
Part II

1. Syllabus of Record

I. Catalog Description

GEOS 105 Exploring the Universe

3c-01-3cr

Prerequisites: No Geoscience Majors/Minors

Examines the evolution and properties of objects in the solar system, galaxy, and universe, how light is used to study distant objects, and the relationship between Earth and space in terms of resources and hazards.

II. Course Outcomes and Assessment (Expected Undergraduate Student Learning Outcomes)

By engaging in the activities and exercises of this course, the students will:

Objective 1:

Demonstrate how distant objects in the heavens are identified, described, and analyzed using light and other observations.

Expected Student Learning Outcomes 1 and 2

Informed and Empowered Learners

Rationale:

Light is the primary tool for study of distant planets, asteroids, comets, stars, and galaxies. Course content and assignments are designed to show how understanding of composition, present state, and evolution of these objects are fundamentally linked to the light they give off.

Objective 2:

Explain how solar system history, objects, and processes, such as chemical differentiation and asteroid impacts, influence life on Earth.

Expected Student Learning Outcomes 1 and 2

Informed and Empowered Learners

Rationale:

Objective 4:

Connect the history and processes of objects in the galaxy, such as supernovae and stellar

evolution, to the chemical elements that exist on Earth today.

Expected Student Learning Outcomes 1 and 2

Informed and Empowered Learners

Rationale:

Most chemical elements are created either in stars or in supernova explosions. Students will learn what conditions lead to the synthesis of each element and interpret the series of events

V. Example Grading Scale

The final grade for this course will be determined by the following:

A=90-100%; B=80-89%, C=70-79%, D=60-69%, F=<60%

VII. Attendance Policy

The attendance policy will conform to IUP's undergraduate course attendance policy as outlined

in the undergraduate catalog.

VII. Required textbooks, supplemental books and readings

Text: Comins, Neil, 2012, Discovering the Essential Universe, 5th Edition: Freeman, 412 pages.

Supplemental Readings: Johnson, G., 2006, Miss Leavitt's stars: The untold story of the woman who discovered how to measure the universe: Norton, 176 p.

DeSitter, L. A., 1988, *Uncommon Sense: A Journey to the Heart of the Universe*, Norton, 176 p.

3. Summary of the proposed revision

1. Objectives – course objectives were modified from the 1995 syllabus of record and aligned with the Expected Undergraduate Student Learning Outcomes (EUSLO).

2. Common Learning Objectives for non-laboratory Natural Science course were incorporated into the content of the course. These objectives include: examine a body of knowledge of natural science that will contribute to an understanding of the natural world and an appreciation of the impacts that natural sciences have on the lives of individuals and the world in which they live; understand the differences between sciences as a means to knowledge of

generates knowledge; develop an inquiring attitude consistent with the tenets of natural science; understand the empirical nature of science; understand the concept of

Liberal Studies Course Approval General Information

1. This course has been taught by one instructor each semester it has been offered, generally taught in one section. Occasionally, one instructor may teach two sections, or two sections may be taught by two different instructors. Instructors frequently consult and collaborate on syllabi, textbooks and assignments for this course.
2. Readings taken from Johnson, G., 2006, *Miss Leavitt's stars: The untold story of the woman who discovered how to measure the universe*: [Norton, 176 p.] will showcase contributions that female scientists have made to astronomy. Scientists highlighted in these readings and in the the course include Caroline Herschel: She and her brother revolutionized the study of astronomy; Annie Jump Cannon: Built a star classification of more than 350,000 stars; Henrietta Leavitt:

Discovered a way to measure distances between stars; Cecilia Payne Gaposchkin: The first woman granted a Ph.D. in astronomy at Harvard; Margaret Burbidge: Described the way chemical elements form in stars; Jocelyn Bell Burnell: Discovered pulsars; Vera Rubin:

Discovered dark matter in galaxies; Carolyn Shoemaker - D:

Old Syllabus of Record

GS 105 Exploring the Universe

I. Catalog Description

GS 105 Exploring the Universe

3 credits

3 lecture hours

Prerequisites: No Geoscience Majors/Minors

(3c-01-3sh)

planets, moons, stars and galaxies; and the history and future of space exploration.

II. Course Objectives

1. Students will be able to explain the relationships between time keeping and the celestial sky.
2. Students will be able to compare and contrast the characteristics and motions of the planets and their moons.
3. Students will be able to distinguish between characteristics and types of stars to predict

The turning of the tides
The geology of the Moon and its origins

1. Unmanned satellites
 - The history of satellites
 - The Earth-observing system
 2. Manned space-flight
 - A glorious history
 - An uncertain future
- F. Where are the Martians? (9 hours)
1. The nine planets and their moons
 - My Very Educated Mother
 - Just Showed Us Nine Planets
 2. The rest of the solar system
 - Meteors, comets and asteroids
- G. The Sun is green (3 hours)
1. How the sun works
 - Fusion reactions
 - Sunspots, coronas, flares and solar winds
 2. Sun-Earth interactions
 - Solar energy
 - Magnetic storms and northern lights
- H. Betelgeuse and her sisters (8 hours)
1. How many types of stars are there?
 - Stellar characteristics
 - Variations on a theme

IV. Evaluation Methods

The final grade for this course will be determined as follows:

85% Tests. Four tests, consisting of multiple choice, true-false and matching questions. 100 points each. Tests will be computer-graded and adjusted to a mean of 75% so that 90-100%=A; 80-89%=B; 70-79%=C; 60-69%=D; below 60%=F. The same scale will be used for the final point score.

15% Non-text book review. A four to five page book review of the non-text

Required textbooks, supplemental books and media:

Textbook: Chaisson, E.E., 1995, ASTRONOMY: A BEGINNER'S GUIDE TO THE UNIVERSE. Englewood Cliffs NJ: Prentice Hall, 451 p.
Non-text: Raup, D. 1986, THE NEMESIS AFFAIR.

VI. Special resource requirements: None.

Example Assignment and Rubric

Ranking task grading rubric

This is an in-class exercise

Correct ranking is that all positions of Moon have same amount of their surface illuminated.

Exercise 2:

Correct ranking is that position A appears most illuminated from Earth down to position

D appears least illuminated. (A, F, B and E, C, D)

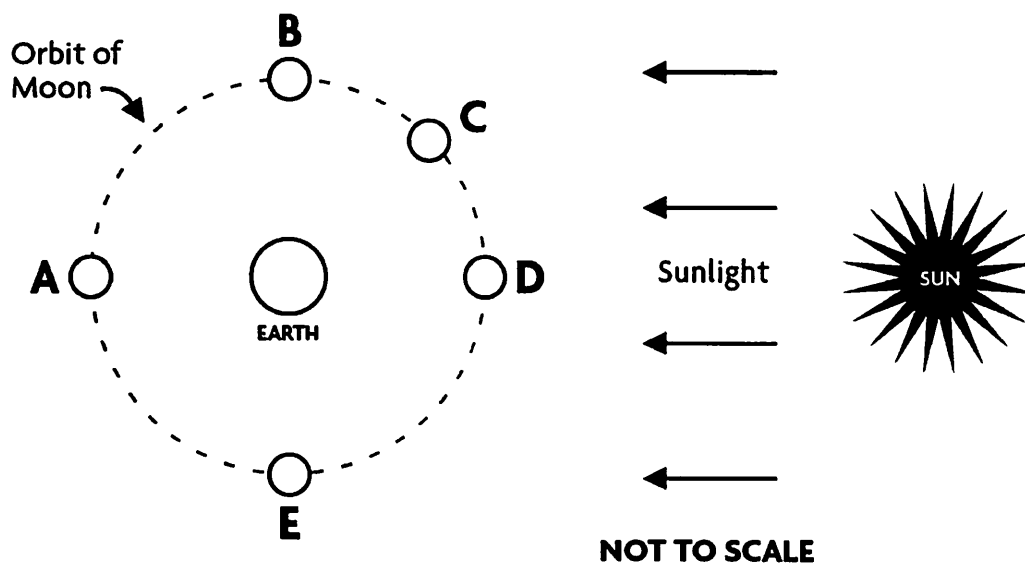
Both exercises: Explanation

Target: Highlights the distinction in the wording of the two questions and why it leads to

Astronomy Ranking Task: Phases of the Moon

Exercise #1

Description: The figure below shows a “top view” of the Sun, Earth, and five different positions (A - E) of the Moon during one orbit of Earth. Note that the distances shown for the Sun to



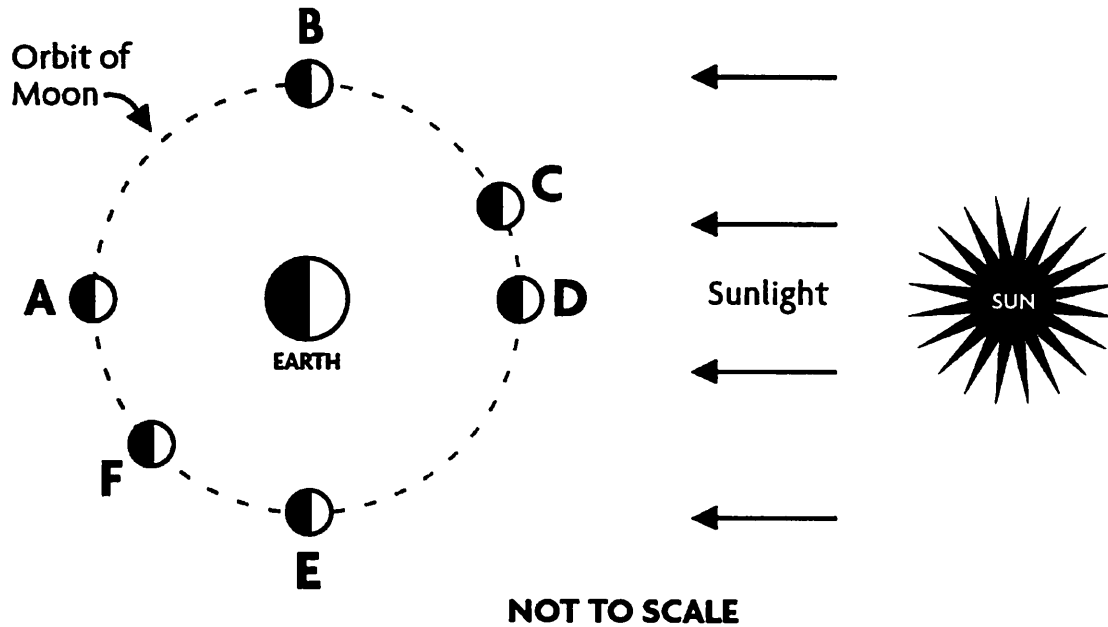
Ranking Instructions: Rank (from greatest to least) the amount of the Moon's entire surface that is illuminated by sunlight for the five positions (A-E) shown.

Ranking Order: Greatest 1 2 3 4 5 Least

Astronomy Ranking Task: Phases of the Moon

Exercise #2

Description: The figure below shows a “top view” of the Sun, Earth and six different positions (A - F) of the Moon during one orbit of Earth. Note that the distances shown for the Sun to Earth and for Earth to the Moon are not drawn to scale.



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