



**FIRST SEMESTER 2021-2022**

**Course Handout (Part-II)**

**Date: 20.08.2021**

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 F213  
**Course Title** : CELL BIOLOGY  
**Instructor-in-Charge** : KUMAR PRANAV NARAYAN  
**Instructors** :Dwaipayan Bhattacharya

**1. Course Description:** The course deals with fundamental processes of life at cellular and sub-cellular levels, cell environments, membrane transport, cell movements, division and control mechanisms.

**2. Scope and Objective of the Course:**

The discipline of cell biology is both dynamic and evolving constantly. Thus, an advanced understanding of 'the cell' is must for biology students. This course will impart the vast knowledge of cell and mechanisms of cell functioning. It will also provide the base to understand cells at microscopic and molecular levels—their physiological properties, structure, intracellular organelles, interactions with microenvironments, division, regulatory mechanisms and related experimental procedures to prepare students for pursuing their enquiry into the fundamentals of life

**3. Text Books (TB):**

*Cell and Molecular Biology* by Phillip Sheeler and Donald E. Bianchi, John Wiley and Sons (3rd Ed). (Note: Available for purchase online)

**4. Reference Books (RB):**

**RB1:** *The World of Cell* by W.M Becker, L.J. Kleinsmith and J. Hardin. Pearson Education (6<sup>th</sup> Ed), 2007.

**RB2:** *Essential Cell Biology* by Bruce Albert, Garland Science (2<sup>nd</sup>Ed).

**5. Course Plan:**

Lecture No.	Learning Objectives	Topics to be covered	Chapter in the TB, RB
1- 4	Preview of Cell	Brief introduction, Cell structure and overview of cell organelles, The composite Animal, Plant, Bacterial, Mycoplasma cells Viruses and Microscopy	Ch.1 (TB) Ch. 4 (RB1) Ch. 1 (RB2)
5 - 6	Microscopy	Understanding cellular architecture using microscopy: light, fluorescence, confocal and electron.	Ch.1 (TB) Ch. 1 (RB2)
7 - 8	Cell growth	Growing, culturing and isolating cells: growth kinetics, quantification, flow cytometry.	Ch. 2 (TB) Class notes
9 - 13	Cell Membrane – organization, constituents, cell junctions	Structure and chemical organization of plasma membrane. Lipids, Carbohydrates and Proteins in the membrane. Origin of plasma membrane and its protein and lipid asymmetry, Cell-cell junctions and other specialized structures	Ch. 15 (TB) Ch. 7 (RB1) Ch. 11 (RB2)
14-16	Transport across	Principles of transmembrane transport: diffusion,	Ch. 15 (TB)

	cell membrane	passive and active transport; membrane transporters & their function; vesicular/vacuolar transport	Ch. 8 (RB1) Ch. 12,15 (RB2)
17 – 20	Intracellular compartments and protein transport	Endomembrane system & peroxisomes and their role in cellular functions like protein trafficking & modifications, metabolism.	Ch. 15 (RB2) Ch. 12 (RB1)
21 – 23	Cytoskeleton	Cytoplasmic filaments, microtubules, spindle fibers and centriole structures and functions	Ch. 23 (TB) Ch. 17 (RB2)
24 – 26	Nuclear processes	Nuclear organization, transcription, division and cytokinesis	Ch. 20 (TB), Ch. 7,19 (RB2)
27 – 30	Ribosome and translation	Eukaryotic and prokaryotic ribosome. Ribosome composition, rRNA operon, translation	Ch. 22 (TB) Ch. 7 (RB2)
31 – 33	Cell cycle	Overview of the cell cycle, regulation of cell cycle. Cell cycle and cell division; growth control and cancer	Ch. 19 (RB1) Ch. 18 (RB2)
34 – 35	Apoptosis	Mechanism of programmed cell death/apoptosis	Ch. 18 (RB2)
36 – 38	Cell communication	General principle, signalling molecules, receptors, secondary messengers, signal transduction, receptor-mediated signalling	Ch. 14 (RB1) Ch. 16 (RB2)
39 – 40	Modern Techniques and Applications of Cell Biology	Cell organelles and human diseases, Cloning, Gene therapy, embryonic stem cells. Transgenesis and applications of Cell Biology, Cell biology of aging, Cell biology in forensic science	Class notes

## 6. Evaluation Scheme:

Components	Duration	Weightage (%)	Date & Time	Nature of Component
Mid Sem Test	<b>90 min</b>	30	20/10/2021 9.00 - 10.30AM	CB
Assignments &/or presentations		20	10% Before Mid Sem 10% After Mid Sem	OB
Quiz or viva		10	5% Before Mid Sem 5% After Mid Sem	CB
Comprehensive exam	<b>120 min</b>	40	16-12-2021 FN	20% CB+ 20% OB

**7. Chamber Consultation Hour:** Tentatively every Thursday, 5 PM (On call at 9505504948)

**8. Notices:** Notices concerning the course will be communicated through email or CMS.

**9. Make-up policy:** As per the **clause 4.07 in the Academic regulations booklet**. **Only hospitalized cases will be considered for makeup.**

**10. Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**INSTRUCTOR-IN-CHARGE  
BIO F213**

