SEMESTER I & II
LSM1105 EVOLUTIONARY BIOLOGY

Prerequisite: GCE 'A' Level or H2 Biology or equivalent, or LSM1301 or LSM1301X
Workload: 50 lecture hours + 16 assignments hours
Evolutionary biology covers the history of life on our planet and the processes that produced the multiple life forms of Earth. Topics include: the origins of life, the eukaryotic cell, and multicellularity; the generation of genetic variation and the sorting of that variation through random processes and through natural and sexual selection; the origin of new traits, new life histories, and new species; the origins of sex, sociality, and altruism; the evolution of humans; and applications of evolutionary biology to solving modern-day problems.

S/N	Topics	Lecture hours	
		Sem 1	Sem 2
1.	**What is Evolution?** - History of life on Earth	2 Antonia Monteiro	2 John Ascher
2.	**What is the evidence for evolution?** - The main factors that led to the idea of Evolution	2 Antonia Monteiro	2 John Ascher
3.	**How did life evolve?** - Basic organic molecules, larger organic molecules, cells, RNA world, DNA world.	2 Ryan Chisholm	2 Danwei Huang
4.	**How do variations come about?** - Mutations in protein coding genes, regulatory genes, translocations, duplications.	2 Ryan Chisholm	2 Danwei Huang
5.	**How do variations get fixed in populations via random processes?** - Drift, Hardy–Weinberg, etc.	2 Ryan Chisholm	2 Danwei Huang
6.	**How do variations get fixed in populations via Natural Selection?**	2 Ryan Chisholm	2 Danwei Huang
7.	**What is the outcome of Natural Selection?** - Morphological, physiological, and behavioural adaptations	2 Antonia Monteiro	2 John Ascher
8.	**What is artificial selection, and how do we use it in our lives?** - Examples of evolution of agricultural crops, dogs, cattle, etc.	2 Antonia Monteiro	2 John Ascher
9.	**How does evolution lead to variation in Life Histories?**	2 Antonia Monteiro	2 John Ascher
10.	**How do we connect genotypes to phenotypes?** - Linkage disequilibrium, association studies, QTL mapping.	2 Antonia Monteiro	2 John Ascher
11.	**How do we reconstruct species relationships?** - Phylogenies, molecular clock	2 Antonia Monteiro	2 John Ascher
12.	**How de we interpret and use phylogenies?** **-**Tree Thinking	2 Antonia Monteiro	2 John Ascher
13.	**Mid-term exam**	2 Antonia Monteiro	2 Danwei Huang
14.	**What is convergent evolution?** - The comparative method, convergence, parallelisms.	2 Ryan Chisholm	2 John Ascher
15.	**What is sexual selection?**	2 Antonia Monteiro	2 Danwei Huang
16.	**Why sex? Causes and consequences.**	2 Ryan Chisholm	2 Danwei Huang
17.	**What are the main transitions in Evolution?** - Evolution of the eukaryotic cell, multicellularity, etc.	2 Ryan Chisholm	2 Danwei Huang
18.	**What are species?** - History of classification	2 Ryan Chisholm	2 John Ascher
19.	**How does speciation occur?**	2 Ryan Chisholm	2 John Ascher
20.	**What is coevolution?** - Mimicry, plants and pollinators, character displacement, mutualisms.	2 Ryan Chisholm	2 John Ascher
21.	**What is evo-devo?** - Deep homologies, Hox genes, eyes, limbs, conserved toolkit of development	2 Antonia Monteiro	2 Danwei Huang

22.	**How do novel traits originate?** - Evolution of genetic architecture, regulatory evolution, serial homology.	2 Antonia Monteiro	2 Danwei Huang
23.	**How does the environment determine phenotypes?** - Phenotypic plasticity, epigenetics.	2 Antonia Monteiro	2 Danwei Huang
24.	**How does sociality and altruism evolve?**	2 Ryan Chisholm	2 John Ascher
25.	**How did humans evolve?**	2 Ryan Chisholm	2 Danwei Huang
26.	**How does evolution affect our lives?** **-** Bacteria and other pathogens, genetic fingerprinting and the law, mapping of human diseases, improved crops.	2 Ryan Chisholm	2 Danwei Huang
	Total Lectures: 50h **Homework assignments: 4h** **Weekly quizzes: 8h** **Continuous Assessment: 2h** **Examination: 2h**		
	Total hours:	**66**	

TEXT BOOK: Evolution by Bergstrom and Dugatkin, second edition.
SUPPLEMENTARY READING: "The Red Queen" by Matt Ridley, "Into the Jungle" by Sean Carroll, "The Beak of the Finch", by Jonathan Weiner

MODE OF ASSESSMENTS: 70% CA (30% Mid-term CA, 20% Weekly Quiz & 20% Assignments) & 30% Final Exam

MODULE CO-ORDINATOR:
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