

ADVANCE ZOOLOGY I (DEVELOPMENTAL BIOLOGY)

CREDIT HOURS: 3

Objectives:

- The course will provide detailed knowledge about the principal features of development, cellular basis of morphogenesis, mechanisms of cellular differentiation and concepts of induction in development.
- It will provide understanding of the mechanisms of organogenesis, factors controlling growth and oncogenesis.
- The concept related to the theory in Developmental Biology will be practically demonstrated in this course.
- In the continuity of the animals during reproduction following the union of the traits from the parents in their gametes, the zygote proceeds through enormous phenomena of development up to their emergence resembling to the parents.
- The concepts of all these developmental mechanisms will be communicated to the students in this course.

Course Contents

Introduction:

Principal features of development, Origin of sexual reproduction, Developmental patterns, Spermatogenesis, Oogenesis

Fertilization:

Recognition of sperm and egg, Fusion of gametes, Activation of egg metabolism, Rearrangement of egg cytoplasm

Cleavage:

Patterns of embryonic cleavage, Mechanism of cleavage

Gastrulation:

Fate maps, Gastrulation in Sea urchin, Amphibians, Birds, Mammals

Early Vertebrate Development:

Neurulation, Ectoderm, Mesoderm, Endoderm

Cellular Basis of Morphogenesis:

Differential cell affinity, Cell adhesion molecules

Mechanism of Cellular Differentiation:

RNA processing, Translational regulation of developmental process, Cell-fate by progressive determinants, Autonomous cell specification by cytoplasmic determinants, Establishment of body axes and mechanism of teratogenesis, Secondary Induction

Organogenesis:(A brief account):

Origin and migration of germ cells in vertebrates

Factors, controlling growth and oncogenesis**Hormones as mediators of development****Regeneration in vertebrates.****Evaluation Criteria**

Examination	Type	Marks
Internal Examination	Sessional Work	15%
	Mid-Semester	25%
External Examination	Final Semester	60%

Recommended Books:

Balinsky, B. I. (1985). *An Introduction to Embryology*. Saunders.

Gilbert, S. F. (2006). *Developmental Biology*, Sunderland: Sinauer Associates.

Ham, R. G., & Veomett, M. J. (1980). *Mechanism of Development*. C. V. Mosby Co.

Klaus, K. (2001). *Biological Development* (2nded.). New York: McGraw Hill.

Oppenheimer, S. S. (1984). *Introduction to Embryonic Development*. Allen and Bacon.

Saunders, J. W. (1982). *Developmental Biology*. McMillan and Company.

ADVANCE ZOOLOGY I (DEVELOPMENTAL BIOLOGY) PRACTICALS

1. Study of structure of gametes in some representative cases, i.e., frog, fish, fowl and mammal.
2. Study of cleavage and subsequent development from prepared slides and/or whole mounts in various animals i.e., frog, chick etc.
3. Study of fertilization, early development of frog through induced spawning under laboratory conditions.
4. Preparation and study of serial sections of frog or chick embryos.
5. Application of microsurgical techniques on chick embryos *in vitro*.
6. Preparation and staining of histological slides.

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