UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS WITH EFFECT FROM 2023-2024

LAB COURSE-SEMESTER – III & IV

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
221C41	**Cell Biology, Genetics And Evolution- Practical-II**	Core	-	-	Y	-	5	4+4	40	60	100

Learning Objectives	
CO1	To encourage students to learn to focus the microscope and usage of ocular & stage micrometer, camera lucida.
CO2	To impart the skills required to understand the nature and types of blood cells and to understand various histochemical and micro techniques and to prepare and observe the chromosome arrangement during cell division.
CO3	To gain knowledge in the various types of cells and tissues by viewing through prepared slides.
CO4	To encourage students to understand about human karyotyping and and to view the polytene chromosome in chironomous larva
CO5	To encourage students to understand the significance of living fossils and know the contributions of famous evolutionists

UNIT	Details	No. of Hours	Course Objectives
I	**CELL BIOLOGY** Micrometry-use of microscopes-microscopes-light microscope, camera lucida, stage and ocular micrometer.	12	CO1
II	**CELL BIOLOGY** 1.Blood smear preparation-differential count of WBC 2. Counting of RBC using haemocytometer 3. Counting of WBC using haemocytometer 4. Mounting of buccal epithelium and observing living cells using vital staining 5. Mitosis in onion root tip squash 6. Meiosis in grasshopper testis squash (Demonstration).	12	C02
III	**CELL BIOLOGY** **Study of prepared slides of histology**. a. Columnar epithelium b. Ciliated epithelium c. Glandular epithelium d. Connective tissue e. Cartilage T.S f. Bone T.S g. Cardiac tissue h. Striated muscle i. Non-striated muscle j. Nervous tissue k. ovary T.S l. T.S of testis	12	CO3

IV	**GENETICS** 1. Observation of common mutants of drosophila 2. Identification of human blood groups 3. Study on normal karyotype –male and female, Down syndrome, Turner and Klinefelter syndrome. 4. Chironomous-salivary gland chromosomes-squash preparation.	12	C04
V	**EVOLUTION** 1. Living Fossils- Features 2. Feet and Beak of Birds 3. Identify and mention the contributions- Charles Darwin , Lamarck, Sewall Wright.	12	CO5
	Total	**60**	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Would be able to to focus the microscope and appreciate the usage of ocular & stage micrometer, camera lucida.	PO1
CO2	Be equipped with the skills required to understand the nature and types of blood cells and identify various stages in cell divisions.	PO1, PO4
CO3	Would gain knowledge in the various types of cells and tissues by viewing through prepared slides.	PO4, PO6
CO4	Would have understood about human karyotyping.	PO4, PO5, PO6
CO5	Would understand the significance of living fossils and know the contributions of famous evolutionists	PO3, PO8

Text Books
(Latest Editions)

1.	Surya Nandan Meena, Milind Naik, 2019. Advances in Biological Science Research: A Practical Approach, Academic Press, New York, USA.
2.	Michael Perlin, William Beckerson, Adarsh Gopinath, 2017. Cell, Genetics, and Molecular Biology: A Lab Manual (First Edition), Cognella Inc., USA.
3.	Saxena J., Baunthiyal M., Ravi I., 2015. Laboratory Manual of Microbiology, Biochemistry and Molecular Biology, Scientific Publishers, India.
4.	Bansal M.P., 2013. Molecular Biology and Biotechnology: basic experimental protocols, The Energy and Resources Institute (TERI), New Delhi, India.
5.	Chaitanya K.V., 2013. Cell and molecular biology: A Lab Manual, Phi Learning Pvt. Ltd., New Delhi, India.
6	Dadson E.O. (1960). Evolution: Process and Product. Reinhold Pub.

References Books (Latest editions, and the style as given below must be strictly adhered to)		
1.	Andreas Hofmann, Samuel Clokie, 2018. Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology, Cambridge University Press, UK.	
2.	Bancroft, J.D. and Gamble, M (2007) Theory and Practice of Histological Techniques, 6 th Edition, Churchill Livingstone.	
3.	Ian Freshney R., 2010. Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications, John Wiley & Sons, USA.	
4.	John Kiernan (2008) Histological and Histochemical Methods: Theory and Practice, 4th edition, Cold Spring Harbor Laboratory Press.	
5.	Kerr, J. (2013) Functional Histology, Elsevier 6. Kiernan, J.A. (2008) Histological & Histochemical methods: Theory & Practice (4th Ed). Cold Spring Harbor Laboratory Press.	
6.	Leonard Davis, Mark Dibner, James Battey, 2012. Basic Methods in Molecular Biology, Elsevier Science Pubilshing Co., NY, USA.	
	Luiz Carlos (2005) Basic Histology: Text and Atlas (11th Ed). Mc Graw Hill Medical.	
7.	Robert F. Schleif, Pieter C. Wensink, 2012. Practical Methods in Molecular Biology, Springer-Verlag, NY, USA.	
	Ross, M.H,, Kaye, G.I. & Pawlina, W. (2002) Histology: A text and atlas (4th ed). Lippincoat Williams & Wilkins.	
	Sarah Stauffer, Aaron Gardner, Wilko Duprez, Dewi Ayu Kencana Ungu, Philip Wismer, 2018. Labster Virtual Lab Experiments: Basic Genetics, Springer Publishers, NY, USA.	
Web Resources		
1.	https://www.jove.com/	
2.	https://vlab.amrita.edu/?sub=3&brch=77	
3.	http://cbii-au.vlabs.ac.in/	
4.	https://media.hhmi.org/biointeractive/vlabs/transgenic_fly/index.html	
5.	https://www.ibiology.org/biology-techniques/	
Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	40 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	60 Marks
	Total	100 Marks

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Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**
CO 1	S							
CO 2	M			M				
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong(3) **M-Medium (2)** **L-Low (1)**