

**HOWARD UNIVERSITY
COLLEGE OF ARTS AND SCIENCES
COMPREHENSIVE SCIENCES PROGRAM**

PLANETARY SCIENCE

**COMP-002
SECTIONS 01-03**

SYLLABUS

INFORMATION SHEET

**DR. NORMA SMALL-WARREN
OFFICE: LOCKE HALL, ROOM 260
LECTURE LOCKE HALL ROOM 105
LABORATORY LOCATION: LOCKE HALL Room P-8**

SPRING 2015

COMPREHENSIVE SCIENCES PROGRAM

PLANETARY SCIENCE COMP-002

SYLLABUS

Course rationale:

Comprehensive Sciences Lecture-Laboratory courses are Life Sciences (Comp-001), Planetary Science (Comp-002 and Comp-702), Physical Science (Comp-003) and Computer Science (Comp-004). These courses are designated among the Introductory Natural Science Course offerings. These courses are required in the General Education curricula in the College of Arts and Sciences; the Schools of Business, Communications, and Education; the Division of Nursing and Allied Health; and the Programs in the Schools of Engineering and Architecture. These academic units have determined the necessity of a Natural Science component in the schedule of courses that students must complete in order to receive a degree from the University.

Course Overview/Description:

Planetary Science consists of geology (the science of the earth) and astronomy (the science of planets, stars and all heavenly bodies found in the universe).

In our study of geology, we are concerned with the principal features of our planet earth, such as size, shape, composition, motions, etc. We take a look at how our planet changes as a result of the external and internal forces that act on it. In astronomy, we have a similar interest in the rest of the planets and other members of our solar system as well as all the other celestial bodies that exist in the universe.

Planetary Science is interdisciplined with Life Science (Comp-001). The studies in Planetary Science examine physical aspects of the earth (Geology) and the universe (Astronomy). Living systems exist on planet Earth and also interact with the layers of gases that surround the planet. Our nearest star (the Sun) provides the solar energy, which is trapped and transformed into chemical energy. Chemical energy, which is found in the hydrogen bonds of organic (carbon-based) molecules, is the exclusive type of energy that is used by all of the different types of cells that comprise life forms.

Planetary Science is interdisciplined with Physical Science (Comp-003). Studies in Planetary Science examine physical aspects of earth (Geology) and the universe (Astronomy). The earth is composed of organic and inorganic substances. The layers of gases that surround the earth are elemental molecules. The laws that govern living and non-living matter affect entities on the earth and in the universe.

SYLLABUS (CONTINUATION)

Textbooks:

Earth: Portrait of a Planet, by Stephen Marshak,
W. W. Norton & Co., fourth ed., 2012

The Essential Cosmic Perspective, by Bennett, Donahue, Schneider &
Voit; Addison Wesley, sixth ed., 2012

Sections 01 - 81559 and 81688 (Lecture) Monday, Wednesday 9:10am-10:00am
(Laboratory) Sec 01-Tuesday 10:10am-12:00

Sections 02 - 81693 and 81696 (Lecture) Monday, Wednesday 10:10-11:0am
(Laboratory) Sec 02-Tuesday 12:10-2:00 pm.

Section 03 - (Lecture) Monday, Wednesday 12:00-1:00pm
(Laboratory) Sec 03 Thursday 10:00pm-12:00am

Office and Office Hours:

Room 260 Locke Hall

Mon. & Wed. 11:00-12:00, Tuesdays 2:15-3:00pm others by appointment

Telephone numbers: (202) 806-5792 (direct line), (202) 806-6744 (office)

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Academic Dishonesty Policy:

Academic dishonesty is defined to include any form of cheating and/or plagiarism. Cheating includes, but is not limited to such acts as stealing and altering information for academic purposes; offering, giving or receiving unauthorized assistance on an examination or other written material in a course. Plagiarism includes taking and passing off intentionally as one's own the ideas, writings, work of another individual without crediting the author.

The minimum disciplinary penalty imposed upon a student found to have committed an infraction ranges from no credit for the test or the course to suspension from the university, depending on the severity of the case. Please read the university's "Academic Code of Conduct" in the *H-Book* and the Students *Reference Manual and Directory of Classes*.

Statement of ADA Procedures:

Howard University is committed to providing an educational environment that is accessible to all students. In accordance with this policy, students in need of accommodations due to a disability should contact the Office of the Dean for Special Students Services for verification and determination of reasonable accommodations as soon as possible after admission to the university, or at the beginning of each semester. The Dean of the Office of Special Student Services, Dr. Barbara Williams, can be reached at (202) 238-2420

GEOLOGY

Jan 12 Discussion of course requirements, distribution of syllabus, introduction to Problem-Based Learning, etc.

Jan 13 Setting rules, discussion on expectations for the course, introduction to Problem #1

Reading assignments: ***Earth: Portrait of a Planet***

The order in which the chapters dealing with topics pertinent to problem #1 are discussed will be determined in class. Chapters 1, 2, 5-8,12, 13 and interludes A-D. In problem #1 the following topics will be discussed:

Crystals, minerals, rocks, the earth's layers paying close attention to their composition, size, properties, etc., methodology used to know about the existence of these layers, etc.

Labs: Identification of minerals, identification and classification of rocks, study of models of the earth's interior.

Trip to the Natural History Museum to visit their mineral and rock collection. Visit to the US Geological Survey Society.

Jan 27 Approximate end of problem #1, evaluations.

Jan 27 Introduction to problem #2

Reading assignments:

Chapters 16-23, interlude E

In problem #2 the following topics will be discussed:

The external forces that affect the Earth's surface, the work of water, wind and ice, geochronology (the origin of the earth) and the changes that it has undergone since then.

Labs: Slide shows, movies, models depicting erosional changes in the Earth's surface due to the work of water, wind and ice. Visit to the US Geological Survey Society.

Feb 17 Approximate end of problem #2, evaluations

Feb 17 Introduction to problem #3

Reading assignments:

Chapters 1, 3, 4, 9-11

In this problem we discuss internal forces that work in the earth-vulcanism and diastrophism, volcanoes and earthquakes, the Theory of Plate Tectonics, continental drift.

Labs: Slide shows on Plate Tectonics, Continental Drift, earthquakes and volcanoes, determination of the epicenter of an earthquake given the seismic data.

March 4 Approximate end of problem #3

ASTRONOMY

- March 4 Introduction to problem #4
- Reading assignments: *The Essential Cosmic Perspective*
Chapters 1-6 and excerpts from other chapters which are applicable
Topics to be covered:
Study of the night sky, optical illusions, myths and erroneous concepts about our universe, introduction to ancient astronomers and their contribution- Ptolemy, Galileo, Brahe, Kepler, Newton and others; archaeoastronomy, geocentric vs. heliocentric concepts of the universe, Kepler's Laws, Instruments used by astronomers, telescopes and Spectroscopes, the study of light, how information is obtained and evaluated, etc.
Labs: Study of models of geocentric and heliocentric systems, study of models of celestial spheres, how to locate constellations, planets, etc., application of Kepler's Laws.
- March 23 Approximate end of problem #4
- March 23 Introduction to problem #5
- Reading assignments:
Chapters 7-12 and other pertinent information
Topics for this problem include:
A detailed study of the members of the Solar System (Sun, planets, plutoids, moons, asteroids, meteoroids, comets, Oort Cloud and Kuiper Belt)
Labs: Models, movies and slide shows related to the Solar System, etc.
- April 9 Approximate end of problem #5, evaluations.
- April 9 Introduction to problem #6
- Reading assignments:
Chapters 13-20 and other pertinent information
Topics for this problem include:
The Milky Way and other galaxies, quasars, novas and supernovas, red giants, pulsars, quasars and black holes, cosmology, possibility of life elsewhere in the universe.
Labs: Models, movies, slide shows related galaxies and the universe at large, trip to the Air and Space Museum.
- April 23 End of problem #6, last day of classes
- April 23 Overall review before final exam
- April 20 **SENIOR FINAL EXAMINATION**
April 23 **FINAL EXAMINATION (OTHER STUDENTS)**

RULES FOR THE TEAM (SEC 04)

ATTENDANCE: Recommended 100% unless there is an emergency. It is the responsibility of the student to inform other members of his/her team if he/she will be absent. The tutor will keep attendance.

PARTICIPATION: Rotating duties will be kept (scribe, facilitator, etc.) Problem solvers will have active involvement in all aspects of the process. Problem solvers will prepare their assignments on time and must be ready to discuss them.

RESPECT: Everyone has the right to participate. No one will be allowed an excessive amount of time to present his views or assignment. Destructive criticism will not be allowed. Politeness is required always. (Two or more persons can not talk at once; students can not sleep in class; personal views must be respected; students are not to be on i-phones and other electronic devices not related to the class, etc.)

OTHER: A notebook to record problems, journal entries, class issues, assignments grades and others should be kept. Students are expected to write a paper at the end of problem #3.

EVALUATION CRITERIA

Problem solvers will be evaluated by:

- Tutor
- Peers
- Self-evaluation

The criteria for evaluation will include:

- Presentations
- Participation
- Laboratory
- Homework/quizzes are graded separately.

The mathematical equation for computing your grade is as follows:

Presentations are worth 50%, participation 30 % and laboratory is worth 20%.

Once this is determined, the evaluation of Dr. Small-Warren is worth 20%, peer evaluation is 30% and self evaluation is worth 50%.

There will be a final exam at the end of the semester. The final grade will consist of an average of the six problems, homework and quizzes and the final exam. Each problem and the final are worth 100 points, and homework and quizzes add to 100 points. These yield a maximum possible score of 800 points. There will be opportunities for field trips and special lectures that will yield bonus points.

PLANETARY SCIENCE TERMS STUDENTS SHOULD KNOW

GEOLOGY

Geology	biosphere	catastrophism	hydrosphere
hypothesis	atmosphere	uniformitarianism	atom
compound	crystal form	element	silicates
cleavage	creep	fracture	delta
luster	mineral	radioactivity	rock
streak	lithosphere	specific gravity	tectonic plate
crust	basalt	divergent boundary	granitic
mantle	core	convergent boundary	magma
lava	subduction	mid-oceanic ridge	oceanic trench
unit cell	igneous	sedimentary	metamorphic
rock cycle	mafic	metamorphism	volcano
batholith	dike	pahoehoe	crater
humus	erosion	weathering	regolith
hot spot	Pangaea	isostasy	bioclastic
lithification	stratification	crystallization	groundwater
water table	cirque	moraine	crevasse
alluvial fan	loess	ventifact	plume
peneplain	stalactite	stalagmite	sinkhole
fjord	relative age	absolute dating	superposition
unconformity	fossil	evolution	half-life
era	epoch	eon	earthquake
fault	seismograph	tsunami	fossil
magnitude	plate tectonics	Mohorovicic Discontinuity	

ASTRONOMY

Astronomy	light year	theory	spectrum
precession	ecliptic	apparent magnitude	equinox
declination	analemma	right ascension	geocentric
heliocentric	epicycle	retrograde motion	parsec
angstrom	eclipse	celestial sphere	solstice
gravity	white light	escape velocity	scintillation
asteroid	Doppler shift	greenhouse effect	comet
planetesimal	Roche limit	protoplanet	albedo
meteoroids	star cluster	continental drift	photosphere
chromosphere	sunspot	neutron star	nova
quasar	pulsar	black hole	galaxy
aphelion	perihelion	rotation	revolution
rotation	constellation	galaxy	plutoid

PLANETARY SCIENCE CONCEPTS

HYPOTHESIS//THEORY/SCIENTIFIC METHOD
UNIT CELL//CRYSTAL//MINERAL//ROCK
METAMORPHISM
WEATHERING//EROSION
BIOCLASTIC ROCKS
EVOLUTION
UNIFORMITARIANISM
RADIOACTIVE DATING//HALF-LIFE
CATASTROPHISM
TIME//TIME TABLE//EONS//ERA//PERIOD//EPOCH//AGES
PLATE TECTONICS//CONTINENTAL DRIFT
VULCANISM//DIASTROPHISM
SEISMOLOGY//VULCANOLOGY
ELECTROMAGNETIC SPECTRUM
WAVES//REFLECTION//DIFFRACTION//DISPERSION
GEOCENTRIC//HELIOCENTRIC/HELIOCENTRISM
PROTOPLANET HYPOTHESIS//ACCRETION THEORY//PLANETARY NEBULAE
GRAVITY//MAGNETISM
DOPPLER SHIFT/RED SHIFT
SOLAR SYSTEM//PLANETS//PLUTOIDS/MOONS//OTHER PLANETARY
SYSTEMS
GREENHOUSE EFFECT
STARS//SUN//NOVA//PULSAR//BLACK HOLE//QUASAR
GALAXY/GALACTIC CLUSTER/COSMIC STRING
BIG BANG THEORY//OSCILLATING UNIVERSE