BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Pilani Campus
AUGS/ AGSR Division

SECOND SEMESTER 2020-21
COURSE HANDOUT

Date: 18.01.2021

In addition to part I (General Handout for all courses appended to the Time table) this portion gives further specific details regarding the course.

Course No : BIO F341
Course Title : Developmental Biology
Instructor-in-Charge : Meghana Tare
Instructor(s) : NA
Tutorial/Practical Instructors: Meghana Tare

1. Course Description:

Developmental Biology deals with the principles, processes and research involved in how a single-celled zygote is transformed into an entire multi-cellular organism. Salient features in the development stages of model organisms (eg. frog, chick, fruit fly, worm and mouse) would be taken up, to exemplify the general principles of development. The course would provide to students a strong exposure to research advances and the interplay of various other areas like molecular biology and genetics in developmental biology, via study of research/review articles from journals.

2. Scope and Objective of the Course:
Familiarize students with events occurring in the transformation of single cell into a multicellular three dimensional organism.

3. Text Books:
Wolpert, Lewis *et. al.* Principles of Development (4th edition). New Delhi: Oxford University Press, 2011.

4. Reference Books:

RB1: Gilbert, Scott F. Developmental Biology (9th edition). Sunderland, MA (USA): Sinauer Associates, 2010.

RB2: Slack, J.M.W. Essential Developmental Biology (2nd edition). Malden, MA (USA): Blackwell Publishing, 2006.

Materials (video/media links) will be made available as and when required

5. Course Plan:

Module No.	Lecture Session	Reference	Learning outcomes
1.	**L1-3** Origin, history and scope of developmental biology; overview of general principles governing development	Ch. 1 (TB), Ch. 2 (RB2)	Orientation to the course. Introduction to developmental biology
2.	**L4-8** Life cycles of selected model organisms - frog, chick, zebrafish and mouse	Ch. 3 (TB), Ch. 7 and 8 (RB1)	Understanding Model Organisms Overview of the vertebrate development
3.	**L9-16** Development of *Drosophila melanogaster* and *C. elegans*, including cell signaling pathways	Ch. 2 (TB), Ch. 3 (RB1)	Molecular Control of Developmental processes of the invertebrate model organisms Illustrative examples of invertebrate development

4.	**L17-19** Eukaryotic gene regulation concepts useful to understand developmental processes Techniques of molecular biology, genetics, genomics and embryo manipulation	Material will be made available	Genetic Control of Development and Techniques involved to understand the processes Techniques used in developmental biology
5a	**L20-23** Setting up the body axes; origin and specification of germ layers in *Xenopus*, chick, mouse and *Drosophila*	Ch 4 (TB)	Understanding Patterning and Body Plan. Patterning the vertebrate body plan I: axes and germ layers
5b.	**L24-26** Somite formation and antero-posterior patterning; role of organizer and neural induction	Ch 4 (TB)	Understanding Patterning and Body: Plan. Patterning the vertebrate body plan II: somites and nervous system
6.	**L27-30** Cell adhesion; formation of blastula; gastrulation movements; neural tube formation.	Ch 8 (TB)	Fertilization and Embryogenesis. Morphogenesis: changes in early embryo
	L31-32 Germ cells development; events at fertilization; determination of sexual phenotype	Ch 9 (TB)	Germ cells, Fertilization and Sex
	L33-35 Models of differentiation; plasticity of gene expression; stem cells – types and uses	Ch 10 (TB)	Cell Differentiation and Stem Cells
7.	**L36-39** Development of vertebrate limb	Ch 11 (TB)	Development of Organs and Organ Systems Organogenesis: development of organs
	L39-41 Specification of cell identity in nervous system; neuronal migration;	Ch 12 (TB)	Development of Organs and Organ Systems: Development of the nervous system

6. Evaluation Scheme:

Component	**Duration**	**Weightage (%)**	**Date & Time**	**Nature of component (Close Book/ Open Book)**
Mid-Semester Test	90 Min.	30	<TEST_1>	TBA
Comprehensive Examination	3 h	35	May 8th, 2021	TBA
Quizzes	30 Min.	25	Course Quizzes, Tutorial Quizzes (some of them can be surprise	Closed Book, some of them can be surprise
Assignments	TBA	10		Take Home/In Class

7. Chamber Consultation Hour:

NA online mode. By appointment over email, a Google Meet will be set up.

8. Notices:
On Google Classroom/ Nalanda and Emails.

9. Make-up Policy:

No make-up will be granted for surprise quizzes and assignments.

10. Note (if any):

NA

Instructor-in-charge: Meghana Tare
Course No. BIOF341