

# **Developmental Biology**

## **3 Credit Course (2+1+0)**

Dr. Megha Singhal (Guest Instructor)

### **Unit 1:**

Basic concepts of developmental biology  
Introduction of developmental biology  
Model systems: Vertebrates model organism- homo sapiens  
Invertebrate model organism: Caenorhabditis elegans;  
Developmental genes identification in Drosophila

### **Unit 2:**

Structure of the gametes  
Fertilization  
Cleavage and gastrulation  
Axis and germ layers  
Morphogenesis  
Origin of patterning  
Segmentation genes  
Homeotic selector genes

### **Unit: 3**

Chick limb development  
Patterning of vertebrate limb  
Homeobox genes in patterning  
Insect imaginal disc  
Homeotic selector genes for segmental identity  
insect compound eye  
kidney development

### **Unit 4:**

Growth  
Aging  
Regeneration  
Embryonic stem cells and their applications;  
Genetic errors of human development  
Pleiotropy, genetic heterogeneity, phenotypic variability, mechanism of dominance;  
Gene expression and human disease  
Teratogenesis

### **Unit 5**

The nature of human syndromes  
Cancer as a disease of development  
Selectable epigenetic variation Yamanaka Factors and Development  
Epigenetic Regulation of Development  
Development Human Diseases  
Preconditions for evolution through developmental change

Mechanism of evolutionary change  
Developmental constraints on evolution.

Suggested reading.

1. Molecular Biology of the Cell. 4th edition. Alberts B, Johnson A, Lewis J, et al. New York: Garland Science; 2002.
2. Developmental Biology. Scott F Gilbert. 9<sup>th</sup> Edition