3 Credits

LS428ADevelopmental Biology3 CredName of the Faculty: Prof. Shweta Saran*; Prof. A.K. Nandi; Prof. AK Sarkar

	Sr.No.	Торіс	Faculty Name/ Contact Hours
Animal Developmental Biology	1.	Principles of Developmental Biology: Questions and approaches in Developmental Biology, Evolution of developmental patterns, Principles of experimental embryology, Genomic equivalence	SS/2
	2.	Signaling cascades involved in the control of developmental program with specific examples	SS/2
	3.	Early embryonic development: Cleavage – Types and mechanism, Gastrulation – movements involved, Cell specification w.r.t. amphibian, chick	SS/3
	4.	Phenomenon of the Organizer w.r.t. amphibians: Progressive determination, Regional specificity of induction	SS/2
	5.	Pattern formation: French flag model, Polar coordinate model	SS /1
	6.	Regeneration: Epimorphic e.g. salamander limbs; Morphallactic e.g. Hydra; Compensatory e.g. mammalian liver	SS/3
	7.	Tetrapod limb development; Axes formation, Coordination of the three axes	SS/3
	8.	<i>Dictyostelium discoideum</i> as a model organism: Life cycle, Pattern formation, cAMP signaling during development	SS/2
	9.	<i>C. elegans</i> as a model system: Invariant cell lineage, Vulval development, sex determination	SS/2
	10.	<i>Drosophila</i> as a model system: Anterior/posterior, Dorsal/ventral polarity development	SS/2
	11.	Applications of Developmental Biology	SS/1
	12.	Program cell death: apoptosis, autophagy and necrosis	SS/2
Plant Developmental Biology	13.	Basic plant architecture: Cell and tissue structures; epidermal, ground, vascular, and meristem tissues; cell division plane and pattern; tissue, cell and organ polarity.	AKN/4
	14.	Embryonic pattern formation and polarity development : Development of embryo from zygote, cell division pattern, initiation of shoot apical meristem (SAM), root apical meristem (RAM); development of embryonic polarity, hormonal regulation of polarity development.	AKS/3
	15.	Shoot Apical Meristem (SAM) and organ size control : Initiation and organization of SAM, roles and interaction of CUC, NAM, STM, WUS, auxin and cytokinin in SAM initiation and size control.	AKS/3
	16.	Root apical meristem (RAM) and radial patterning : Initiation and organization of RAM, role of SHR, SCR, ethylene and auxin organization of radial patterning, root-branching, differentiation of root epidermal layer.	AKS/3
	17.	Leaf development- shape and dorsoventral patterning: Leaf initiation and expansion, phyllotaxy, positioning of leaf on SAM; dorsoventral patterning, signal from SAM on dorso- ventral patterning, coordination of cell division and expansion,	AKS3

		leaf asymmetry development, stomata density and distribution control, trichome development.	
	18.	Flower development and organ patterning: Organization of floral organs, ABC model, modification of floral organs, boundary genes; homeotic genes of plants, MADS box, evolutionary conservation between eudicot and cereal crop plants.	AKN/3
	19.	Transition : Transition from vegetative and reproductive stage, photoperiodic, vernalization, Gibberlic acid and autonomous pathways.	AKN/2
	20.	Development of reproductive organs: Development of gamotophytes and gametes, meiosis, developmental control, pollination, fertilization.	AKN/2

Suggested readings:

- 1. Developmental Biology: Scott F Gilbert
- 2. Essentials of Developmental Biology: JMW Slack
- 3. Principles of Developmental Biology (2nd, edition): Louis Wolpert
- 4. Ecological developmental Biology integrating epigenetic, medicine and evolution: Scott F Gilbert and Epel
- 5. The Arabidopsis Book, ASPB publication (available freely at www.aspb.org)
- 6. Biochemistry and Molecular Biology of plants Ed. Buchanan, Gruissem, and Jones, ASPB publication.
- 7. Plant Physiology by Taiz and Zeiger, Sinauer Associate Inc. Publishers.
- 8. Molecular Life of Plants, Ed. Jones, Ougham, Thomas, and Waaland. Wiley- Blackwell/ASPB publication.