

Course Code	Course Name	Credits
26ZY007	BASIC EMBRYOLOGY	04

### Course Objectives

- To understand the fundamental concepts and scope of developmental biology.
- To explain the processes of gametogenesis, fertilization, and early embryonic development.
- To study cleavage, gastrulation, organogenesis, and morphogenesis in vertebrates.
- To analyze regeneration, tissue repair, and developmental mechanisms in different organisms.
- To examine metamorphosis and hormonal regulation during developmental changes in insects and amphibians.

### Learning Outcomes

- Explain the stages of gametogenesis and fertilization in animals.
- Illustrate cleavage patterns, gastrulation, and organogenesis during embryonic development.
- Compare developmental processes in frog, chick, and other vertebrates.
- Analyze the biological significance of regeneration and tissue repair.
- Interpret the role of hormones and physiological changes during metamorphosis.

### Unit 1 – Concept of Developmental Biology (12 Hrs.)

Gametogenesis-Oogenesis-Types of eggs – Growth, development and maturation of oocyte –Spermatogenesis-Seminiferous tubules- Differentiation of spermatozoa - Fertilization - Approach of spermatozoon - Reaction of egg Essence of activation.

### Unit 2 – Fertilization (12 Hrs.)

Sperm aggregation, Sperm activation, Chemotaxis, Sperm maturation and capacitation in mammals, Acrosome reaction. Sperm – egg interaction. Sperm entry into the egg - Egg activation - Cortical reaction - Physiological polyspermy - Fusion of male and female pronuclei - Post fertilization metabolic activation – Parthenogenesis.

### Unit 3 - Cleavage and Organogenesis (12 Hrs.)

Patterns of cleavage - Morula and Blastula- types. Morphogenetic gradients – Fate map. Gastrulation – Spemann's primary organizer – Morphogenetic movements in Frog – Neural induction. Development of organs in Chick - Brain, Eye and Heart, Embryonic induction, Primary organiser and its Morphological Differentiation,

### Unit 4 – Developmental Process and Regeneration (12 Hrs.)

Physiological changes during regeneration in hydra, planarians, amphibians, and Reptiles. Wound healing and regeneration in mammals. Life cycles and Evolution of Developmental pattern – Frog.

### Unit 5 - Metamorphosis (12 Hrs.)

Introduction, Types of Metamorphosis, Metamorphosis in insects and Amphibia; Physiological and Biochemical changes during Metamorphosis, Hormonal control of metamorphosis in insect and amphibian - Endocrine control of moulting and growth in insects - Neoteny and pedogenesis.

### Reference Books:

1. Verma, P.S., & V.K. Agarwal (2004). Chordata Embryology; S. Chan & Co Ltd; New Delhi.
2. Subramoniam. T. (2002). Developmental Biology, Narosa Publication, New Delhi.
3. Balinsky, B.L., (1981). An Introduction to embryology, Saunders, Philadelphia.
4. Grant, P., (1978) Biology of developing system, Halt Rein Chart and Winston Inc., NY and Chicago.
5. Gilbert, S (1985) Developmental Biology. Sinauer Association, Inc., Publishers.

### REFERENCE WEB LINKS:

[https://embryology.med.unsw.edu.au/embryology/index.php/Main\\_Page](https://embryology.med.unsw.edu.au/embryology/index.php/Main_Page)

<https://www.biologydiscussion.com/embryology>

<https://www.easybiologyclass.com/category/embryology/>