



DEPARTMENT OF PHYSICAL SCIENCES & ENGINEERING

MASTER SYLLABUS

Harry S. Truman College: Our Mission dedicates us to deliver high-quality, innovative, affordable and accessible educational opportunities and services that prepare students for a rapidly changing and diverse global economy.

Course (Discipline): Physical Science

1. Title, Number, and Classification

General Course I - Physical Science

076 0111

College Credit – General Education Physical Science with laboratory

2. Course Term

16 week Semester or 8 week summer term

3. Credit and Contact Hours

Credit hours: 4

Contact hours: 3 lecture and 2 lab

4. Prerequisites

English 101 eligibility

5. Catalog Description

Introduction to the scientific method, astronomy, geology, meteorology. Writing assignments, as appropriate to the discipline, are part of the course. Credit Hours: 4, 3 lecture hours and 2 lab hours per week based on sixteen weeks.

6. Students for whom the course is intended

This is a course required for students seeking an AA or AS who require a physical science course with laboratory

7. Course Objectives

At the completion of this course the successful student will be able to do the following:

In Geology:

- Differentiate between minerals and rocks and identify many of the common rocks.
- Classify types of rocks and draw the rock cycle.
- List causative agents and products of various types of erosion.
- Describe the causes and results of diastrophism.
- Classify earthquake waves, faults and types of unconformities.
- Use the laws of geology to determine the relative age of rock structure.
- Describe the gross structure of the Earth, i.e., crust, mantle, core.

- Sort and identify a mixture of minerals according to their physical properties
- Identify geological land forms and describe their origin.
- Relate diastrophism and land forms to tectonic plate motion.

In Meteorology:

- Describe the structure and composition of the atmosphere.
- Describe atmospheric circulation patterns.
- Read simple weather maps and identify fronts, air masses and wind direction.
- Describe the movement of air about high and low pressure centers.
- Use principles of air mass and frontal movement to predict weather in various parts of the U.S. using maps and weather satellite information.

In Astronomy:

- Give evidence of the sphericity, rotation and revolution of the Earth.
- Use latitude and longitude to identify geographical and time zones on Earth.
- Describe the motions of the Earth and the Moon in their orbits
- State and explain the various cosmological models.
- List Kepler's Laws.
- Use scale models as they relate to astronomical systems.
- List types of stars and describe the process of stellar evolution.
- Describe composition, structure, and possible origin of the solar system.
- Describe the structure and evolution of the universe.

Generally:

- Use laboratory equipment to perform experiments and demonstrations.

8. Learning Outcomes

At the completion of this course the successful student will be able to do the following:

1. Relate information obtained in the course to current stories in the media about geological, meteorological and astronomical phenomena
2. Describe the role the scientific method has played in arriving at our current theories about Earth Science.
3. Read and interpret a variety of maps: topographical, meteorological, geographical
4. Discuss the historical development and present rational arguments for our current state of knowledge in the Earth sciences

9. (suggested)

| Week | Topic | Text Reference |
|----------------|--|-----------------------|
| Geology | | |
| Week 1: | Scientific Method: Hypothesis, Theory, Law, Inductive and Deductive Reasoning | Chapter 1 |
| | Minerals: Definition, Atomic Structure, Properties, Abundance, Mining | Chapter 2 |
| Week 2: | | Chapter 3 |

| | | |
|--------------------|---|------------------|
| | Rocks: The Rock Cycle, Igneous, Metamorphic, Sedimentary, Ores | |
| Week 3: | Weathering, Soil and Mass Wasting: Weathering, Soil Formation, Types of Mass Wasting | Chapter 4 |
| Week 4: | Running Water and Groundwater: The Hydrologic Cycle, River Systems, Work From Running Water, Erosion, Deposition, Floods, Storage and Movement of Groundwater, Springs and Wells, Contamination | Chapter 5 |
| | Glaciers, Deserts and Wind: Glacial Erosion, Landforms, Glacial Deposits, Ice Ages, Evolution of a Desert, Dunes | Chapter 6 |
| Week 5: | Exam One | Chapters 1 to 6 |
| | Plate Tectonics: Continental Drift, Plate Boundaries, Hot Spots, Mechanisms | Chapter 7 |
| Week 6: | Earthquakes and Earth's Interior: Faults, Foreshocks and Aftershocks, Seismology, Scales, Tsunamis, Subsidence, Earth's Layers | Chapter 8 |
| Week 7: | Volcanoes: Flows, Gases and Pyroclastics, Types of Volcanoes, Volcanic Landforms, Plate Tectonics and Vulcanism | Chapter 9 |
| Week 8: | Mountain Building: Folds, Faults, Types of Mountain Ranges, Isostasy, Joints | Chapter 10 |
| | Geological Time: Relative Dating, Law of Superposition, Cross-Cutting Relationships, Inclusions, Principle of Original Horizontality, Unconformities, Disconformity, Fossils, Radiometric Dating, The Geologic Timescale | Chapter 11 |
| Week 9: | Exam Two | Chapters 7 to 11 |
| | Exit Exam Part One: Geology | Chapters 1 to 11 |
| Meteorology | | |
| Week 10: | The Atmosphere: Composition, Structure and Temperature Weather and Climate, Height and Structure of the Atmosphere, Earth-Sun Relationships, Mechanisms of Heat Transfer, The Greenhouse Effect, Cloud Cover and Albedo, World Distribution of Temperature | Chapter 16 |
| | Moisture, Clouds and Precipitation: Phase Changes of Water, Relative and Absolute Humidity, Dew Point, Stability and Instability of Air Masses, Classification of Cloud Types, Precipitation, | Chapter 17 |

| | | |
|------------------|--|-------------------|
| Week 11: | Air Pressure and Wind: Measuring Air Pressure, Idealized Global Circulation, Local Winds, Land and Sea Breezes | Chapter 18 |
| Week 12: | Weather Patterns and Severe Storms: Types of Air Masses, Fronts, Cyclones and Anti-cyclones, Thunderstorms, Tornados, Hurricanes | Chapter 19 |
| Week 13: | Climate | Chapter 20 |
| | Exam Three | Chapters 16 to 20 |
| Astronomy | | |
| Week 14: | Origin of Modern Astronomy: Early Greeks, Ptolemaic System, Copernican System, Kepler's Laws, Galileo, Constellations, Rotation, Revolution, Precession, Phases of the Moon | Chapter 21 |
| | Touring Our Solar System: Terrestrial Planets, Jovian Planets, The Moon, Asteroids, Comets, Meteoroids | Chapter 22 |
| Week 15: | Light and the Sun: Nature of Light, Spectroscopy, Doppler Effect, Telescopes, Structure and Composition of the Sun | Chapter 23 |
| | Beyond the Solar System: Stellar Brightness, Hertzsprung-Russell Diagram, Variable Stars, Interstellar Matter, Stellar Evolution | Chapter 24 |
| Week 16: | Exam Four | Chapters 21 to 24 |
| | Exit Exam Part Two: Meteorology and Astronomy | Chapters 16 to 24 |
| SYLLABUS | | |

| Date | Laboratory Exercise |
|------|---|
| | <u>Identification of Minerals</u> |
| | <u>Identification of Rocks</u> |
| | <u>Map Reading Latitude and Longitude Contour Lines</u> |
| | <u>Geological Models: Models 4 and 6 - Glaciers</u> |
| | <u>Earthquake Data (Computer Simulation)</u> |
| | <u>Geological Models - Volcanoes and Mountains</u> |
| | <u>Simulation of Radioactive Decay</u> |
| | <u>Clay Models</u> |
| | <u>Air and Air Pressure</u> |

| Date | Laboratory Exercise |
|---------------------|--------------------------------|
| | Cloud Journal |
| | <u>Using the NOAA Website</u> |
| | Weather Map (Handout in Class) |
| | <u>Night Vision</u> |
| LABORATORY SCHEDULE | |

10. Texts and Materials (suggested)

Earth Science 13th Ed.

by Tarbuck & Lutgens

Prentice Hall © 2012

ISBN-10: 0-321-68850-3

ISBN-13: 978-0-321-68850-7

11. Methods of Instruction

Lecture and Notes: Lecture notes will be provided.

Group Exercise: Documents on instructions and methodologies will be provided by the instructor. This will include group discussions, presentations, and writing.

Videos/CDs: The instructor will show or provide cd roms as deemed necessary.

12. Methods of Evaluation:

The Grade will be based on laboratory reports and activities (30%), examinations (best three out of four) (40%), Exit Exam (Part One and Part Two) * (20%) and attendance/class participation/homework (10%).

| Letter Grade | Percentage |
|--------------|-----------------------------|
| A | 90% |
| B | 80% |
| C | 70% |
| D | 60% |
| F | below 60% |
| I | *Incomplete |
| ADW | **Administrative Withdrawal |
| NSW | ***No Show Withdrawal |

*"I" (Incomplete) are non-grades received by students who have actively pursued the course and are doing passing work at the end of the course, but who have not completed the course's final examination and/or other specific course assignments.

****ADW (Administrative Withdrawal).** Any student who is not actively pursuing the course objectives will be administratively withdrawn from the course at mid-term. An ADW will be given if a student does not complete at least 70% of all assignments; homework, exams, laboratories, quizzes due prior to mid-term by the mid-term date. Since make up work is NOT permitted this means that attendance is extremely important and excessive absences will most likely result in an ADW.

*****NSW (No Show Withdrawal).** Any student who misses the first two classes and does not discuss with me the circumstances of these absences will be given an NSW after the second class. A student who attends the first class and then fails to attend the next two classes and fails to discuss with me the circumstances of these absences will be given an NSW. Any student who misses more than half of the classes in the first two weeks of the term will also be given an NSW if we do not discuss the circumstances of these absences. In my discussion with you I will determine if it is feasible for you to successfully pursue the course objectives under whatever circumstances are causing you to miss class. Your success is very important to me and I know, from years of experience, that your success depends on your commitment and ability to attend the class and participate in all activities.

* You must correctly answer 20/50 questions on the Exit Exam (sum of correct answers on both parts) to receive a "C" or better in this course. Passing the Exit Exam does not guarantee passing the course.

Make-Up Policy

Make-Up work is not permitted under any circumstances. This includes but is not limited to hospitalization, deaths in the family, illness, family emergencies. Life happens to everyone. This is why some quizzes, one exam and one laboratory are dropped from your grade with no penalties. If circumstances arise that prevent you from actively participating in all aspects of this course please let me know. There is no substitute for attending classes regularly and on time. Please choose someone else in the class that will be able to exchange notes with you in the event either of you misses class. You are responsible for all missed announcements, assignments and class work. Please do not use the phrase "I didn't know" to excuse any missed work. Check the website often. Announcements and assignments are posted and updated regularly.

Success in the Laboratory

Lab Reports: Laboratory reports are formal writing assignments and need to be taken seriously. You are expected to turn laboratory reports in on time, with all questions answered clearly and legibly and all pages neatly stapled (not folded or mutilated) together. Points will be deducted for late reports, messy reports, incomplete sentences and poor grammar/spelling, handwriting that is difficult to read. Points will also be deducted for errors in content.

Authorized Signature and File

Date: _____