

**UNIVERSITY OF MADRAS**  
**M.Sc. DEGREE PROGRAMME IN ZOOLOGY**  
 SYLLABUS WITH EFFECT FROM 2023-2024

**531C3B**

<b>Course Objectives:</b>		
The main objectives of this course are:		
<b>1.</b>	To critically analyze the concepts of evolution	
<b>2.</b>	Recognize the factors responsible for origin and generation of diversity among living beings	
<b>3.</b>	To develop strategies for sustenance of life on this planet	
<b>4.</b>	To realize the need for molecular level of evolution.	
<b>Course</b>	<b>:</b>	<b>Core VIII</b>
<b>Course title</b>	<b>:</b>	<b>Evolution</b>
<b>Credits</b>	<b>:</b>	<b>5</b>
<b>Pre-requisite:</b>		
Students shall have basic knowledge on the diversity of animals, biology including morphological, anatomical, physiological and embryological features of various phyla and their environment.		
<b>Expected Course Outcome:</b>		
On the successful completion of the course, student will be able to		
<b>1.</b>	To understand the concept of evolution. It provides a comprehensive account of evidences to support concept of evolution and different theories for exploring the mechanism of evolution.	<b>K1 &amp; K3</b>
<b>2.</b>	Study the origin of eukaryotic cells; Evolution of unicellular eukaryotes; Anaerobic metabolism, photosynthesis and aerobic metabolism.	<b>K1 &amp; K2</b>
<b>3.</b>	Understand the major events in the evolutionary time scale; Origins of unicellular and multi-cellular organisms.	<b>K2 &amp; K3</b>
<b>4.</b>	Comprehend the origin of new genes and proteins; Gene duplication and divergence.	<b>K2 &amp; K4</b>
<b>5.</b>	Appreciate the concepts and rate of change in gene frequency through natural selection, migration and random genetic drift	<b>K4 &amp; K5</b>

**K1-** Remember; **K2-** Understand; **K3-** Apply; **K4-**Analyze; **K5-**Evaluate; **K6-** Create

<b>Units</b>	
<b>I</b>	Emergence of evolutionary thoughts: Lamarck and Darwin – concepts of variation, adaptation, struggle, fitness and natural selection – Spontaneity of mutations .
<b>II</b>	Origin of cells and unicellular evolution: Origin of basic biological molecules - Abiotic synthesis of organic monomers and polymers - Concept of Oparin and Haldane - Experiment of Miller (1953) - The first cell - Evolution of prokaryotes - Origin of eukaryotic cells - Evolution of unicellular eukaryotes - Anaerobic and aerobic metabolism.

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<b>III</b>	Paleontology and evolutionary history: The evolutionary time scale - Eras, periods and epoch - Major events in the evolutionary time scale - Stages in primitive evolution including <i>Homo sapiens</i>
<b>IV</b>	Molecular evolution: Molecular divergence - Molecular tools in phylogeny, classification and identification - Protein and nucleotide sequence analysis - Origin of new genes and proteins - Gene duplication and divergence
<b>V</b>	The mechanisms: Population genetics - Populations, Gene pool, Gene frequency - Hardy-Weinberg Law - concepts and rate of change in gene frequency through natural selection, migration and random genetic drift- Adaptive radiation - Isolating mechanisms – Speciation - Allopatricity and Sympatricity - Altruism and evolution

**Reading list**

1. Bergstrom, C. T. and L. A. Dugatkin. 2012. Evolution, Second MEDIA Edition. W.W. Norton & Company, International Student Edition, pp-756.
2. Jobling, M., E. Hollox, M. Hurles, T. Kivisild and C. T. Tyler Smith. 2014. Human Evolutionary Genetics. Second Edition. Garland Sciences, London, pp-650.
3. Veer Bala Rostogi, 2018. Organic Evolution (Evolutionary Biology), Thirteenth Edition Vinoth Kumar Jain, Scientific International (Pvt.) Ltd, New Delhi, pp-590.
4. <https://www.flipkart.com/books/evolution~contributor/pr?sid=bks>
5. <http://www.evolution-textbook.org/>
6. <https://onlinelibrary.wiley.com/journal/15585646>
7. <http://darwin-online.org.uk/>

**Recommended texts**

1. Strickberger. M. W. 2000. Evolution. Third Edition, Jones Bartlett Publishers, pp-722.
2. Hall B. K. and B. Hallgrimsson. 2014. Strickberger's Evolution. Fifth Edition, Bartlett Learning, An Ascend Learning Company, pp-642.
3. Barton, N.H., D. Briggs, J.A. Eisen David, D.B. Goldstein and N.H. Patel. 2007. Evolution. Cold Spring Harbor Laboratory Press, pp-833.

**Mapping with Programme Outcomes\***

Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
CO1	M	S	M	S	M	L	S	M	L	M
CO2	S	S	L	S	S	L	S	S	S	S
CO3	S	M	S	S	S	S	S	L	L	M
CO4	S	S	S	S	S	M	S	S	S	L
CO5	S	S	S	M	M	S	S	L	L	M

\*S - Strong; M - Medium; L – Low