

INTRODUCTION TO ASTRONOMY LAB

Course Design

2002-2003

Course Information

Organization:	EASTERN ARIZONA COLLEGE
Division:	Science & Allied Health
Course Number:	PHY 102
Title:	INTRODUCTION TO ASTRONOMY LAB
Credits:	1
Developed by:	BONNIE BRISCOE
Lecture/Lab Ratio:	No 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 = 92, Points = 100)
Semester Taught:	Fall and spring.
Gen. Ed. Area:	None
Separate Lab:	No
Awareness Course:	No
Intensive Writing	
Course:	No
Prerequisites:	1. None
Educational Value:	This course meets the lab portion of the lab/science general studies requirement for graduation when taken with the lecture (PHY 101). This course is provided for students who cannot take lab and lecture during the same semester. The combination of PHY 101-102 is equivalent to PHY 103.
Goals:	1. to develop an understanding and appreciation of the laws of the Universe
Description:	Introduction to astronomical observation with the use of a series of telescopes and lab exercises.
Textbooks:	---. SKY & TELESCOPE MAGAZINEcurrent month & year. This textbook is not required. ---. ASTRONOMY MAGAZINEcurrent month & year. This textbook is not required.
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>
<p>Criteria--Performance will be satisfactory when:</p> <ul style="list-style-type: none"> • learner can explain various contributions made in the advancement of astronomy • learner can describe some of the modern approaches to astronomy 	<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> <ol style="list-style-type: none"> Describe observations and calculations made by Isaac Newton, Galileo and Johannes Kepler 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 	
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>
<p>Criteria--Performance will be satisfactory when:</p> <ul style="list-style-type: none"> • learner can distinguish the differences and similarities among the planets and moons in our solar system • learner can specify the differences and similarities among the meteoroids, asteroids and comets within our solar system • learner can explain the differences between the Sun and the planets • learner can describe the properties of extrasolar planetary systems 	<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> <ol style="list-style-type: none"> Describe the properties of each of the planets in our solar system Describe the properties of extrasolar planets Describe the properties of the meteoroids, asteroids and comets in our solar system Describe the properties of the Sun in our solar system Describe 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 lab activity reports and sky observations • in objective final exam 	Learning Objectives: <ol style="list-style-type: none"> Identify properties 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-- Medium</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 explain the distribution of the various galaxies 	Conditions-- Competence will be demonstrated: <ul style="list-style-type: none"> • in lab activity reports and sky observations • in objective final exam 	Learning Objectives: <ol 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 Describe the distribution of galaxy clusters and superclusters 	

5. Interpret a star chart		
<i>Domain-- Cognitive</i>	<i>Level-- Evaluation</i>	<i>Importance--Essential 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> <ol style="list-style-type: none"> a. Locate constellations and stars in the sky with a star chart and observe their positions in the sky during a season b. Plot the path of planets in the sky with the constellations c. Identify the distance, size, composition and types of deep-sky objects in the sky d. Identify the surface features and phases of our Moon e. Identify the orbits of the moons of other planets f. Identify the phases and configurations of the planets g. Locate a celestial object with right ascension, declination azimuth and altitude coordinates h. Compare the parallax, magnitude, size, temperature, age and evolutionary stage of major stars

Types of Instruction

- lab experiments & demonstrations
- night sky observations
- participation in star party
- student presentations

Grading Policy

Evaluation Methods: PRE-TEST - give first week of class= (0%)

LAB EXERCISES & SKY OBSERVATIONS = (60%)

SKY MAP TEST= (28%)

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

ONE FINAL EXAM + 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:

- _____ 1. Observe lab demonstrations
- _____ 2. View and take notes on videos and slides
- _____ 3. Ask questions during lab activities and demonstrations
- _____ 4. Participate in discussions with lab partners
- _____ 5. Complete lab activities and sky observations

Performance Assessment Activities: _____ 1. Complete sky map tests
 _____ 2. Submit lab reports

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:

- _____ 1. Observe lab demonstrations
- _____ 2. View and take notes on videos and slides
- _____ 3. Ask questions during lab activities and demonstrations
- _____ 4. Participate in discussions with lab partners
- _____ 5. Complete lab activities and sky observations

Performance Assessment Activities: _____ 1. Complete sky map tests
 _____ 2. Submit lab reports

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:

- _____1. Complete lab activities and sky observations
- _____2. View and take notes on videos and slides
- _____3. Observe lab demonstrations
- _____4. Ask questions during lab activities and demonstrations
- _____5. Participate in discussions with lab partners

Performance Assessment Activities: _____1. Complete sky map tests
_____2. Submit lab reports

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:

- _____1. Observe lab demonstrations
- _____2. View and take notes on videos and slides
- _____3. Ask questions during lab activities and demonstrations
- _____4. Participate in discussions with lab partners
- _____5. Complete lab activities and sky observations

Performance Assessment Activities: _____1. Complete sky map tests
_____2. Submit lab reports

Learning Plan 5-- Star Chart

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

Competency: 5. **Interpret a star chart**

Learning Activities:

- _____1. Observe lab demonstrations
- _____2. View and take notes on videos and slides
- _____3. Ask questions during lab activities and demonstrations
- _____4. Participate in discussions with lab partners
- _____5. Complete lab activities and sky observations

Performance Assessment Activities:

- _____1. Complete sky map tests
- _____2. Submit lab reports