

Common Course Outline

ARSC 104

Great Perspectives in Science

3 Semester Hours

The Community College of Baltimore County

Description

Great Perspectives in Science presents a review of developments in the natural sciences by means of three perspectives: analytical, unifying, and evolutionary. Topics include atomic theory, vascular circulation, relativity, genetics, plate tectonics and cosmology. Individuals highlighted include Aristotle, Galileo, Newton, Darwin, Pasteur, Einstein, Hubble, Crick and Watson, Leakey and Hawking.

3 credits: 3 lecture hours per week.

Prerequisites: (ENGL 052 or ESOL 052 or LVE 2), and (MATH 083 or LVM 3) and (RDNG 052 or ESOL 054 or LVR 2).

Overall Course Objectives

Upon completion of this course the student will be able to:

1. use scientific terminology to describe discoveries and theoretical explanations concerning many fields of science. (I, 1)
2. describe, numerically and graphically, various presentations of scientific data. (I, 1, 3)
3. incorporate scientific information into effective written and oral communications. (II, 4)
4. apply mathematical methods to the interpretation of scientific data. (III, 3)
5. use scientific data and methods, individually and collaboratively, to solve problems involving scientific topics. (III, VI, 2, 4)
6. use scientific technology to research a scientific topic. (III, VI, 6)
7. explain how scientists have used results from technologies to develop theoretical models. (IV, 5)
8. utilize the Internet and/or other informational resources to research scientific topics. (IV, 6)
9. discuss how physical and biological processes affect the conditions for biological and social organization on Earth. (IV, V, 7)
10. examine the relationships among advances in a variety of scientific disciplines. (IV, 7)
11. examine the lives and contributions of scientists from diverse cultures over the course of the history of science. (V)

Major Topics

This course deals with the processes of scientific discovery in a wide variety of specific topics.

Analytical Perspective

Components of Matter and Energy

Curie's Studies of Radioactivity

Oersted's and Faraday's Investigations of Electrical-Magnetic Interactions

Bohr's Theory of Quantum Mechanics

Components of Living Things
Harvey's Determination of Blood Circulation
Pasteur's Germ Theory
Crick and Watson's Model of DNA

Components of the Universe
Newton's Calculations of Planetary Orbits
Payne's Studies of Stellar Spectra
Hubble's Observations of Galaxies

Unifying Perspective

Universal Motions
Aristotle's and Ptolemy's Geocentric Systems
Aristarchus' and Copernicus' Heliocentric Systems
Hubble's Determination of the Universe's Expansion

Universal Forces
Einstein's General Relativity
Feynmann's Quantum Electrodynamics
Gell-Mann's Quantum Chromodynamics

Universal Relationships
Mendeleev's Periodic Table
Cuvier's Fossilized Quadrupeds
Wilson's Florida Keys Experiment

Evolutionary Perspective

Material Processes
Hoyle's Studies of Nucleosynthesis
Wegener's Theory of Continental Drift
Kauffman's Concept of Autocatalytic Self-Organization

Organic Processes
Darwin's and the Grants' Studies of the Galapagos Finches
Morgan's and Benzer's Studies of Fruit Flies
Johanson's and the Leakeys' Discoveries of Hominid Fossils

Universal Processes
Calusius' Concept of Entropy
Poincare's and Feigenbaum's Theories of Chaos
Guth's and Hawking's Inflationary Models of the Universe

Course Requirements (VII)

Grading/exams: Grading procedures will be determined by the individual faculty member but will include the following:

- a minimum of 3 exams
- a minimum of 6 group activities involving discussion and presentation
- a minimum of 1 written report on an activity involving the collection and analysis of scientific data
- a minimum of 8 other writing assignments, consisting of essays on exams, reports on supplemental reading, research papers, etc.

Other Course Information

This course fulfills a 3-credit General Education requirement in the Biological and Physical Sciences and can serve as a science elective.

This course is also taught over the World Wide Web.

Individual faculty members may include additional course objectives, major topics, and other course requirements to the minimum expectations stated in the Common Course Outline.

Date Revised: 2005