

# SEMESTER I

## LSM3233 DEVELOPMENTAL BIOLOGY

**Prerequisite:** LSM2233

**Workload:** 24 lecture hours + 6 tutorial hours + 20 laboratory hours

**Course description:**

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> Why and how to study plant development? An introduction to flowering plants	2 Xu Jian
2.	<b>A Flowering Plant from Seed to Seed</b> Seed germination and seedling development, photomorphogenesis	2 Xu Jian
3.	<b>A Flowering Plant from Seed to Seed</b> Shoot and root development, phyllotaxis and rhizotaxis	2 Xu Jian
4.	<b>A Flowering Plant from Seed to Seed</b> Leaf and flower development	2 Xu Jian
5.	<b>A Flowering Plant from Seed to Seed</b> Development of floral reproductive organs and gametophytes	2 Xu Jian
6.	<b>A Flowering Plant from Seed to Seed</b> Fertilization, embryogenesis and seed development	2 Xu Jian
7.	<b>Animal Development: An Overview</b> Historical perspective and milestones in the study of animal embryology. Principles, concepts and tools in modern developmental biology	1 Winkler C
8.	<b>Fertilization: Starting a New Organism</b> The union of gametes, cytoplasmic determinants, cleavage patterns, maternal effect and zygotic control	1 Winkler C
9.	<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
10.	<b>Pattern Formation I: Development of the Nervous System</b> Cell migration and differentiation, morphogen gradients, positional information, signalling cascades	2 Winkler C
11.	<b>Pattern Formation II: Limb development</b> Formation and regeneration of limbs	2 Winkler C
12.	<b>Pattern Formation III: Segmentation</b> Somitogenesis in vertebrates; body segment formation in invertebrates	2 Winkler C
13.	<b>Model Organisms and the Determination of Sexes</b> <i>C. elegans</i> , <i>Drosophila</i> , zebrafish and mouse: evolution of sex determination	2 Winkler C
	Total Lectures: 24h Tutorials: 2h Practicals: 24h	
	<b>Total hours:</b>	50h

**TEXT BOOK (Reference books):**

Molecular Genetics of Plant Development by Stephen H. Howell, Publisher: Cambridge University Press (selected chapters)

The Arabidopsis Book, <http://www.arabidopsisbook.org/topical/growth-and-development> (selected chapters)

Mechanisms in Plant Development by Ottoline Leyser and Stephen Day, Publisher: Blackwell Publishing (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)

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