

**BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI**  
**FIRST SEMESTER 2021-22**

Dated: 10.08.21

**Course Handout Part II**

**Course No.** : BIO G526  
**Course Title** : Cancer Biology  
**Instructor In-charge** : VIVEK SHARMA  
**Lab Instructors** : Bakhyashree GB, Swati, Md.M S. Mustafa

**1. Course Description:**

Basic concepts and molecular basis of Cancer, Growth, Regulation and Metastasis, Cancer Immune system Interaction, Cancer therapy, Cancer and Environment, Cancer and Society.

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

This course is designed to provide insight in the basic concepts as well recent advances in the area of cancer biology. Changes at the molecular and cellular level for Cancer cells will be discussed in detail. Clinical aspects of the disease as well as therapeutic approaches will be discussed. Preventive aspects of the disease, its epidemiology and its effects on society will be elaborated. Exposure of practical aspects related to cancer cell research will be demonstrated.

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

T1. *The Biology of Cancer*. Robert A. Weinberg, Garland Science. 2014. (Available online for purchase)

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

- (i) Principles of Cancer Biology. Lewis J. Kliensmith. Pearsons. 2007.
- (ii) Recent review articles/Papers will be discussed / provided

**5. Course Plan:**

<b>Lec . No.</b>	<b>Module</b>	<b>Learning Objectives</b>	<b>Topic to be covered</b>	<b>Ref. to Chapters</b>
1-3	Introduction to Cancer Biology	Understanding the basic biology of Cancer and its association with mutagens. Also understanding the influence of healthy/unhealthy life style	Nature, origin, and types of Cancer, Factors affecting Cancer, Association of Cancer with Life style and mutagens	Chap 1,2 T1
4-7	Tumour Viruses	Understanding virus induced cell transformation <i>in vitro</i> and <i>in vivo</i>	DNA/RNA Viruses, Proto-oncogene Activation and Oncogenes in Viruses	Chap 3, T1
8-13	Genetic & Molecular Basis of Cancer	Understanding the genetic basis of Cancer and	Cellular Oncogenes, Receptors and Growth factors, Cytoplasmic Signaling	Chap 4-6, T1;

		associated cell signaling mechanisms		
14-19	TSGs and Cell Cycle Control	Understanding cell cycle and its regulation at a genetic level with special reference to TSGs	TSGs: Rb & p53, Cell Cycle, Apoptosis, Necrosis, Necroptosis Autophagy	Chap 7-9, T1
20-24	Cell immortalization and Tumorigenesis	Understanding the role of telomeres , genetic instability and inflammation in tumour development	Telomere Biology DNA defenses to mutation, Multi-Step Tumorigenesis Inflammation Genomic Stability	Chap 10-12, T1
25-28	Tumour Growth and Moving Out	Understanding tumor progression at a molecular, cellular and systemic level	Hypoxia, and Angiogenesis EMT transition Metastasis	Chap 13-14, T1
29-33	Tumor - Immune System Interaction	Understanding the intricacies of tumor immune cell interaction and its application in therapy	Immuno surveillance Theory Immunoediting Types of Tumor Antigens:TSTAs & TATAs, Cancer Immunotherapy	Chap 15, T1
34-37	Treatment of Cancer	Understanding the current approaches to cancer therapy against pre-existing background	Evolution of Drugs, Personalized Therapy, Potential Targets Clinical Trials	Chap 16, T1
38-40	Epigenetics, Aging and Non-coding RNAs in Cancers	Exposure to recent advances in Cancer development and novel Therapeutic Approaches	Chromatin modifications, miRNAs, LncRNAs, Age-related alterations in Cancer	Reviews

## 6. Laboratory Plan

- Cell Culture: Glioblastoma and Oral Cancer Cell line revival, freezing, and maintenance
- Cell Migration Assay
- TGF- $\beta$  signaling induced Gene Expression analysis from Cancer Cells
- Cancer Gene expression analysis due to drug treatment
- Databases for studying Cancer
- Analyzing Mutations in Cancer using in silico tools
- Plotting survival curves using in silico tools
- Predicting miRNA targets for a gene in silico

**7. Evaluation Scheme:**

EC No.	Evaluation Component	Duration	Weightage (%)	Date, Time	Remarks
1.	Mid Semester	90 min	25	TBA	OB
4.	Class Assignments		10	TBA	OB
5.	Lab Records/Participation LabViva/Group discussion		25	TBA	OB
6.	Comprehensive	120 mins	40	15/12 FN	OB

**8. Chamber consultation hour:** Virtual consultation hrs to be announced in the class.

**9. Notices:** All notices will be displayed on Course management system.

**10. Make-up policy:** Make-up decisions will be considered for only genuine cases and validated by proper evidence of illness. No make-up for Lab component and assignments.

**11. 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.

VIVEK SHARMA  
**Instructor-in-charge**  
**BIO G526**