

## Plant Developmental Biology (LS 477) (2-credits)

(Prof. Ashis Nandi\*, Prof. A.K. Sarkar)

S. No.	Topics	Name of faculty	No. of lectures
1	<b>Basics of plant evolution and life (5 lectures)</b> Evolution of land plants, evolutionary landmark in bryophytes, pteridophytes, gymnosperms and angiosperms; types of reproduction, evolution of sexual reproduction, developmental differences in semelparous and iteroparous lifestyles. Seed germination and dormancy. Comparative Developmental features between plant and animal	Ashis Nandi	5
2	<b>Basic plant architecture (3 lectures):</b> Cell and tissue structures; epidermal, ground, vascular and meristem tissues; cell division plane and pattern; tissue, cell and organ polarity	AKN	3
3	<b>Model plants for development and agricultural research (2 lectures):</b> Genetic model, experimental model, genomic model, transformable/transgenic model; specific advantages and disadvantages of <i>Arabidopsis</i> , tobacco, maize, petunia, rice, <i>Physcomitrella</i> .	AKN	2
4	<b>Embryonic pattern formation and polarity development (3 lectures):</b> 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
5	<b>Shoot Apical Meristem and organ size control (2 lectures):</b> Initiation and organization of SAM, roles and interaction of CUC, NAM, STM, WUS, auxin and cytokinin in SAM initiation and size control.	AKS	2
6	<b>Root-apical meristem and radial patterning (2 lectures):</b> Initiation and organization of RAM, role of SHR, SCR, ethylene and auxin organization of radial patterning, root branching, differentiation of root epidermal layer.	AKS	2
7	<b>Leaf development, shape and dorsoventral patterning (3 lectures):</b> Leaf initiation and expansion, phyllotaxy, positioning of leaf on SAM; dorsoventral patterning, effect of SAM dorsoventral patterning, coordination of cell division and expansion, leaf asymmetry development, stomata density and distribution control, trichome development.	AKS	3
8	<b>Flower development and organ patterning (3 lectures):</b> Organization of floral organs, ABC model, modification of floral organs, boundary genes; homeotic genes of plants, MADS box, evolutionary	AKN	3

	conservation between eudicot and cereal crop plants.		
9	<b>Transition (2 lectures):</b> Transition from vegetative and reproductive stage, photoperiodic, vernalization, GA and autonomous pathways.	<b>AKN</b>	2
10	<b>Development of reproductive organs (2 lectures):</b> Development of gametophytes and gametes, meiosis, developmental control, pollination, fertilization.	<b>AKN</b>	2

**Reference/ Books:**

1. The *Arabidopsis* Book, ASPB publication (available freely at [www.aspb.org](http://www.aspb.org))
2. Biochemistry and Molecular Biology of plants Ed. Buchanan, Grisseem, and Jones, ASPB publication.
3. Plant Physiology by Taiz and Zeiger, Sinauer Associate Inc. Publishers.
4. Molecular Life of Plants, Ed. Jones, Ougham, Thomas, and Waaland., Wiley-Blackwell/ASPB publication.