BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI (RAJASTHAN)

INSTRUCTION DIVISION

Second Semester 2014-2015

07-Jan-2015

COURSE HANDOUT (PART II)

In addition to part-I (General Handout for all courses) printed on page 1 of the Timetable book, this portion gives further specific details regarding the course.

Course No. : **BIO F341**
Course Title : **DEVELOPMENTAL BIOLOGY**
Instructor-in-Charge : **Rajdeep Chowdhury**
Co-instructor : **Prof Ashis Kumar Das**
Offices : **Rajdeep Chowdhury - 3222-S; Prof Ashis Kumar Das - 3222-L**

1. Scope and Objective of the Course:

This course 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. Textbook:

Wolpert, Lewis *et. al.* Principles of Development (3rd edition). New Delhi: Oxford University Press, 2010.

3. 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.

4. Course Plan:

Lec. #	Learning Objective	Content	Reading
1-3	Introduction to developmental biology	Origin, history and scope of developmental biology; overview of general principles governing development	Ch. 1 (TB), Ch. 2 (RB2)
4-8	Overview of the vertebrate development	Life cycles of selected model organisms - frog, chick, zebrafish and mouse	Ch. 3 (TB), Ch. 7 and 8 (RB1)
9-11	Developmental Genetics	Eukaryotic gene regulation concepts useful to understand developmental processes	Ch. 2 (RB1)
12-14	Techniques used in developmental biology	Techniques of molecular biology, genetics, genomics and embryo manipulation	Material to be made available
15-19	Illustrative examples of invertebrate development	Development of *Drosophila melanogaster* and *C. elegans*, including cell signaling pathways	Ch. 2 (TB), Ch. 3 (RB1)
20-23	Patterning the vertebrate body plan I: axes and germ layers	Setting up the body axes; origin and specification of germ layers in *Xenopus*, chick, mouse and *Drosophila*	Ch. 3 (TB)
24-26	Patterning the vertebrate body plan II: somites and nervous system	Somite formation and antero-posterior patterning; role of organizer and neural induction	Ch. 4 (TB)
27-30	Morphogenesis: changes in early embryo	Cell adhesion; formation of blastula; gastrulation movements; neural tube formation.	Ch. 7 (TB)

31-32	Germ cells, Fertilization and Sex	Germ cells development; events at fertilization; determination of sexual phenotype	Ch. 11 (TB), Ch. 4 (RB1)
33-35	Cell Differentiation and Stem Cells	Models of differentiation; plasticity of gene expression; stem cells – types and uses	Ch. 8 (TB), Ch. 13 (RB2)
36-38	Organogenesis: development of organs	Development of vertebrate limb	Ch. 9 (TB)
39-41	Development of the nervous system	Specification of cell identity in nervous system; neuronal migration;	Ch. 10 (TB)

5. Evaluation scheme:

Component	Weight	Date and Time	Venue (Rm. #)	Remarks
Mid Sem	30%	19/3 2:00 -3:30 PM	NB*	Closed Book
Quizzes and Assignments#	30%	May be announced in class		Several quizzes, some pre-announced
Comprehensive Examination	40%	16/5 FN	NB*	Partly open-book type

* NB – Check Notice Board for the venue announcement; # May include presentations.

6. Grading Policy:

Award of grades would be guided by the histogram of marks. Decision for cases on borderline of two grades will be based on the student's promptness and participation in classroom activities as well as satisfactory attendance in lecture and tutorial classes. If a student misses even a single component entirely or does not give sufficient opportunity for being assessed, he/she may be awarded 'NC' report regardless of his/her final total score in the course (see Clause 4.19 of *BITS Academic Regulations*).

7. Office Consultation:

By prior appointment obtained in person or by email (rajdeep.chowdhury@pilani.bits-pilani.ac.in).

8. Make-up Policy:

For a foreseen absence, make-up request should be made *in person* to the Instructor-in-Charge, well before the scheduled evaluation component. Reasons for unanticipated absence that qualify a student to apply for make-up include medical or similar personal emergencies only; in such an event, the student should contact the Instructor-in-Charge as soon as practically possible. Make-ups for journal club presentations and quizzes/assignments are not usually given. For regulations about the make-up flexibility, students are advised to refer to Clause 4.07 of *BITS Academic Regulations*

9. Course Announcements and Notices:

Announcements pertaining to the course will be made in the lecture/tutorial class. In some cases, printed notices shall be displayed in the notice board of only the Department of Biological Sciences.

Instructor-in-Charge
BIO F341