

SEMESTER I
LSM3252 EVOLUTION AND COMPARATIVE GENOMICS

Prerequisite: LSM1105

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

Course description:

The objectives are to build on the students' foundation in evolutionary concepts and to advance their knowledge and skills related to comparative biology. The lectures present the theory of evolution as the unifying discipline in biology, and enhance the integrated understanding of four main themes: natural selection, palaeobiology, the tree of life and comparative genomics. Overall the module emphasises the importance and application of evolutionary biology for explaining a wide variety of phenomena in biology, from the history of life to genes, genomes and cellular processes.

S/N	Topics	Lecture hours
1	Natural selection Recap natural selection, population genetics, selection and drift, neutral theory, evolution at multiple loci, species and speciation	6
2	Palaeobiology History of life, geologic time scale, fossil record, extinction, palaeoecology, biogeography, biostratigraphy, fossil taxa	6
3	Tree of life Understanding relationships, inferring and reading trees, fossil calibration, diversification rates, evolutionary trends, trait evolution	6
4	Comparative genomics Evolution of genome size, structure and organisation, linkage and genetic maps, complex traits, horizontal gene transfer, gene regulatory networks	8
	Lectures:	13 x 2h
	Practicals:	6 x 3h
	Tutorials:	6 x 1h
	Total hours:	50 h

RECOMMENDED TEXTBOOK:

Bergstrom, C.T. and L.A. Dugatkin. 2016. Evolution. W. W. Norton & Company, 700 pp.

REFERENCE BOOKS:

Meneely, P., R.D. Hoang, I.N. Okeke, K. Heston. 2017. Genetics: Genes, Genomes, and Evolution. Oxford University Press, 776 pp.

Prothero, D.R. 2013. Bringing Fossils to Life: An Introduction to Paleobiology (third edition). Columbia University Press, 672 pp.

Stearns, S.C. and R.F. Hoekstra. 2005. Evolution: An Introduction (second edition). Oxford University Press, 596 pp.

PRACTICALS & TUTORIALS: Practicals comprise two field trips for applying principles of evolutionary biology on living examples of Singapore's biodiversity. There will be three laboratory sessions on fossils, the hominin phylogeny, and evolution of genes and genomes. The final practical is for students to present their group research projects. Tutorials are incorporated into the practical sessions to allow students to discuss evolutionary concepts and examples with the lecturer and TAs.

MODES OF ASSESSMENT: 60% CA; 40% Final Exam

MODULE COORDINATOR & LECTURER: Dr Huang Danwei (Email: huangdanwei@nus.edu.sg)