Integrated Bachelor and Master Programmes in Biomedical Science
IBMP (Dietetics) Semester (II)

Paper Code	IS02CDET52	Periods per week	04
Title of the paper	Developmental Biology	Exam Duration	3 Hrs
Total Credit of the Paper	04	Total Marks	100

Course Objectives: (As per Guidelines – I)	1.The purpose of this course is to provide a comprehensive understanding of the concepts of early animal development. 2.Students taking this course must develop a criticalappreciation of methodologies specifically used to study the process of embryonic developmentin plants and animals.

Course Description		
Unit	Description	Weightage*
1.	Morphology of an Angiosperm plant with the understanding of evolution in terms of morphology of leaf and flower; venation pattern in leaves; mono and dicots and land plants, aquatic plants and epiphytes. Evolution of seed through heterospory. Life cycle of an angiosperm plant showing alternation of generations. Experimental and Applied Embryology: Artificial pollination and sexual, incompatibility, methods to overcome incompatibility, Scope of Embryology and Palynology in reference to plant biotechnology.	25%
2.	Evolution of megasprophyll into gynoecium and microsporophyll into Androecium; Structure and development of microsporangium and male gametophyte; Structure and development of megasporangium and female gametophyte. Endosperm with types.Embryogeny in Monocots and Dicots;Polyembryony, Apomixis, Parthenocarpy, Applications of Embryology in Crop improvement – Haploid production, Nucellus, Ovule, Ovary, Seed culture, Parthenocarpy, Genetic transformation.	25%
3.	Introduction to animal development: Gametogenesis – Spermatogenesis: mechanism and significance. Oogenesis, Types of eggs in animals, types of egg membranes. Fertilization and Parthenogenesis.	25%
4.	Cleavage: Patterns and Types of cleavage Blastulation, Brief account on Holoblastic and Meroblastic cleavages, Gastrulation (Epiboly and Emboly) Growth and Differentiation, Medical implications of Animal Development Biology: Genetic errors of Human development, Infertility and Teratogenesis	25%

* Units will have the same weightage in the evaluation as suggested in the course outline

Teaching-Learning Methodology (As per Guidelines –II)	Regular class room teaching will be done with following tools: • Conventional black board and chalk. • ICT tools such as projectors, smart boards, etc will also be used for better explanation of scientific components. Appropriate reference materials will also provide to the students as and when required from departmental library resources.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	15%
3.	University Examination	70%
4.	Minimum Passing Criteria	

Course Outcomes: Having completed this course, student will be able to (As per Guidelines – III)	
1.	To understand the basic concepts and theories related to developmental biology
2.	Understand reproductive organs, gametogenesis and fertilization
3.	Understanding the phenomenon of regeneration in animals
4.	Understand the concept of cell differentiation and gene action in development

Suggested References: Include reference material from where a student is expected to study the said content in APA style. Reference websites can also be included. (As per Guidelines – IV)	
Sr. No.	Reference
1.	A textbook of Botany (Vol. 1&2) by Bhattacharya, Hait and Ghosh. Pub. New Central Book Agency (P) Ltd., ISBN: 8173815500
2.	Morphology of an Angiosperms by Eames

3.	Taxonomy Evolution at Work by M. Daniel. Pub. Narosa Publishing House, ISBN:9788173199592 Structure, Development and Reproduction in Angiosperms by RC Pandey and DK Jain, Rastogi Publications, Meerut
4.	Embryology of Angiosperms by SS Bhojwani and SP Bhatnagar, 4th Revised & Enlarged Ed., Sangam Books Pvt. Ltd., New Delhi
5.	Embryology by P Maheshwari, Rastogi Publications, Meerut (ISBN: 0070396205)
6.	Developmental Biology by Scott F Gilbert, 8th Ed., Sinaur Publishers, USA (ISBN: 0-87893-250-X)

On-line resources available that can be used as reference material (As per Guidelines –V)

Sr. No.	On-line Resources
1.	https://nptel.ac.in/courses/102/106/102106084/
2.	https://onlinecourses.nptel.ac.in/noc20_bt35/preview