

BTPC2007 DEVELOPMENTAL BIOLOGY (3-0-0)

Module I (10 hours)

Gametogenesis and Fertilization Definition, scope & historical perspective of development Biology, Gametogenesis Spermatogenesis, Oogenesis Fertilization Definition, mechanism, types of fertilization. Different types of eggs on the basis of yolk.

Module II (6hours)

Early embryonic development Cleavage: Definition, types & patterns, Mechanism of Blastulation: Process, types, Mechanism of Gastrulation, Morpho genetic movement sepiboly, emboly, extension, invagination, convergence, de-lamination. Formation & differentiation of primary germ layers.

Module III (8hours)

Embryonic Differentiation: Cell commitment and determination-the epigenetic landscape: a model of determination and differentiation, control of differentiation at the level of genome, transcription and post-translation level.

Module IV (8hours)

Axis formation in Drosophila, morphogen gradient, eyes lens induction. Metamorphosis (insectandamphibians), regeneration and tetrapod limb development.

Module V (8hours)

Concept of organizer, Neurulation, notogenesis, development of vertebrateeye. Fate of different primary, germ layers Development of behaviour: constancy & plasticity, Extraembryonic membranes, placenta in Mammals.

Course Outcomes (COs):

1. Understand the molecular and cellular processes involved in organismal development from a single cell to maturity.
2. Identify and describe the roles of various gene products and signaling pathways in developmental processes.
3. Analyze the advantages and disadvantages of different model systems used in developmental biology research.
4. Explain the events occurring during embryonic development, including germ layer formation and patterning.
5. Explore the principles of stem cell biology, regeneration, and cellular reprogramming techniques.

Program Outcomes (POs):

1. Acquire a comprehensive understanding of developmental biology concepts applicable to real-world biological problems.
2. Prepare for careers in research, education, or industry by developing critical thinking and problem-solving skills.
3. Integrate knowledge from interdisciplinary fields such as genetics, molecular biology, and bioengineering into developmental studies.
4. Foster a commitment to lifelong learning and professional development in the rapidly evolving field of developmental biology.

5. Exhibit leadership qualities and teamwork skills necessary for collaborative scientific endeavors.

Books:

- [1] Developmental Biology by Scott F. Gilbert
- [2] An Introduction to Embryology by B.I Balinsky and B.C. Fabian
- [3] Principles of Development by Lewis Wolpert et al

Digital Learning Resources:

CourseName: Introduction to Developmental Biology
CourseLink: <https://nptel.ac.in/courses/102/106/102106084/>
CourseInstructor: Prof.SubramaniamK, IIT Madras