

BBIO412 Evolution

ECTS Value: 5 ECTS

Module Description

This module will focus on the theories of evolution by providing several complementary perspectives. The module will cover the process of natural selection and its importance in evolutionary biology. It will utilise examples from various lineages in which multicellularity evolved in order to illustrate processes and concepts. The module will include discussion on the events in the evolution of life on earth from the first unicellular organism to the first multicellular organism. It will also clarify evidence of how life evolved and how new evidence is changing our view of the relatedness of organisms. The underlying philosophy of this module is to portray and link the general and unifying principles and mechanisms.

Overall Objectives and Outcomes

By the end of this module, the learner will be able to:

Competences

- a. Develop an understanding of “key events” in the evolution of life on Earth;
- b. Critically review biochemical evidence to show how closely two organisms are related;
- c. Engage with literature on how the evolution of life on earth is derived from a common ancestor;
- d. Develop an understanding of how evolution is linked to how closely two species are related;
- e. Review and communicate the connection between fossil record and lineages; Earth history and mass extinctions and evolution by selection and drift;
- f. Critically engage with research literature on evolution.

Knowledge

- a. Explain that evolution is a heritable change;
- b. Describe the conditions necessary for natural selection to occur;
- c. Illustrate that the present-day complex species developed from earlier, distinctly different simpler species;
- d. Detail the main issues and processes on how and why variations occur;
- e. Demonstrate knowledge on the components of the Modern Theory of Evolution;
- f. Outline the component parts of natural selection;
- g. Consolidate understanding of cladistics and systematics and molecular evolution and phylogeny;
- h. Extend knowledge and make links on the impact natural selection has on evolution;
- i. Describe how and why extinction occurs.
- j. Demonstrate knowledge of sexual selection, kin selection, speciation mechanisms, adaptive radiation and rates of evolution.

Skills

- a. Investigate the evolution of life on earth from a common ancestor;
- b. Evaluate the biological significance of evolution.
- c. Critically review the significance of ontogeny and phylogeny.
- d. Examine the evolutionary relationships of major plant and animal groups.
- e. Critically analyse Eukaryote genome evolution
- f. Interpret links between evolution and genetic mutations and recombination of genes during meiosis.
- g. Critically analyse the significance of variation that exists in all species and which allows some individuals to be better able to survive in a particular environment than others.

Mode of Delivery

This module adopts a blended approach to teaching and learning. Information related to the structure and delivery of the module may be accessed through the IfE Portal. For further details, kindly refer to the Teaching, Learning and Assessment Policy and Procedures found on the Institute for Education's website.

Assessment Methods

This module will be assessed through: Research Assignment and Online Tasks/Reflections.

Suggested Readings

Core Reading List

1. Barton N.H., Briggs D.E.G., Eisen J.A., Goldstein D.B., Patel N.H., (2007) Evolution. Cold Spring Harbor Laboratory Press.
2. Futuyma D., and Kirkpatrick (2017) Evolution. 4th edition. Sinauer Associates.
3. Stearns S. C., Hoekstra R. F. (2005) Evolution an Introduction. UK: OUP.

Supplementary Reading List

1. Darwin C., (1859). The Origin of Species. UK: OUP.
2. Dawkins R., (2005). The Ancestor's Tale: A Pilgrimage to the dawn of evolution. US:Mariner Books.
3. Trillo R.I., Nedelcu A.M., (2016). Evolutionary Transitions to Multicellular Life: Principles and Mechanisms. Netherlands: Springer.