**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)**:

* 1. Principles of Cancer Biology. Lewis J. Kliensmith. Pearsons. 2007.
  2. Recent review articles/Papers will be discussed / provided

**5. Course Plan:**

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| --- | --- | --- | --- | --- |
| **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 |
| 4-7 | 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 |
| 8-13 | Genetic & Molecular Basis of Cancer | Understanding the genetic basis of Cancer and associated cell signaling mechanisms | Cellular Oncogenes, Receptors and  Growth factors,  Cytoplasmic Signaling | Chap 4-6, T1; |
| 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 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 |
| 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-β 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:**

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| --- | --- | --- | --- | --- | --- |
| **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**