K. J. SOMAIYA COLLEGE OF SCIENCE AND COMMERCE , AUTONOMOUS

An Introduction to Cancer Biology

Course Details

Department of Zoology & Botany
2019-2020

This document contains the structure of course, details of syllabus and evaluation pattern.

Course Details

- **Course type** : Certificate
- **Course Title** : An Introduction to Cancer Biology
- **Preamble** : The course has been started with the foresight of Dr.S.Mani and Mr. Sameer Somaiya who felt the dearth of cancer research in India and the need to make more young minds aware of the gravity of Cancer, its effect on the society, treatment modalities and related research. This course would be one of its kind, a pioneering effort to bring together likeminded people in the understanding of cancer.

- **Objectives of course** :

1. To introduce eager minds to the world of cancer.
2. To share theoretical information of the basics of cancer and its biology
3. The focus will be more on awareness, information and interactions with the experts in cancer.

- **Learning Outcomes :**

1. If the stakeholder gains sufficient curiosity, he/she may pursue it in the future at the PG level and want to take up cancer research.
2. An Undergrad who completes this six- month course, will be well informed of the basics of Cancer Biology.
3. Terminologies, basic concepts, causes, types, genetics and treatment of cancer will be taught in theory. There will be no hands-on practicals in Cancer Biology.
4. The student will visit existing cancer research labs in the city, attend seminars and interact with cancer scientists and experts.

- **Prerequisites / Eligibility Criteria : T.Y.B.Sc**

- **Intake Capacity : 20**

- **Duration** : 6 months

- **Course Coordinator** : Dr. Shanti Upadhye Dr. Veena Salvi

❖ **Syllabus :**

Module I	**Subtopics**
The Nature of Cancer [Cellular and molecular basis of cancer]	1.1 Tumor arises from normal tissues a. Primary tumor b. Benign tumor c. Malignant tumor d. metastases 1.2 Tumor arises from many specialized cells throughout the body a. Epithelia b. Endothelia c. Carcinomas d. sarcomas 1.3 Cancer develops progressively a. Hyperplasia b. Metaplasia c. Polyps, papillomas, warts 1.4 Clonal nature of tumors a. Monoclonal b. Polyclonal c. Lineage tracing 1.5 Agents that can induce cancer a. Physical

	b. Chemical c. Biological(viruses) 1.6 Growth factors, receptors and cancer a. Normal Growth factors b. Src or EGF- TK based signaling c. Altered GF receptor can function as an oncoprotein d. Nuclear receptors, Integrin receptors e. Ras protein
Reference	**Chapters 2 and 5 of The Biology of Cancer- Robert Weinberg**

Module II	**Subtopics**
Reference	**Chapters 1,4and 7 of The Biology of Cancer- Robert Weinberg**

Module III	**Subtopics**
Tumorigenesis [the journey of cancer from tumor to metastases]	3.1 Cell Immortalization a. Normal cell population, growth pattern b. How cancer cells deviate from this c. Generational clock 3.2 Cell – physiologic stresses

	a. Onset of senescence b. Cumulative oxygen demand c. Effect of senescence on cellular biochemistry d. Crisis 3.3 Role of Telomeres a. Significance of telomere b. If functional telomere is lost c. Megachromosome d. Mitosis of a dicentric chromosome 3.4 Multi-step tumorigenesis a. Human cancers develop progressively b. Histological evidence of multi step process c. Cells accumulate genetic and epigenetic alterations 3.5 Invasion and Metastasis a. How a primary tumor evolves, cells move out b. Invasion-metastasis cascade c. Intrvasation d. Extravasation e. Colonization f. EMT
Reference	**Chapters 10,11and 14 of The Biology of Cancer- Robert Weinberg**

Labs/ Visits/ Hands-On	
Module IV	**Subtopics**
Tumor immunology and therapy [how immune system functions in cancer, treatment patterns]	4.1Crowd control by immune System a. How immune system tries to protect: HMI, CMI b. Adaptive immune response- antibodies and cytotoxic cells c. Innate immune response 4.2 Immune-tolerance a. self and non-self b. regulatory T cells c. Tumor antigens 4.3 Immune-surveillance a. Theory-allograft rejection b. histocompatibility c. immunoeditting d. human immune system in warding off cancers e. escape from surveillance 4.4 The rational treatment of cancer: a. surgery, b. radiotherapy,

	c. Chemotherapy d. Differentiation, cell cycle checkpoints and apoptosis in cancer therapy 4.5 Recent advances a. Immunotherapy b. Combination therapy
Reference	**Chapters 15 and 16 of The Biology of Cancer- Robert Weinberg**
Labs/ Visits/ Hands-On	
Course Evaluation	

- **Evaluation Pattern :** Viva voce, Reports

Reference Books : The Biology Of Cancer-Robert Weinberg