

**SEMESTER I**  
**LSM3233 – DEVELOPMENTAL BIOLOGY**

**Prerequisite: LSM2103**

**Workload: 26 lecture hours + 6 tutorial hours + 18 laboratory hours**

This course will showcase and examine embryogenesis, starting from fertilization to birth in the case of animal development; and to germination, growth and differentiation in plants. Students will be exposed to concepts, principles and mechanisms that underlie development in plants and animals. Different model organisms will be studied to demonstrate the rapid advances in this field of life sciences.

S/N	Topics	Lecture hours
1.	<b>Plant Development : An Introduction</b> Objectives, approach and what are we going to learn	1 Loh CS
2.	<b>From Seeds to Plant</b> Post-embryonic development. The organization and function of the apical meristem	2 Loh CS
3.	<b>Leaf Positioning and Development</b> Phyllotaxy and the determination of leaves	2 Loh CS
4.	<b>Flowering and Flower Development</b> Juvenility and phase change, competence and determination in flowering, physiological studies of flowering, light and flowering, genes that regulate flower development	4 Loh CS
5.	<b>Pollen, Embryo Sac Development and Fertilization</b> From diploid to haploid cells: development of the pollen and the ovule. The union of gametes in plant and embryo formation	3 Loh CS
6.	<b>Animal Development: An Overview</b> Historical perspective, philosophical approaches and milestones in the study of animal embryology. Principles, concepts and tools in modern developmental biology	2 Winkler C
7.	<b>Fertilization: Starting a new organism</b> The union of gametes, cytoplasmic determinants, cleavage patterns, maternal effect and zygotic control	2 Winkler C
8.	<b>From Eggs to Embryos: Morphogenesis</b> Process and significance of gastrulation and neurulation, concepts of embryonic induction and axis formation, determination and differentiation	2 Winkler C
9.	<b>Pattern Formation I: Development of the nervous system</b> Cell migration and differentiation, morphogen gradients, positional information, signalling cascades	2 Winkler C
10.	<b>Pattern Formation II: Limb development</b> Formation and regeneration of limbs	2 Winkler C
11.	<b>Pattern Formation III: Segmentation</b> Somitogenesis in vertebrates; body segment formation in invertebrates	2 Winkler C
12.	<b>Model organisms and the determination of sex</b> C. elegans, Drosophila, zebrafish and mouse: evolution of sex determination	2 Winkler C
<b>Total Lectures: 26h</b>		
<b>Tutorials: 6h</b>		
<b>Practicals: 6x3= 18h</b>		
<b>Total hours:</b>		50h

**TEXT BOOK** (Reference books):

Plant Development, the Cellular Basis by RF Lyndon, Publisher: Unwin (selected chapters)  
Developmental Biology of Flowering Plants by V Raghavan, Publisher: Springer-Verlag (selected chapters)  
Molecular Plant Development , from Gene to Plant by Peter Westhoff (selected chapters only)  
Plant growth and Development: a molecular approach by DE. Fosket, Academic Press (general reference)  
Developmental Biology by Scott F. Gilbert. Publisher: Sinauer (selected chapters)  
Essential Cell Biology by B. Alberts et al., Publisher: Garland Science (general reference)

**MODULE CO-ORDINATOR:**

A/P Christoph Winkler (Tel: 6516-7376, E-mail: dbswcw@nus.edu.sg)

**LECTURERS:**

A/P Christoph Winkler (E-mail: dbswcw@nus.edu.sg)  
A/P Loh Chiang Shiong (E-mail: dbslohcs@nus.edu.sg)