

Evolution and Global Environment

Syllabus Number

5G344

Special Subjects

Elective 2 credit

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1. Course Description

This course deals with evolution and global environment. Topics to be covered are as follows:

1. To develop a conceptual framework of the 4.6 billion year history of the Earth.
2. Evidence of chemical evolution, the birth of life, and evolution of living things in accordance with the changes in earth's history.
3. Latest hypothesis of molecular evolution.
4. Technological progress aimed at sustainable society based on the biological law of evolution and prediction for the global environment in the near future.

The aim of this course is to help students acquire the DP2 and DP3 related knowledge, technique and performance. Group discussion and presentation will be carried out, if necessary.

2. Course Objectives

At the end of the course, participants are expected to

- (1) Explain the sequential events of evolution and global environment that has happened on planet Earth.
- (2) Predict the changes in the global environment of the future based on the scientific evidence, and explain the principles of sustainability of energy and water, and advancements of technology.

3. Grading Policy

Your final grade will be calculated according to the following process: Reports and short-term exam on LSM (40%) and term-end examination (60%). Reports and results of short-term exam will be returned and important points will be summarized on LSM.

4. Textbook and Reference

Textbook

- (1) Inoue I. (2007) Natural history of algae for three billion years, the second edition, evolution of algae (in Japanese) Tokai University Press, ISBN978-4-486-01777-6 3045
- (2) Maruyama S. and Isozaki Y. (1998) History of life and the Earth (in Japanese) Iwanami, ISBN4-00-430543-8 C0245

Textbook (2) is necessary for the first half term, then textbook (1) is necessary for the second half term.

5. Requirements(Assignments)

- Handouts should be hold in a letter file, and bring them every classes. Clear folder is not recommended.

6. Note

7. Schedule

- [1] Global environment from past to present (1): Challenges of human beings to be solved; Characteristics of the planet earth; Features of organisms living on the earth
- [2] Global environment from past to present (2): Dynamics of the earth; Plate techniques and Plume techniques; The hypothesis of the birth of the earth
- [3] Global environment from past to present (3): The first half of the seven major affairs of the earth
- [4] Global environment from past to present (4): The second half of the seven major affairs of the earth; Novel view of the existence of the earth
- [5] Life evolution (1): Theories of evolution; From Darwinism to the neutral theory; Basic principles of evolution
- [6] Life evolution (2): Evolution before life birth; Molecular evolution; The first half of the chemical evolution
- [7] Life evolution (3): The second half of the chemical evolution; RNA world; Hypothesis of obcells
- [8] Life evolution (4): Major classification of living organisms; Establishment of Prokaryote; The birth of photosynthetic organisms and climate changes
- [9] Life evolution (5): The hypothesis of the birth of Eukaryote, Organelle symbiosis theory; Various photosynthetic organisms

- [10] Life evolution (6): Origin of chloroplasts; The primary plants; The secondary plants
- [11] Life evolution (7): Mechanisms for the production of novel genes; Big bang of the Eukaryote; Evolution from unicellular organisms to multicellular organisms
- [12] Life evolution (8): Coevolution between life and the earth; Major climate changes caused mass extinction
- [13] Progress of the technology for sustainability (1): Future prediction of the global environment, climate changes and living things
- [14] Progress of the technology for sustainability (2): Water resources; Principle of water purification for tap water and sewage water; Marine environmental conservation; Desalination of seawater
- [15] Progress of the technology for sustainability (3): New energy; Biofuels deal with the future society