ASU ARIZONA STATE UNIVERSITY

GENERAL STUDIES COURSE PROPOSAL COVER FORM
(ONE COURSE PER FORM)

1.) DATE: **Sept. 4, 2009**	2.) COMMUNITY COLLEGE: **Maricopa Co. Comm. College District**

3.) COURSE PROPOSED: Prefix: **PHS** Number: **120** Title: **Introduction to Physical Science: Astronomy, Meteorology, Geology and Oceanography** Credits: **4**

CROSS LISTED WITH: Prefix: Number: ; Prefix: Number: ; Prefix: Number: ;

Prefix: Number: ; Prefix: Number: ; Prefix: Number:

4.) COMMUNITY COLLEGE INITIATOR: **CHERYL DELLAI** PHONE: 623-845-3678
FAX:

ELIGIBILITY: Courses must have a current Course Equivalency Guide (CEG) evaluation. Courses evaluated as NT (non-transferable are not eligible for the General Studies Program.

MANDATORY REVIEW:

☒ The above specified course is undergoing Mandatory Review for the following Core or Awareness Area (only one area is permitted; if a course meets more than one Core or Awareness Area, please submit a separate Mandatory Review Cover Form for each Area).

POLICY: The General Studies Council (GSC-T) Policies and Procedures requires the review of previously approved community college courses every five years, to verify that they continue to meet the requirements of Core or Awareness Areas already assigned to these courses. This review is also necessary as the General Studies program evolves.

AREA(S) PROPOSED COURSE WILL SERVE: A course may be proposed for more than one core or awareness area. Although a course may satisfy a core area requirement and an awareness area requirement concurrently, a course may not be used to satisfy requirements in two core or awareness areas simultaneously, even if approved for those areas. With departmental consent, an approved General Studies course may be counted toward both the General Studies requirements and the major program of study.

5.) PLEASE SELECT EITHER A CORE AREA OR AN AWARENESS AREA:
Core Areas: **Select core area...** Awareness Areas: **Global Awareness (G)**

6.) **On a separate sheet, please provide a description of how the course meets the specific criteria in the area for which the course is being proposed.**

7.) DOCUMENTATION REQUIRED
☒ Course Description
☒ Course Syllabus
☒ Criteria Checklist for the area
☒ Table of Contents from the textbook required and/or list or required readings/books
☒ Description of how course meets criteria as stated in item 6.

8.) THIS COURSE CURRENTLY TRANSFERS TO ASU AS:
☐ DEC prefix
☒ Elective

Current General Studies designation(s): **SQ, G**

Effective date: Spring 2010 Course Equivalency Guide

Is this a multi-section course? ☒ yes

Is it governed by a common syllabus? ☒ yes

Chair/Director: **CHERLY DELLAI, IC CHAIR/ATF LEAD** Chair/Director Signature: Cheryl K Dellai

AGSC Action: Date action taken: ☐ Approved ☐ Disapproved

Effective Date:

Proposer: Please complete the following section and attach appropriate documentation.

ASU--[G] CRITERIA			
GLOBAL AWARENESS [G]			
YES	**NO**		**Identify Documentation Submitted**
☒	☐	**1.** Studies **must** be composed of subject matter that addresses or leads to an understanding of the contemporary world outside the U.S.	Syllabus, Course Outline, & Supplement statement 1
		2. Course must be **one or more** of following types (check all which may apply):	
☐	☒	**a.** In-depth area studies which are concerned with an examination of culture-specific elements of a region, country or culture group. The area or culture studied must be non-U.S. and the study must contribute to an understanding of the contemporary world.	
☐	☒	**b.** Contemporary non-English language courses that have a significant cultural component.	
☐	☒	**c.** Comparative cultural studies in which most, i.e., more than half, of the material is devoted to non-U.S. areas.	
☒	☐	**d.** In-depth studies of non-U.S. centered cultural interrelationships of global scope, such as the global interdependence produced by problems of world ecology, multinational corporations, migration, and the threat of nuclear war. Most, i.e., more than half, of the material must be devoted to non-U.S.	Syllabus, Course Outline & Supplement statement 2

Course Prefix	Number	Title	Designation
PHS	120	Introduction to Physical Science: Astronomy, Meteorology, Geology and Oceanography	SQ/G

Explain in detail which student activities correspond to the specific designation criteria. Please use the following organizer to explain how the criteria are being met.

Criteria (from checksheet)	**How course meets spirit** (contextualize specific examples in next column)	Please provide detailed evidence of how course meets criteria (i.e., where in syllabus)
Studies must be composed of subject matter that addresses or leads to an understanding of the contemporary world outside the U.S.	. This course is the study of physical processes on /within and above the Earth. The course presentation is based on three themes as outlined in Earth Science 12th Edition, by Tarbuck, Lutgens & Tasa. These themes are: Earth as a System (SQ), People and the Environment (G) and Understanding Earth (SQ & G). Many aspects of geology come into direct interaction with humans, and many of these transcend U.S. borders and culture, whether they be of the sort where international interaction is involved or more local. Geologic hazards are not confined to this country, and in many cases are a more pressing issue to non-U. S. countries, especially due to the lack of preparedness in many of the developing nations.	Weathering, Soil & Mass Wasting Chapter 4 Course Outline II Atmosphere, Weather Patterns & Storms Chapter 16,17,18,19 Course Outline IX, X, XI & XII Glaciers. Deserts. Ocean Currents and Global Climate Change (Chapter 6 pps 153-185) (Chapter 9 pps 272-273) "El Nino/La Nina" weather phenomenon Chapter 5, 6, 13 & 15 Course Outline III,IV Geologic Hazards pps 232 - 234 Chapters 8 & 9 Course Outline V, VI, VII Solar Flares & Sunspots pp 665-672 Course Outline XIV
In-depth studies of non-U.S. centered cultural interrelationships of global scope, such as the global interdependence produced by problems of world ecology, multinational corporations, migration, and the threat of nuclear	1) Global Energy & Mineral Resources. 2) World Ecology	Minerals and Rocks Chapters 2 & 3 Course Outline I People & Environment pp 76-78 46, 81,102-3, 396, 423,502, 526 Discussed in Each Chapter except Chp 21-24

war. Most, i.e., more than half, of the material must be devoted to non-US.	.	People & Environment pp 91, 86, 98-9,105, 109 -121, 131, 175, 224 - 237, 272, 276-8, 292 396, 423,435, 449, 452, 492, 559 Understanding Earth 502
In-depth studies of non-U.S. centered cultural interrelationships of global scope, such as the global interdependence produced by problems of world ecology, multinational corporations, migration, and the threat of nuclear war. Most, i.e., more than half, of the material must be devoted to non-US.	3) International Cooperation for natural diasters:	Weather Business pp 547 Earthquake prediction 233-236 Volanoes and Climate change pp 272 Atmosphere problems pp 449 Ozone depletion pp 452 Erosion pp 435 Wind pp. 527 Food Chain pp406 History of Resources pp 388

Official Course Description: **MCCCD Approval: 10/27/92**

PHS120	**932-999**	LEC	4 Credit(s)	3 Period(s)
		LAB	0 Credit(s)	3 Period(s)

Introduction to Physical Science: Astronomy, Meteorology, Geology and Oceanography
Designed primarily for students with limited background in physical science and mathematics and for nonscience majors. Topics from astronomy, meteorology, geology and oceanography. A laboratory course designed to help the students learn the basic laws and facts of the physical sciences, which provide the starting points for scientific thought and speculations. May not receive credit for both PHS120 and GLG106.

PHS120	**932-999**	LEC	4 Credit(s)	3 Period(s)
		LAB	0 Credit(s)	3 Period(s)

Introduction to Physical Science: Astronomy, Meteorology, Geology and Oceanography Competencies

1. Identify the basic properties and types of minerals and rocks and describe their formation and occurrence. (I)
2 Describe the alteration of rock material by physical and chemical weathering processes. (II)
2. Explain the dynamics of the hydrologic cycle. (III)
3. Describe the characteristics of streams and ground water and the landforms they produce. (III)
4. Describe characteristics of deserts. (IV)
5. Identify the factors involved in the formation of arid climates. (IV)
6. Describe earthquake waves and characteristics, and explain what these waves indicate about the internal structure of the Earth. (V)
7. Describe the driving force behind plate tectonics and the resultant evolution of the Earth's crust. (VI)
8. Classify volcano types as to the style of eruption and the distinguish between intrusive and extrusive igneous rock bodies. (VII)
9. Describe the bias of the fossil record and the determination of the age of the Earth based on radiometric dating techniques. (IX)
10. Interpret geologic structure and describe their history based on relative age dating techniques. (IX)
11. Describe the structure of the Earth's atmosphere and distinguish between the methods of heat energy transfer. (XII)
12. Describe the role of water in its various states to the production of weather phenomena. (XIII)
13. Explain the dynamics of atmospheric pressure. (XIV)
14. Describe the conditions necessary for the development of storms and the wave cyclone as a weather producer. (XV)
15. Describe the motions of the Earth and celestial bodies as described by Kepler and Newton. (XX)
16. Identify and characterize the parts of the electromagnetic spectrum and relate them to atomic theory. (XXI)
17. Describe the physical characteristic of the Moon and the Sun and the planets. (XXII)
18. Describe the structure of the Galaxy and explain the evolution of stars. (XXIII)
19. Classify stars as to spectral type and describe these types as to the H R diagram. (XXIII)
20. Explain the significance of Doppler shifts. (XXIV)
21. Describe the structure of the Universe and cosmological theories as to its origin and end. (XXIV)

MCCCD Official Course Outline:

I. Minerals and Rocks
- A. Atomic structure
- B. Minerals
- C. Igneous rocks
- D. Sedimentary rocks
- E. Metamorphic rocks

II. Weathering and Mass Wasting
- A. Mechanical weathering
- B. Chemical weathering
- C. Rates of weathering
- D. Mass wasting

III. Running water and ground water
- A. Stream flow
- B. Changes downstream
- C. Base level
- D. Stream valleys
- E. Drainage patterns
- F. Cycles of landscape development
- G. The movement of groundwater
- H. Springs
- I. Wells
- J. Thermal features

IV. Deserts
- A. Distribution and causes
- B. Geologic processes
- C. Desert landscapes
- D. Wind erosion and deposition

V. Earthquakes and the Earth's Interior
- A. Earthquake waves
- B. Seismic instruments
- C. Location and intensity
- D. Destruction
- E. The Earth's interior and composition

VI. Plate Tectonics
- A. The development of the idea
- B. A modern version
- C. Plate boundaries
- D. The evidence
- E. Pangaea

VII. Igneous Activity
- A. The nature of volcanoes
- B. Pyroclastics
- C. The types of volcanic cones and some famous eruptions
- D. Volcanoes and climate
- E. Volcanoes and plate tectonics

VIII. Geologic Time and Earth History
- A. Historical notes
- B. Relative dating
- C. Correlation
- D. Fossils and the bias of the fossil record
- E. Radioactivity and dating rocks
- F. The geologic time scale
- G. Life of the past

IX. The Atmosphere
- A. Weather and climate
- B. Composition of the atmosphere
- C. The ozone and CO_2 problems
- D. Earth - Sun relations
- E. Radiation
- F. Mechanics of heat transfer
- G. Controls of temperature

X. Moisture in the Atmosphere
- A. Change of state
- B. Humidity
- C. Condensation and clouds
- D. Air stability
- E. Precipitation

XI. Pressure and Wind
- A. Pressure measurement
- B. The factors affecting wind
- C. Cyclones and anticyclones
- D. Global circulation patterns
- E. Local winds

XII. Weather Patterns and Severe Storms
- A. Air masses
- B. Fronts
- C. The wave cyclone
- D. Thunderstorms
- E. Tornadoes
- F. Hurricanes

XIII. The Earth's Place in the Universe
- A. The birth of modern astronomy
- B. Constellation and astrology
- C. Powers of ten - a perspective of the Universe

XIV. The Moon, the Sun and astronomical tools
- A. The Moon
- B. The study of light and telescopes
- C. The Sun

XV. The Solar System
- A. The origin of the solar system
- B. The Planets
- C. Space debris

XVI. Beyond the Solar System
- A. Properties of stars
- B. Stellar distances
- C. Star classification
- D. Hertzsprung-Russel diagram
- E. Unusual stars
- F. Stellar evolution
- G. Star clusters
- H. Galaxies
- I. Cosmology

Supplemental Statement #1

General Studies Course Proposal: PHS 120 = Global Awareness-G

PHS 120, Introduction to Physical Science: Astronomy, Meteorology, Geology and Oceanography is taught in the Maricopa County Community College District. This course is the study of physical processes on /within and above the Earth. The fundamental chemical and physical aspects (matter and energy) of Earth processes are what qualify PHS 120 to have SQ General Studies status at ASU. In recent years there has become an increased awareness of the variety of ways in which human activity is impacted by geology, meteorology and oceanography. This emphasis is incorporated into most of the leading textbook offerings, and is an emphasis that is followed in the teaching of PHS 120. We have selected one syllabus (Stan Celestian) and table of contents (text: **Earth Science 12th Edition**, by Tarbuck, Lutgens & Tasa) from the Glendale Community College as representative. Documents supporting the Criteria Checklist are drawn from Tarbuck, Lutgens & Tasa.

This proposal is submitted by the Glendale Community College Department of Physical Sciences (Cheryl Dellai, lead).

This is numbered according to the sections in Criteria #1, e.g. 1.1. Some of this documentation is also cited for Criteria #2d.

Criteria #1: "Subject matter that leads to an understanding of the contemporary world outside the U.S.

As a natural science of the Earth, Geology is without borders. Continents, ocean basins, mountain ranges, plains, climate belts and all the geological processes associated with them are studied where they are found without regard to national boundaries. Classic examples more often come from outside the United States than within. Many aspects of geology come into direct interaction with humans, and many of these transcend U.S. borders and culture, whether they be of the sort where international interaction is involved or more local. Geologic hazards (earthquakes, volcanoes, tsunamis, floods and landslides) are not confined to this country, and in many cases are a more pressing issue to non-U.S. countries, especially due to the lack of preparedness in many of the developing nations. The study of nonrenewable mineral and energy resources is not only about conservation but also economics and politics on both global and local scales. The link between culture and political/economic decisions is a theme that is also explored. We emphasize that students, as registered voters, will be asked to make important policy decisions for which a knowledge of the interactions of global geologic processes and the limits of resources will be crucial in understanding the issues. Studies of global climate problems including soil erosion, acid rain, rain forest destruction, "El Nino/La Nina", "greenhouse effect" warming, and "volcanic- or nuclear-induced" cooling all represent examples of such issues.
The following list of topics expands on how **PHS 120** leads to an understanding of the contemporary world outside the U. S.:

1) World Climates & Global Climate Change. Chapter 20 in **Earth Science 12th Edition**, by Tarbuck, Lutgens & Tasa *(2009)* discusses the geologic processes involved in weathering and the production of soils. The Weathering and Soils video of the Annenberg CPB Earth Revealed Series is a popular supplement to this discussion. [Note: there are many other examples in other popular Earth Science texts.] Soil development is related to climate (rainfall and temperature). Laterite soils are typically developed in tropical rain forests in Brazil, Africa, and Asia. Contrary to what students initially may think, laterite soils are remarkably infertile. The tropical rain forests are prime examples of the biological concept of symbiosis. That is, the rain forest is a self-perpetuating system that does not rely on the fertility of the soil in which it grows. Clear-cutting of such forests has potentially disastrous results, not only for those who were hoping to farm on the "presumably rich soil", but also for those of us living thousands of miles from the equator. The best known example is the raising of cattle in Brazilian clear-cut rain forest land to supply McDonald's Big Mac. The global effect is due to the change in atmospheric oxygen/carbon dioxide levels and consequent climate changes caused by the destruction of the rain forest flora. This revelation typically excites students into suggesting solutions to this problem- most of which involve bans on rain forest destruction. It is easy to stimulate lively discussion by pointing out that many of these rain forests exist in countries of northern South America or central Africa wherein the per capita income and standard of living is typically low relative to the U. S. values. Having the students grasp the complexities of this problem, from the global consequences of a local action to the political and economic ramifications of potential solutions is clearly within the scope of the **Global Awareness area**.

2) Glaciers. Deserts. Ocean Currents and Global Climate Change. Because most students taking introductory physical sciences classes are non-majors, we typically focus on large-scale concepts and processes rather than on detailed nomenclature in our studies of glaciers and deserts. In glacial studies, for example, emphasis is placed on the changes in global temperature that cause ice-age and interglacial periods and the consequences of such changes in the ice cap volumes (e.g. global sea level) in **Earth Science 12th Edition**, by Tarbuck, Lutgens & Tasa *(2009 (Chapter 6 pps 153-185)* enumerates several hypotheses for explaining glacial ages including changes in atmospheric oxygen/carbon dioxide levels. High carbon dioxide levels may induce "greenhouse" warming resulting in melting of the polar ice caps and associated rise in sea level. This concept is easy to relate to the rain forest destruction introduced during soils studies. An increase in 'greenhouse" gases and its global effects may also be attributable to air pollution. This notion reinforces the idea that air pollution is not just the problem of heavily industrialized cities. Even though some pollution remediation has been accomplished through regulation in the U. S., air pollution in Santiago, Chile is as much a concern as that of Cleveland, Ohio. On the other end of the temperature spectrum, global cooling may be the result of particulate matter released into the atmosphere through intense volcanic eruptions, or nuclear war. in **Earth Science 12th Edition**, by Tarbuck, Lutgens & Tasa *(2009 (page 272-273)* cites the evidence for a "mini ice age" following the 1815 eruption of Mount Tambora in the southwestern Pacific Ocean. In addition, 3 modern volcanoes Mount St Helens in Washington state, El Chicon in Mexico, and Mount Pinatubo in the Philippines are also cited. The students generally come away with the idea that air pollution, volcanic eruptions, rain forest destruction, and nuclear war are matters of global rather than local concern. In short, an explosive volcanic eruption in Indonesia, or a nuclear war between Pakistan and India may indeed have consequences in Phoenix. Investigations into the causes of desert climates show that the temperature of ocean currents can affect the amount of ocean evaporation, and consequently, the amount of rainfall on the continents. "El Nino/La Nina" weather phenomenon has made it particularly easy to illustrate this point. Recent warming in the eastern Pacific ocean currents has enabled greater evaporation of water. News media attention to the global climate change has increased as the White House reissued and refocused the global assessment report from 2007 last June. (AZ Republic June 17, 2009) Less prominent in the news media is the lack of sunspots when the cycle predicted greater number of sunspots (**Earth Science 12th Edition**, by Tarbuck, Lutgens & Tasa *(2009 (page 665- 672)* This might indicate a global cooling as seen in the **Maunder Minimum (1650-1720)** when there were very few sunspots and abnormal cold weather in Europe for seventy years. Again, we are providing students with an appreciation of the consequences of processes that occur outside the U. S. borders.

3) Geologic Hazards. Volcanic hazards are often illustrated with a photo of Pompeii, Italy, which was buried in a pyroclastic flow emanating from nearby Mount Vesuvius. Panning away, the modern city Naples is shown in a similarly precarious position. This example is usually "brought home" with a slide of Seattle in the shadow of Mount Rainier, an active volcano similar to Vesuvius in character. Earthquakes, volcanic eruptions, floods and landslides (all of which are Chapters in standard Physical Science texts) tend to be thought of as local disasters but many can have global ripple effects. Perhaps the most direct effect is the generation of seismic sea waves (tsunamis) generated by offshore earthquakes.(see pps232 - 234). These enormous waves (popularly called "tidal waves") may strike coastal areas thousands of miles from their point of origin. The 2004 Indonesian Tsunami death toll of 230,000 would have been reduced had there been an adequate warning system in place. Less obvious, however, is the effect of such disasters on international travel and trade. Many geology instructors use the example of a sharp rise in the price of computer memory boards resulting from the damage to a major "chip" manufacturer in Japan during a recent earthquake. Business majors and consumers alike are thus introduced to the influences of foreign geologic hazards on local supplies and economies.

4) Global Energy & Mineral Resources. Most Physical Science texts contain a chapter or two covering geologic resources broadly divided into energy and mineral resources. Energy resources studies tend to focus on oil, coal, and natural gas as well as geothermal, hydroelectric, wind, solar, and nuclear. Mineral resources include the metals (copper, aluminum, zinc, lead, gold, silver, etc.) as well as the nonmetals (sand, gravel, salt, gypsum, etc.). Resource studies consider three problems: environmental impact, supply, and political influences. The environmental aspects include various types of pollution involved in the extraction, shipment and use of energy resources. Oil spills, air pollution from the burning of fossil fuels, and radioactive waste disposal are all global problems. Air pollution, regardless of the source, may affect climate as discussed above or contribute to the acid rain. Oil spills, even in non-U. S. waters, may affect the food supplies dependent on the fishing industry. Ocean currents can also transport

oil spills into populated coastal areas. The disposal of radioactive waste in ocean areas may also have disastrous global consequences resulting from disruption or contamination of food chains. Mineral supplies are often dependent on the activities of foreign countries. The price of Chilean copper, for example, may regulate which copper mines in Arizona can be operated profitably thus affecting the local job market. Students also gain further appreciation for the effects of mineral resource cost and availability on international political interactions, perhaps best exemplified by our political interest in the oil-based economies of the Middle East.

5) Global Plate Tectonics. At or near the beginning of each semester, students are introduced to the concept of plate tectonics and the idea that the U.S. is but one portion of the North American continent which drifts embedded in the North American Plate (which extends well into the Atlantic Ocean). As such, North America is placed on equal terms to any of the other continents. Furthermore, many examples of plate tectonic interactions are more classically illustrated on other continents or oceans. The East African Rift Valley and Red Sea are typically used as examples of the early and middle stages of continental break-up, Iceland as an on-land example of the Mid-Atlantic Ridge, the Andes of South America as typical, subduction-generated mountains, and the Himalaya as the example of continental collision, Plate Tectonics is the global, unifying paradigm in Geology, and is given a full chapter or more in every Physical Science textbook, in **Earth Science 12th Edition**, by Tarbuck, Lutgens & Tasa *(2009* Chapter 7 186-218 (see submitted Table of Contents.)

Supplemental Statement #2

General Studies Course Proposal: PHS 120 = Global Awareness-G

PHS 120, Introduction to Physical Science: Astronomy, Meteorology, Geology and Oceanography is taught in the Maricopa County Community College District. This course is the study of physical processes on /within and above the Earth. The fundamental chemical and physical aspects (matter and energy) of Earth processes are what qualify PHS 120 to have SQ General Studies status at ASU. In recent years there has become an increased awareness of the variety of ways in which human activity is impacted by geology, meteorology and oceanography. This emphasis is incorporated into most of the leading textbook offerings, and is an emphasis that is followed in the teaching of PHS 120. We have selected one syllabus (Stan Celestian) and table of contents (text: **Earth Science 12th Edition**, by Tarbuck, Lutgens & Tasa) from the Glendale Community College as representative. Documents supporting the Criteria Checklist are drawn from Tarbuck, Lutgens & Tasa.

This proposal is submitted by the Glendale Community College Department of Applied Sciences (Cheryl Dellai, lead).

This is numbered according to the sections in Criteria #2d.

Criteria #2. Global scope studies "such as the global interdependence produced by problems of world ecology, multinational corporations...

1) World Ecology. Ecology is the science governing the interrelationships of organisms and their environment, with Earth the foundation of all ecosystems. The examples cited above clearly demonstrate that PHS 120 addresses the interaction of humans with the environment of the planet on a global scale. Air pollution, rain forest destruction, global climate change, geologic hazards, and energy and mineral resources are all problems whose solutions demand international and intercultural cooperation. Students learn to appreciate that the concerns of peoples with very different cultural backgrounds and values must be addressed in order to implement mutually acceptable solutions. This appreciation is consistent with the intent of the Global Awareness area.

2) Multinational Corporations. Several of the examples cited in the first statement show that international business both influences and is influenced by geologic processes. Many petroleum and mineral companies, for example, are multinational corporate entities (e.g. Exxon, Western Minerals, etc.). Management and technical personnel must be prepared to function in cultural and political climates which contrast from those in the U.S. Furthermore, the understanding of the global consequences of corporate decisions involving environmental and economic concerns is an important part of the student experience in PHS 120.

A. The effects that environmental changes due to industrial/technological development have had on cultures around the world are addressed in **Earth Science 12th Edition**, by Tarbuck, Lutgens & Tasa Chapters 2-6, and 13-20.

1. The primary concerns addressed here are how resources are mined, how is the waste stored and disposed of, and the resultant changes in the environment. (an example)

Aluminum is the third most abundant element in the earth's crust. The common raw material for aluminum production, bauxite is composed primarily of one or more aluminum hydroxide compounds, plus silica, iron and titanium oxides as the main impurities. More than 160 million tons of bauxite are mined each year. The major locations of deposits are found in a wide belt around the equator. Bauxite is currently being extracted in Australia (in excess of 40 million tons per year), Central and South America (Jamaica, Brazil, Surinam, Venezuela, Guyana), Africa (Guinea), Asia (India, China), Russia (and Kazakhstan) and Greece.

There is significant concern regarding bauxite mining in the tropics because the mining is preceded by removal of tropical vegetation destroying the ecosystem. In the process the soil dries out and can not be used for farming after the mine is played out. (**Earth Science 12th Edition**, by Tarbuck, Lutgens & Tasa pp 102) The multinationals including Alcoa insist they can minimize damage using modern techniques, but environmentalists point to current mines.

There are lawsuits in most bauxite-producing countries over the costs of restoration of the land. This May in Vietnam the fight over bauxite mining reached the PM and Politburo level. There were also concerns that local labor would not be used. (http://www.globalissues.org/news/2009/05/29/1657)

2. The course discusses water resources including groundwater, river use, dams and levees, flood control, shoreline dynamics, desalinization, and contamination. (pp115 -143) and (pp 175 -177). (an example)

   The Aral Sea lies on the border between Uzbekistan and Kazakhstan in central Asia. In 1960 it was the world's 4th largest inland water body fed by two rivers. Both rivers were diverted to meet agricultural needs in the dry region. Wetlands were lost; the sea is now shallow and small; and the salt from the seabed has led to crop reductions. To restore the Aral Sea would require 50 years of fresh water flows from both rivers. (: **Earth Science 12th Edition**, by Tarbuck, Lutgens & Tasa pp 175)

3. The course discusses atmospheric conditions, ozone depletion and global warming including the Montréal Treaty in **Earth Science 12th Edition**, by Tarbuck, Lutgens & Tasa Chapter 16-20.
   The **Montreal Protocol on Substances That Deplete the Ozone Layer** (a protocol to the Vienna Convention for the Protection of the Ozone Layer) is an international treaty designed to protect the ozone layer by phasing out the production of a number of substances believed to be responsible for ozone depletion.(http://en.wikipedia.org/wiki/Montreal_Protocol)

B. Various cultures around the world response to environmental changes based on their traditions and economic need. (**Earth Science 12th Edition**, by Tarbuck, Lutgens & Tasa pps 5-6

It is possible to interpret the intent of the **Global Awareness area** such that this understanding meets this standard.

3) International Cooperation: Natural disasters can be local, regional, or global. In some cases the time and severity of the events are predictable. This is true with hurricane and typhoon prediction. Tsunamis are less predictable since only some earthquakes will produce tsunamis. Once the tsunami is called as in 2004 there was the lack of a good network. The 2004 Indonesian Tsunami death toll was 230,000. There has been considerable effort toward developing this network in the last 5 years. Volcanoes are monitored and eruptions can be predicted. Earthquake prediction is in dispute. The Chinese methods using animal behavior, foreshocks and air ionization were unable to predict the earthquake that occurred in 2008. (http://www.drgeorgepc.com/EarthquakePredictionChina.html)
(**Earth Science 12th Edition**, by Tarbuck, Lutgens & Tasa pps 24, 236-8)

Physical Science 120 Spring 2009

Introduction to Physical Science: Astronomy, Meteorology, Geology and Oceanography
Designed primarily for students with limited background in physical science and mathematics and for nonscience majors. Topics from astronomy, meteorology, geology and oceanography. A laboratory course designed to help the students learn the basic laws and facts of the physical sciences, which provide the starting points for scientific thought and speculations. May not receive credit for both PHS120 and GLG106.

INSTRUCTOR: STAN CELESTIAN

OFFICE: PS 103

PHONE: 623-845-3681 FAX: 623-845-3846

Send me electronic mail at: stan.celestian@gcmail.maricopa.edu

OFFICE HOURS: BY APPOINTMENT)

TEXTBOOK: Earth Science 12th Edition by Tarbuck, Lutgens & Tasa

LAB BOOK: Physical Science Lab Manual by CELESTIAN

http://www.gc.maricopa.edu/earthsci/imagearchive/index.htm

http://www.gc.maricopa.edu/earthsci/imagearchive/physical_science_120.htm

POWER POINT PRESENTATIONS

HOW TO USE THE MINERAL IDENTIFICATION KEY (11.2 Mb)

THE PHYSICAL PROPERTIES OF MINERALS (26.5 Mb)

ROCKS (4.8 Mb)

SUNNYSLOPE QUADRANGLE - THE BASICS OF TOPOGRAPHIC MAPS (12.1 Mb)

TOPOGRAPHIC MAPS PART 2 (20.6 Mb)

FUN IN THE DESERT (17.3 Mb)

SANDS (5.9 Mb)

PALEONTOLOGY (13.3 Mb)

The Wave Cyclone (2.0 Mb)

Meteorology Concepts (7.5 Mb)

Astrophotography (15.2)

Also check out my on-line Geology Photo Library at:

http://home1.photoisland.com

Guest Log-in ID: gccscience | Password: celestian

CLASS POLICIES:

GRADES:

Your grade is dependent on the total number of points accumulated. Points are obtained by the 12 quizzes, 3 tests, returning the lab kit and the rock and mineral identification labs.

Each quiz has a value of 25 points
Each test has a value of 200 points
Lab kit return is extra credit and is 25 points
Mineral Identification Lab is 25 points
Rock Identification Lab is 25 points

I am taking the best 11 of the 12 quizzes. This means you get to drop one.
If you are, for any reason, unable to turn is a quiz, you will get a zero for a score. BUT, the good news is that I will drop that one score.

Here is the grade breakdown:
A = 925 to 830 (90%)
B = 829 to 740 (80%)
C = 739 to 645 (70%)
D = 644 to 555 (60%)
F = Anything less than 555

NOTE: These grade boundaries will be strictly adhered to at the end of the semester.

TESTING: Test will be administered in the **TESTING CENTER** HTC143.

PHS 120 has a required lab.

Due to the nature of the class the class schedule may change at the discretion of the instructor to accommodate the needs of the class.

DATE	CHAPTER & TOPIC	Quiz & Lab
Week Jan 18-23	**Chapter 16 The Atmosphere Composition, Structure, and Temperature** **Chapter 17 Moisture, Clouds & Precipitation**	Quiz 1
Jan 25-31	**Chapter 18 Air Pressure & Wind**	Quiz 2 The Basics Of Meteorology
Feb 1-7	**Chapter 19 Weather Patterns & Storms**	Quiz 3 Wave Cyclone
Feb 8- 14	**Chapter 22 Touring the Solar System** **Chapter 23 Light, Astronomical Observations and the Sun**	Quiz 4 Telescope Optics & Astrophotography
Feb 15 -17	Test Preparation	TEST 1 HTC143
Feb 22- 28	**Chapter 2 Minerals: Building Blocks of Rocks** **Mineral Identification Kit**	Quiz 5 Physical Properties of Minerals How to use the Mineral Identification Key
Mar 1 -7	**Chapter 3 Rocks: Materials of the Solid Earth** **Rock Identification Kit**	Quiz 6 Rocks & How to Identify Them.
Mar 8 -13	**Chapter 4 Weathering, Soil & Mass Wasting** **Chapter 6 Glaciers, Deserts, and Winds**	Quiz 7 Topographic Maps 1 Sunnyslope Quadrangle
Mar 22-28	**Chapter 5 Running Water & Groundwater**	Quiz 8 Topographic Maps 2
Mar 29-31	Test Preparation	TEST 2 HTC143
April 5 - 11	**Chapter 7 Earthquakes & the Earth's Interior**	Quiz 9 Desert & Sands
Apr 12 - 18	**Chapter 9 Volcanic Landforms & Intrusive Rock Bodies**	Quiz 10 Volcanics
Apr 19 - 25	**Chapter 11 Geologic Time**	Quiz 11 Paleontology
Apr 26 – May 2	**Chapter 13 The Ocean Floor** **Chapter 15 The Dynamic Ocean (Shorelines)**	Quiz 12 Shoreline Processes
May 3-5	Test Preparation	TEST 3 HTC143

COURSE DESCRIPTION:

Designed primarily for students with limited background in physical science and mathematics and for nonscience majors. Topics from astronomy, meteorology, geology and oceanography. A laboratory course designed to help the students learn the basic laws and facts of the physical sciences which provide the starting points for scientific thought and speculations

Prerequisites: None

AUDIO TAPING:

Audio taping is allowed for the sole purpose of enhancing notes or as an aid in sleeping. The taping process will be allowed as long as it does not interfere with the lecture presentation or students' perception of the lecture.

FIELD TRIPS:

Several off campus trips will be offered. All of these triDs are optional.
NO EXTRA CREDIT will be accepted other than the points after the lecture tests.

Don't ask.

Earth Science, 12/E

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Frederick K. Lutgens, (Emeritus) Illinois Central College

Dennis Tasa

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