

SEMESTER I
LSM3252 – EVOLUTION AND COMPARATIVE GENOMICS

Prerequisite: LSM1103

Workload: 26 lecture hours + 6 tutorial hours + 18 practical hours

Presentation of the theory of Evolution as one of the unifying disciplines in biology. The module introduces the three main themes in modern Evolutionary Biology: (I) Tree-of-Life: including processes and mechanisms of speciation, (II) Natural selection: including sexual selection and kinship selection, (III) Neutral Evolution: including genetic drift. Comparative Genomics is incorporated in the module by discussing the origin of life, whole genome comparisons, gene duplication, and using molecular data for the reconstruction of the phylogenetic relationships between species. The module emphasizes the importance of evolutionary biology as a tool that can explain a wide variety of phenomena in biology.

S/N	Topics	Lecture hours
1.	<ul style="list-style-type: none"> • Proximate and ultimate causation in Biology • Speciation and Species, Tree-of-Life, Fossil record (RM) • Introduction into Phylogenetics (RM) • Comparative Genomics: Use of DNA data in phylogenetics • Human Evolution: Fossil Evidence (RM) • Natural Selection I - Theory & Experimental Evidence (RM) • Artificial Selection • Misconceptions about Natural Selection\ • Individual vs. Group Selection (RM) • Micro- & Macroevolution (RM) • Darwinian Medicine • Kinship Selection • Sexual Selection I (RM) • Comparative Genomics: Genetic Drift and Neutral Evolution • Comparative Genomics: Molecular Clock (RM) 	26 R. Meier
	Lectures: Practicals: Tutorials:	26h 6x3h 6h
	Total hours:	50h

RECOMMENDED TEXTBOOK: Stearns, S.C. and R.F. Hoekstra. 2005. Evolution: An Introduction. Oxford University Press, 381 pp.

REFERENCE BOOKS:

- Andersson, M. 1994. Sexual Selection. Princeton University Press, Princeton.
 Dawkins, R. 1989. The Selfish Gene. Reprinted from 1976 edition. Oxford: Oxford University Press.
 Dawkins, R. 1986. The Blind Watchmaker. Oxford: Oxford University Press.
 Dawkins, Richard. 1989. Extended Phenotype: The Long Reach of the Gene. Oxford University Press.
 Futuyma, D. 1998. Evolutionary Biology, 3rd edition. Massachusetts: Sinauer Associates Inc.
 Maynard Smith, J., and Szathmáry, E. 1999. The origins of life: From the birth of life to the origin of language. Oxford University Press, Oxford.
 Page, D. M., and Holmes, E. C. 1998. Molecular Evolution. A Phylogenetic Approach. Blackwell, Science, London.

PRACTICALS and TUTORIALS: The laboratory sessions will comprise 1-2 field trips during which we will discover how evolution works based on living examples from animals and plants. There will be one practical session on human evolution and three practical sessions on cladistics analyzing molecular data sets and learning how to code and study the evolution of various primate features. The last practical will be for the students to present their own research on a chosen topic – this will be in the form of an oral session. The tutorials are incorporated into the practicals and field trips and allow the students to discuss evolution with the TAs and staff.

MODE OF ASSESSMENT: 40% CA ; 60% Final Exam. There will be a formal written final examination (essay and short questions) which will constitute ca. 60% of the total. The other 40% will be from one Cladistics Lab report, one oral presentation, and classroom participation during the practicals and on IVLE. The details are published on IVLE.

MODULE CO-ORDINATOR:

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LECTURER:

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