

Semester Lecture Plan

Name of College: Government College of Arts, Science & Commerce, Sanquelim Goa							
Name of Faculty: Dr. Suphala Pujari			Subject: Zoology				
Paper code: ZOC-108			Program/Course: T.Y. B.Sc.			Division: A	
Academic year: 2024-2025			Semester: VI			Total Lectures: 60	
Course Objectives: To provide students with theoretical and practical understanding of animal developmental Biology.							
Course Learning Outcome: The student should be able to describe the science of developmental Biology and its role in advancement of research in Science .							
Month	Lectures From:                      To:		No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
Dec 2024	09/12/24	14/12/24	4	Branches of embryology. Scope of embryology.		Power point	<ul style="list-style-type: none"><li>Balinsky, B. I., (2016). An introduction of embryology, Saundus College pub., Philadelphia.</li><li>Jain, P. C. (2001). Elements of Developmental Biology, Vishal Publications, Jalandhar.</li><li>Verma, P. S. and V. K. Agarwal (2010). Chordate Embryology (Developmental Biology) S. Chand and Company Ltd., Ram Nagar, N. Delhi.</li></ul>
				Gametogenesis: Spermatogenesis			
				Gametogenesis: Oogenesis			
				Vitellogenesis, Egg membranes			
Jan 2025	02/01/25	04/01/25	4	Types of eggs; Fertilization: Definition, activation and Amphimixis. Types of Fertilization		Power point	<ul style="list-style-type: none"><li>Gilbert, S. F. (2017) Developmental Biology, Sinauer Associates, Sunderland.</li><li>Jain, P.C. (2001) Elements of Developmental Biology, Vishal Publications, Jalandhar</li><li>Verma, P. S. and V. K. Agarwal (2010). Chordate Embryology (Developmental Biology) S. Chand and Company Ltd., Ram Nagar, N. Delhi.</li></ul>
				Biochemical changes during fertilization, Significance of Fertilization.			
				Parthenogenesis			
				Parthenogenesis, planes of cleavage			

	06/01/25	11/01/25	4	Patterns of cleavages		Power point	<ul style="list-style-type: none"> <li>Jain, P.C. (2001) Elements of Developmental Biology, Vishal Publications, Jalandhar</li> <li>Verma, P. S. and V. K. Agarwal (2010). Chordate Embryology (Developmental Biology) S. Chand and Company Ltd., Ram Nagar, N. Delhi.</li> </ul>
				Blastulation			
				Gastrulation			
				Fate maps			
Jan/ Feb 2025	13//01/25	18//01/25	4	Cell lineage		Power point	<ul style="list-style-type: none"> <li>Jain, P.C. (2001) Elements of Developmental Biology, Vishal Publications, Jalandhar</li> </ul>
				Growth and differentiation			
				Differentiation contd.			
				Structure of hen's egg,			
	20/01/25	25/01/25	4	Cleavage		Power point	<ul style="list-style-type: none"> <li>Jain, P.C. (2001) Elements of Developmental Biology, Vishal Publications, Jalandhar</li> <li>Verma, P. S. and V. K. Agarwal (2010). Chordate Embryology (Developmental Biology) S. Chand and Company Ltd., Ram Nagar, N. Delhi.</li> </ul>
				Blastulation in chick			
				Gastrulation in chick			
				Gastrulation in chick contd			
	27/01/2025	01/02/2025	4	Development of chick embryo up to 3 days of incubation. (24 hrs)		Power point	<ul style="list-style-type: none"> <li>Jain, P.C. (2001) Elements of Developmental Biology, Vishal Publications, Jalandhar</li> </ul>
				Development of chick embryo up to 3 days of incubation. (24 hrs)			
				Development of chick embryo up to 3 days of incubation. (33 hrs)			
				Development of chick embryo up to 3 days of incubation. (48 hrs)			
	03/02/2025	08/02/2025	4	Development of chick embryo up to 3 days of incubation. (48 hrs)		Power point	<ul style="list-style-type: none"> <li>Gilbert, S. F. (2017) Developmental Biology, Sinauer Associates, Sunderland.</li> <li>Jain, P.C. (2001) Elements of Developmental Biology, Vishal Publications, Jalandhar</li> </ul>
				Development of chick embryo up to 3 days of incubation. (72 hrs)			
				Development of chick embryo up to 3 days of incubation. (72 hrs)			
				Types of regeneration, Regenerative ability in different animal groups			
	10/02/2025	15/02/2025	4	Regenerative ability in different animal groups contd			
				Mechanism of regeneration, Stimulus, and suppression of regeneration			
				Polarity in regeneration			
				Introduction to Ageing: Concepts and models			

Feb 2025	17/02/2025	22/02/2025	4	Introduction to Ageing: Concepts and models, contd.		Power point	<ul style="list-style-type: none"> <li>Jain, P.C. (2001) Elements of Developmental Biology, Vishal Publications, Jalandhar</li> <li>Verma, P. S. and V. K. Agarwal (2010). Chordate Embryology (Developmental Biology) S. Chand and Company Ltd., Ram Nagar, N. Delhi.</li> </ul>
				Apoptosis			
				Definition of transplantation, nuclear transplantations			
				Embryonic induction: Types			
Feb / March 2025	24/02/2025	01/03/2025	4	Concept of primary organizer, Experiments by Brachets, Spemann, and Mangold		Power point	<ul style="list-style-type: none"> <li>Jain, P.C. (2001) Elements of Developmental Biology, Vishal Publications, Jalandhar</li> <li>Verma, P. S. and V. K. Agarwal (2010). Chordate Embryology (Developmental Biology) S. Chand and Company Ltd., Ram Nagar, N. Delhi.</li> <li>Jordan, E. L. &amp; Verma P. S. (2006). <i>Chordate Zoology</i>. S. Chand &amp; Co. Ltd, New Delhi.</li> </ul>
				Characteristics of an organizer, Regional specificity of organizer.			
				Neural induction:, mechanism. Surface interaction and Chemical interaction			
				Neural induction:, mechanism. Chemical interaction contd.			
March 2025	03/03/2025	08/03/2025	4	Gradient theory of neural induction		Power point	<ul style="list-style-type: none"> <li>Jain, P.C. (2001) Elements of Developmental Biology, Vishal Publications, Jalandhar</li> <li>Verma, P. S. and V. K. Agarwal (2010). Chordate Embryology (Developmental Biology) S. Chand and Company Ltd., Ram Nagar, N. Delhi.</li> <li>P., &amp; Verma, P. S. (2013). <i>Chordate Zoology</i>. S. Chand Limited.</li> </ul>
				Secondary, Tertiary and Quaternary organizers, Eye as an example of sequential induction			
				Competence			
				Fate of Germ Layers			
	10/03/2025	15/03/2025	4	Extra-embryonic membranes of chick (Development, structure and functions of yolk sac,)		Power point	<ul style="list-style-type: none"> <li>Armugam (2014) A text book of Embryology, Saras Publications.</li> <li>Jain, P. C. (2001). Elements of Developmental Biology, Vishal Publications, Jalandhar.</li> </ul>
				Extra-embryonic membranes of chick (Development, structure and functions of Amnion and Chorion)			
				Extra-embryonic membranes of chick (Development, structure and functions of Allantois)			
				Placenta (Structure & functions of placenta)			
	17/03/2025	22/03/2025	4	Types of placentae		Power point	<ul style="list-style-type: none"> <li>Armugam (2014) A text book of Embryology, Saras Publications.</li> <li>Jain, P. C. (2001). Elements of Developmental Biology, Vishal Publications, Jalandhar.</li> </ul>
				Types of placentae contd.			
				Teratology. stage sensitivity of foetus			
				twins – Identical, fraternal, and conjoined - equal and unequal			
	24/03/2025	29/03/2025	4	Malformations in external structures of body		Power point	<ul style="list-style-type: none"> <li>Armugam (2014) A text book of Embryology, Saras Publications.</li> </ul>
				Causative factors in teratogenesis			

March/ April 2024				Infertility			• Jain, P. C. (2001). Elements of Developmental Biology, Vishal Publications, Jalandhar.
				Artificial insemination			
	31/03/2025	05/04/2025	4	Surrogacy		Power point	• Armugam (2014) A text book of Embryology, Saras Publications. • Jain, P. C. (2001). Elements of Developmental Biology, Vishal Publications, Jalandhar.
				ART (Assisted Reproductive technologies), IVF and Test tube babies			
				GIFT (Gamete intra fallopian transfer) ZIFT (Zygote intra fallopian transfer)			
				ICSI (Intra cytoplasmic Sperm Injection)			
	07/04/2025	11/04/2025	3	Revision			

* Assessment Rubrics	
Component	Max Marks
ISA 1	10
ISA 2	10
Practical	50
Semester End Exam	80

Dr. Suphala Pujari

Practical Plan

Name of the college: Government College of Arts, Science and Commerce, Sanquelim - Goa

Name of Faculty: Dr. Suphala PujariSubject: Zoology

Paper code: ZOC 108Program: TY BScDivision: A

Academic year: 2024 - 2025Semester: VITotal Practicals/Labs: 10

Credits: 02

Course Objectives: To provide students with practical understanding of animal developmental Biology.

Expected Course Outcome: Sound practical knowledge of animal Developmental Biology.

Student Learning Outcome: On completion of the course, the student should be able to describe the science of developmental Biology and its role in advancement of research in science.

Month	Practicals/Labs Scheduled Date	No. of Practical s/Labs planned	List of Experiments	Reference books
December	09/12/2024	1	Observation of different types of eggs	<ul style="list-style-type: none"><li>Armugam (2014) A text book of Embryology, Saras Publication</li><li>Balinsky, B. I., (2016) An introduction of embryology, Saundus College pub., Philadelphia.</li><li>Gilbert, S. F. (2017) Developmental Biology, Sinauer Associates, Sunderland.</li></ul>
December	16/12/2024	1	Observation of developmental stages of frog's egg (Early and late cleavage)	
January	06/01/2025	1	Observation of developmental stages of frog's egg (Blastula and Gastrula)	
January	13/01/2025	1	Study of morphogenetic movement in vivo in hen's egg using vital staining technique by preparing a window opening.	
January	20/01/2025	1	Completion of Journal	
January	27/01/2025	1	In vitro observation of the different extra embryonic membranes in a 6 days old chick embryo To study the regenerative ability in vertebrates (fish fin).	

February	03/02/2025	1	In vitro observation of the different extra embryonic membranes in a 6 days old chick embryo (Demonstration) Mounting of eye vesicle and limb buds of a 6-day old chick embryo.	<ul style="list-style-type: none"> <li>Jain, P.C. (2001) Elements of Developmental Biology, Vishal Publications, Jalandhar.</li> <li>Verma, P. S. and V. K. Agarwal (2010) Chordate Embryology (Developmental Biology) S. Chand and Company Ltd., Ram Nagar, N. Delhi.</li> </ul>
February	10/02/2025	1	To study the regenerative ability in vertebrates (fish fin).	
February	17/02/2025	1	Preparation of permanent slides of chick embryo, 24 hrs. regenerative ability in fish fin (Observation and interpretation).	
February	24/02/2025	1	Preparation of permanent slides of chick embryo, 36 hrs. Preparation of permanent slides of chick embryo, 24 hrs	
March	03/03/2025	1	regenerative ability in fish fin (Observation and interpretation). In vitro observation of the different extra embryonic membranes in a 6 days old chick embryo	
March	10/03/2025	1	Preparation of permanent slides of chick embryo, 48 hrs. Mounting of eye vesicle and limb buds of a 6-day old chick embryo.	
March	17/03/2025	1	Preparation of permanent slides of chick embryo, 72 hrs	
	24/03/2025	1	Revision, Completion of Journal	
	07/04/2025	1	Certification of Journals	

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