Natural Science II

Earth, Life and Time
(CORE-UA 312.001)

Spring 2015

Room 207 Silver, Tuesday and Thursday 2:00 to 3:15
Lectures: Professor Michael R. Rampino
Departments of Biology and Environmental Studies
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Office Hours: Tues/Thurs from 12:30 to 1:30 in Room 1157 Brown

The Universe is 13.7 billion years old, and during its lifetime the elements necessary to build planets and life were created in stars and distributed across the galaxies. Life on Earth, originating some four billion years ago, has evolved in response to environmental changes on the planet. At the same time, major innovations in the history of life have led to transformations of the Earth's atmosphere, oceans and climate. *Earth, Life and Time* **examines the history of the intimate relationship between the Earth's changing environments and the evolution of life. This long-term perspective provides a narrative of cosmic evolution, and a context for understanding current issues such as global warming, habitat destruction and loss of biodiversity, and the search for life elsewhere in the Universe.**

<u>Required Reading</u>: *Origins of Life in the Universe* (OLU), R. Jastrow and M. Rampino, 2008 (Cambridge University Press, paperback). *T-Rex and the Crater of Doom*, W. Alvarez, 1997 (Princeton Univ. Press, paperback). Additional readings will be placed on the class website. Videos on Youtube are also assigned to go along with some of the lectures.

All students must register for a lab. There will be two quizzes and a final exam (each covering a third of the semester) (see schedule below) each accounting for 25% of your final grade. The labs will count as 20% of the final grade. Homeworks count for 5% of your grade. Students are required to attend the lectures, as some material discussed in the lectures will not be covered in the readings. Quiz 1 on 3/5 and Quiz 2 on 4/16.

Week	Lectures	Lab
1	**Origins** 1/27 Galaxies and Stars 1/29 The Universe and its Origin **Reading: OLU, Chapter 1, 2** **Homework: Questions Chapters 1 and 2** ***Watch: "Beyond the Big Bang" on Youtube***	**No Labs**
2	**Prelude to Earth** 2/3 Stellar Evolution 2/5 The Solar System & Extra-Solar Planets **Reading: OLU, Chapters 3, 4** **Homework: Questions Chapters 3 and 4**	**Introduction to the Universe**
3	**How to Build a Habitable Planet** 2/10 Earth and its Moon 2/12 Fossils and Geologic Time **Reading: OLU, Chapter 5** **Homework: Questions Chapter 5** ***Watch: "Origin of the Moon" on Youtube***	**The Moons of Jupiter**
4	**Mars and Venus: The Goldilocks Problem** 2/17 Mars and Venus 2/19 The Search for Life on Mars **Reading: OLU, Chapters 6, 7** **Homework: Questions Chapters 6 and 7** ***Watch: "Why Mars Died and Earth Lived" on Youtube***	**President's Day: No Lab**
5	**Continents Adrift** 2/24 Earth: Structure and Composition 2/26 Plate Tectonics and Continental Drift **Reading: OLU, Chapters 8, 9** **Homework: Questions Chapters 8 and 9**	**Fossils and Geologic Time**
6.	**The Amazing Earth** 3/3 Amazing Earth—Film 3/5 **QUIZ 1**	**Review for Quiz 1**

7. Climatic Change and the Earth's Orbit **Sea-Floor Spreading**

3/10 Climate Change and its Causes
3/12 Astronomical Cycles and the Earth
Reading: OLU, Chapter 10
Watch "Earth Cycles Part 2" on Youtube
Homework: Questions Chapter 10

8 Monday, March 16th to Sunday, March 22rd
SPRING BREAK

9 Life and its Origins **Dances with the Earth 1**

3/24 What is Life? Important Life Processes
3/26 The Origin of Life
Reading: OLU, Chapter 11
Watch: "DNA Structure and Replication, Crash Course in Biology #10" on Youtube and "DNA, Hot Pockets & the Longest Word Ever: Crash Course in Biology #11" on Youtube.

10 Evolution & Natural Selection **Dances with the Earth 2**

3/31 Evolution by Natural Selection
4/2 Film: "Darwin's Dangerous Idea".
Reading: OLU Chapter 11
Homework: Questions Chapter 11
Read: "*A Sound of Thunder*" by Ray Bradbury (Google it)

11 Life: Diversity and Early History **Evidence of Evolution**

4/7 The Diversity of Life
4/9 The Early History of Life and Earth
Reading: OLU, Chapter 12
Watch: "Why Evolution is True and Why Many People Still Don't Believe It" by Jerry Coyne on Youtube

12 From Sea to Land—The Vertebrates **Review for Quiz 2**

4/14 The Rise of the Vertebrates
4/16 **QUIZ 2**
Reading: OLU, Chapter 12
Watch "Carl Sagan-Cosmos-Evolution" on Youtube
Homework: Questions Chapter 12

13 The Dinosaurs and Their Fate **Major Innovations of Life**

4/21 Reptiles, Ice Ages and Continental Drift
4/23 The Age of Dinosaurs
Reading: OLU, Chapter 13; Read: *T-Rex and the Crater of Doom*
Homework: Questions Chapter 13

14 The Mammals and Their World **No Lab: AMNH Dinosaurs Trip**

4/28 Mass Extinctions and Radiations of Life
4/30 The Evolution of Mammals and Intelligence
Reading: OLU, Chapter 14
Watch: "The Siberian Traps and the Volcanic Mass Extinction Theory" on Youtube
Homework: Questions Chapter 14

15 Human Evolution

5/5 Human Evolution and Growth of the Brain **Human Evolution and Brain Size**

Reading: OLU, Chapter 15

Homework: Questions Chapter 15

5/7 The Search for Extraterrestrial Intelligence

Reading: OLU, Chapter 16

Watch: "Carl Sagan-Cosmos-Drake Equation" on Youtube

Homework: Questions Chapter 16

16 5/11 Monday Labs only **Lab: Review for Final**

FINAL EXAM WEEK 5/13 to 5/19