History of the Universe

Outline

This is an elective, non-Regents, half-year (one semester) science course. The course is open to all High School students who have completed Earth Science and Living Environment. There are no math or other prerequisites, but reading, discussion, and writing are emphasized, and a written research project is required.

This course will explore the nature of science, the Universe, and the histories of Earth, life, humans, and technology. Topics will include astronomy, paleontology, anthropology, the relationships between science, technology and culture, climate change, and the future.

I. The Nature of Science
- A. The purpose of scientific inquiry
- B. How are philosophy and religion different from science?
- C. Scientific methodology
- D. Why is science important?

II. The Universe
- A. The big bang model and the structure of the Universe
  - 1. Relativity: time, space and the speed of light
  - 2. Quantum theory
- B. Galaxies
- C. Stars and nebula
- D. The nebular hypothesis and the Solar System
- E. The planets
- F. Asteroids, comets, meteoroids and the Kuiper Belt
- G. Space exploration

III. The History of Earth
- A. The Nebular Hypothesis, Earth, Moon, oceans and atmosphere
- B. The origin of life - multiple hypotheses
  - 1. Oparin & Haldane
  - 2. Miller & Urey
  - 3. Fox
  - 4. Cairns-Smith
  - 5. Cech
  - 6. Margulis
  - 7. Sagan
  - 8. Gold
- C. The PreCambrian Eon
- D. The Paleozoic Era
- E. The Mesozoic Era
  - 1. Saurischian dinosaurs

2. Ornithischian dinosaurs
3. Extinction

F. The Cenozoic Era
1. The mammals
2. Pleistocene megafauna

IV. Our Primate Ancestry
A. Strepshirines
B. Haplorines
1. Tarsiers
2. Anthropoids
a. Catarrhine Primates
b. Hominoids
i. Australopithicine - bipedalism and small canines
A. Sahelanthropus tchadensis
B. Orrorin tugenensis
C. Ardipithecus ramidus
D. Australopithicus anamensis
E. Australopithicus afarensis
F. Australopithicus africanus
G. Kenyanthropus platyops
H. Australopithicus garhi
I. Australopithicus aethiopicus
J. Australopithicus boisei
K. Australopithicus robustus
ii. Homo
A. Homo habilis
B. Homo rudolfensis
C. Homo ergaster
D. Homo erectus
E. Homo heidelbergensis
F. Homo neaderthalensis
G. Homo floresiensis
H. Homo sapiens sapiens

V. Technology, Science, Culture and the Future
A. Science history
B. Techno culture
C. Technology and responsibility
D. Climate change
E. The future