BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI

FIRST SEMESTER 2020-21

Dated: 13.08.20

Course Handout Part II

Course No. :BIO G526
Course Title :Cancer Biology
Instructor In-charge : VIVEK SHARMA
Instructors: Vivek Sharma, Piyush Khandelia
Lab Instructors :Bakhyashree GB & M.Wasil

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) Molecular Biology of the cell. 5th Ed. Bruce Alberts, Garland science.

(ii) Principles of Cancer Biology. Lewis J. Kliensmith. Pearsons. 2007.

(iii) Recent review articles/Papers will be discussed / provided

5. CoursePlan:

Lec. No.	Module	Learning Objectives	Topic to be covered	Ref. to Chapters
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

4-6	Tumour Viruses	Understanding virus induced cell transformation *in vitro* and *in vivo*	DNA/RNA Viruses, Proto-oncogene Activation and Oncogenes in Viruses	Chap 3, T1
7-13	Genetic & Molecular Basis of Cancer	Understanding the genetic basis of cancer and associated cell signalling mechanisms	Cellular Oncogenes, Receptors and Growth factors, Cytoplasmic Signaling	Chap 4-6, T1;
14-17	Cell immortalization and Tumori-genesis	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
18-21	Cancer Cell Metabolism and Multi-Drug Resistance	Understanding the concept of tumour cell metabolism and development of drug resistance	Alterations of Glycolysis, Glutaminolysis Fatty Acid Synthesis, PPP and MRPs in Cancer	Review Articles
22-25	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
26-29	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
30-33	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
34-35	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
36-38	Cancer, Society and Life Style	Evolving suitable lifestyle for cancer prophylaxis and cure	Environmental Toxicants and Diets	Reviews
39-43	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 line revival, freezing and Maintenance
- Cell Migration Assay
- Cell Staining with DAPI
- RNA Isolation 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 & Venue	Remarks
1.	Test I	30 min	15	TBA	OB
2.	Test II	30 min	15	TBA	OB
3.	Test III	30 min	15	TBA	OB
4.	Lab Assignments		15	TBA	OB
5.	LabViva/Group discussion		15	TBA	OB
6.	Comprehensive	120 mins	25	02/12 AN	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.

Instructor-in-charge
BIO G526