

USC/Norris Cancer Center, Departments of Molecular Microbiology and Immunology, Biochemistry and Molecular Biology, and Pathology.

Four-Unit Interdisciplinary Graduate Course, INTD504

'THE MOLECULAR BIOLOGY OF CANCER' Fall Semester, 2015

Mondays and Wednesdays afternoons, 3:00-5:00 pm, in McKibben Room #256

Lecture-notes will be posted on the USC Blackboard site (<https://totale.usc.edu/>), either as Power-Point or as PDF files.

Suggested general textbook for additional reading:

Robert A Weinberg: The Biology of Cancer (2ND ed, 2013) [GS Garland Science, Taylor & Francis Group]. Specific papers (as PDFs) will be posted on Blackboard.

LECTURE GOALS:

Upon completion of this course, the student should:

- Understand basic aspects of cancer pathology. What is cancer?
- Understand chromatin as it relates to gene expression.
- Understand epigenetics and somatic genetic changes in tumors.
- Understand modern aspects of RNA biology.
- Understand the cell cycle, angiogenesis and apoptosis.
- Be familiar with basic facets of carcinogenesis and methods to study the process.
- Be familiar with basic principals and applications of cell culture and animal models to study cancer.
- Understand how genetics contributes to predisposition and progression of cancer.
- Understand the differences and overlap of cancers by tissue type.
- Understand how immunotherapy is, and can be, used to treat human illness: strategies, advantages, and hurdles to overcome to realize its potential.
- Be familiar with the basic tenants in each module.

COURSE OVERVIEW:

In the past several years dramatic advances in cancer knowledge have established the foundation for a new era in the understanding and ultimate cure of this deadly group of diseases. The goal of this Cancer Center flagship course is to expose budding investigators to modern strategies of understanding the mechanisms of cancer development and progression. Such strategies encompass cell biological and genomic approaches; hence the course is the main one in the CBG program. The questions being addressed all relate to what goes wrong with normal mechanisms, which then leads to cancer. The lecture series applies a multidisciplinary approach toward these goals, with the full realization that cancers in different organs represent different diseases. However, all cancers (i) are characterized by uncontrolled cell proliferation and (ii) have strong genetic components, both in the germline and the somatic tissues. The ultimate aim of the course is to understand how multidisciplinary and molecular approaches are necessary to provide a basis for the ultimate treatment development for this group of diseases; by necessity the course content is basic in nature, given by experts in their respective fields.

COURSE POLICIES:

Primary didactic materials will be distributed to students preceding each (most) lecture, and posted on the Blackboard Website. Expanded supporting information can be obtained from the textbook and specific references (also posted on Blackboard). Professors are responsible for all material presented in course, either orally, by projection, or in handouts, and any assigned readings specified in the syllabus or by the faculty. To preserve the integrity of the course and the educational program within the School of Medicine, assigned grades will not be further 'negotiated' unless there are glaring mistakes in the grading (such as arithmetic errors). Medical issues may be reported to the course coordinator for consideration for accommodations, but only when the medical issue is reported before the exam is taken and graded. Photography or videotaping of the course lectures is explicitly prohibited, in accord with USC School of Medicine policy.

TESTS & FORMAT:

- There will be two examinations, a Midterm (October 19) and a Final (December 9)
- Exam questions can be of any format, and there will be choices.
- The Midterm will comprise 50% of the final grade, and the Final exam 50%.
- The Final will be comprehensive; material presented since the Midterm will be emphasized.

STUDENTS WITH DISABILITIES:

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to the course instructor as early in the semester as possible. DSP is located in STU 301 and is open 8:30 AM to 5:00 PM, Monday through Friday. The phone number for DSP is (213) 740-0776.

Schedule:

Date	Subject	Lecturer	
Module 1: Tumor Pathology / Epidemiology			
08/26/15	Pathology of Neoplasia	Dr. Louis Dubeau	✓
08/31/15	Cellular Cancer Evolution	Dr. Darryl Shibata	✓
09/02/15	Brain Tumor Biology	Dr. Anat Erdreich-Epstein	✓
09/09/15	Molecular Epidemiology	Dr. Fred Schumacher	✓
Module 2: Genomics and Genetics of Cancer			
09/14/15	Significance of Chromatin Signatures	Dr. Gerry Coetzee	✓
09/16/15	Somatic Structural Variation of Genomes	Dr. Anton Valouev	✓
09/21/15	Transcriptional Regulation	Dr. Ruchi Bajpai	✓
09/28/15	WashU Epigenome Browser	Dr. Ting Wang	
Module 3: Epigenetics and RNA			
09/30/15	Epigenetic Mechanisms	Dr. Judd Rice	✓
10/05/15	Epigenetic Diagnostics	Dr. Ite Laird-Offringa	✓
10/07/15	Epigenetic Therapy	Dr. Gangning Liang	✓
10/12/15	Single Cell Gene Expression	Dr. James Knowles	✓
10/14/15	ncRNA	Dr. Muller Fabbri	✓

10/19/15: Midterm Exam**Module 4: Molecular Pathways**

10/21/15	Oncogenes and Signaling	Dr. Axel Schönthal	✓
10/26/15	Tumor Suppressors and Signaling	Dr. Axel Schönthal	✓
10/28/15	Apoptosis	Dr. Florence Hofman	✓

Module 5: Chemical Carcinogenesis / Animal Models

11/02/15	History, Bioassays, Initiation & Promotion, Carcinogens	Dr. Joe Landolph	✓
11/04/15	Chemical transformation, Chemically-induced Lung Cancer	Dr. Joe Landolph	✓
11/09/15	Cancer in Mouse Models and Cancer Stem Cells	Dr. Rob Maxson	✓

Module 6: Hormonal Carcinogenesis

11/11/15	Molecular Analysis of CTCs in Prostate and Other Cancers	Dr. Amir Goldkorn	✓
11/16/15	Bone Metastasis	Dr. Baruch Frenkel	✓
11/18/15	Ovarian Cancer Predisposition and Risk	Dr. Susan Ramus	✓
11/23/15	Colorectal Cancer Predisposition and Risk	Dr. Graham Casey	

Module 7: Immunological and Molecular Approaches to Cancer Therapy

11/25/15	Angiogenesis as a target for therapy	Dr. Young Kwon Hong	
11/30/15	Introduction to Tumor Immunology	Dr. Martin Kast	✓
12/02/15	Translational Aspects	Dr. Martin Kast	✓

12/09/14 Final Exam

For additional information, contact the Graduate Assistant in the Dept. of Molecular Microbiology/Immunology at 442-2337 or in the Dept. Biochemistry/Molecular Biology at 442-1145.

Course Coordinators: Drs. J Landolph (224-7781) and G Coetzee (865-0631).

Postdoctoral fellows and other interested parties are welcome to attend.