. Participate in class and small group discussions
- ___ 7. Complete lab activities and sky observations

Performance**Assessment Activities:**

- ___ 1. Complete objective/essay tests
- ___ 2. Submit lab reports