CNBY-Cancer Biology

Courses

CNBY 210. Colloquium in Cancer Biology. 1 Hour.
This course will introduce students to current topics in cancer biology. The goal is to cover a wide range of subjects, with speakers from UAB and if appropriate from outside institutions. Topics covered will be very broad and will range from basic science to clinical and translational medicine, and if appropriate will also address some of the ethical issues surrounding cancer treatment and the sociological impact of chronic disease. The goal will be to build interest in the topic and for students to gain a broad appreciation of the many facets of the disease.

CNBY 320. Introduction to Cancer Biology. 3 Hours.
This course will introduce students to cancer biology. Topics will include the history of cancer, hallmarks of cancer biology on a cellular level, common cancers in the body, cancer treatment, and prevention and risk factors. This course will serve as a foundation and prerequisite to the more advanced upper level CNBY courses.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C]

CNBY 410. Proliferation and Carcinogenesis. 3 Hours.
This course will cover the basic tenets of cell biology as they apply to cancer. Topics to be covered will include the cell cycle, how cells normally grow and divide, how they stop growing and how that process is disrupted in cancer; the normal processes associated with cell death such as autophagy, apoptosis and necrosis; the concepts of “stemness” and immortalization in relation to cancer cells and the role of telomerase, mutagens, environmental toxins and DNA repair.
Prerequisites: CNBY 320 [Min Grade: C]

CNBY 420. Genetic Basis of Cancer. 3 Hours.
This course will provide an overview of genomic organization transcription and translation, prior to commencing an in-depth study of cancer genetics and the roles of oncogenes, tumor suppressors, RNA, DNA methylation, gene amplification and the control of gene expression and the viral causes of cancer. Students will also be introduced to basic concepts in bioinformatics and database mining using The Cancer Genome Atlas (TCGA) as a model.
Prerequisites: CNBY 320 [Min Grade: C]

CNBY 425. Sex Differences in Cancer. 3 Hours.
This course will provide an overview of the sex differences in cancer with regards to incidence, prevalence, and mortality of various cancers as well as the role of the X and Y chromosomes in tumor cell survival. The course will also discuss hormone dependent cancers and the importance of cancer screenings and awareness for all persons, including all sexes and genders.
Prerequisites: CNBY 320 [Min Grade: C]

CNBY 430. Tumor Survival and the Microenvironment. 3 Hours.
This course will examine cancer cell physiology in terms of the tumor microenvironment, nutrients and angiogenesis and will explore how these influence cancer cell survival, invasion and metastasis.
Prerequisites: CNBY 320 [Min Grade: C]

CNBY 435. Pediatric Cancers. 3 Hours.
This course will provide an overview of the cancers that primarily affect children. We will discuss the biology, genetics, treatments, and risks of each, and students will present reports of recent pediatric clinical trials. We will also discuss the potential long-term consequences following cancer treatment for survivors.
Prerequisites: CNBY 320 [Min Grade: C]

CNBY 440. Cell Signaling and Cancer. 3 Hours.
In this course the major cell signaling pathways involved in cancer cell development will be examined. An initial overview of signaling (cytosolic, nuclear, dual-address), receptors and basic second messenger pathways (PKA/PKC) will be followed by an in-depth study of pathways of particular relevance to cancer such as receptor tyrosine kinases, RAS, PI3 kinase/PTEN, growth factors (e.g. EGF, TGF-#), integrins, Wnt/#-catenin and JAK/STAT pathways. The role of post-translational modifications of proteins, such as glycosylation will also be discussed.
Prerequisites: CNBY 320 [Min Grade: C]

CNBY 445. Cancer Neuroscience. 3 Hours.
This course will provide an overview of the various types of cancers that grow in the brain from a neuroscience perspective. Specifically, we will focus on the connections between neurons and cancer cells, the role of neurotransmitters on tumor growth, functional connectivity within the brain through imaging, and understanding symptoms including epilepsy and edema. Lastly, we will discuss current clinical trials as well as long-term mental and physical side effects for survivors.
Prerequisites: CNBY 320 [Min Grade: C] or NBL 230 [Min Grade: C]

CNBY 450. Microbiome in Cancer. 3 Hours.
This course explores the complex interactions between cancer biology and the microbiome, focusing on mechanisms, therapeutic strategies, and clinical applications. Students will engage with current research, analyze experimental data, and discuss emerging trends in microbiome-cancer interactions. The course integrates lectures, literature analysis, and critical discussions to develop a deep understanding of this evolving field.
Prerequisites: CNBY 320 [Min Grade: C]

CNBY 455. Cancer Bioinformatics. 3 Hours.
This course introduces the integration of various data types: single-cell sequencing, genomics, metagenomics, flow cytometry, and more into cancer biology research. Students will explore how multi-omics approaches enable novel insights into cancer mechanisms, diagnosis, and treatment. Emphasis is placed on computational tools and methodologies for data analysis and interpretation in cancer research.
Prerequisites: CNBY 320 [Min Grade: C]

CNBY 460. Tumor Pathobiology and Immunology. 3 Hours.
This course will examine the pathological changes that occur in cancer cells and tissues. The course will start with a brief overview of normal histology and will then focus on pathological changes that occur in some select cancers, e.g., colon, lung and breast. This will be followed by exploration of the roles of infection and immunity in cancer that will involve the role of innate and adaptive immunity and cancer cell defenses. The course will conclude by discussing cancer staging and classification of different cancers.
Prerequisites: CNBY 320 [Min Grade: C]

CNBY 470. Cancer Treatment. 3 Hours.
Major advances have been made in the diagnosis and treatment of multiple cancers. This course will review current therapeutic approaches to cancer treatment including radiotherapy, chemotherapy, surgery and gene therapy. This course will also include an introduction to the role of personalized medicine in cancer treatment. The course will conclude by considering other facets of caring for the patient with cancer including maintenance of nutrition, mental health and palliative care.
Prerequisites: CNBY 320 [Min Grade: C]

CNBY 480. Journal Club in Cancer Biology. 1 Hour.
This journal club will be appropriate for senior students. Students, either individually or in small groups will select, read and present articles from the current cancer literature as guided by their instructor.
Prerequisites: CNBY 320 [Min Grade: C]

CNBY 495. Undergraduate Research in Cancer Biology. 0-6 Hours.
In this major, students will be required to undertake a research project and register for 6 credit hours of CNBY 495 Undergraduate Research, as well as this CNBY 499 Senior Research Capstone course during their final semester of research.
Prerequisites: PSDO 200 [Min Grade: P]

CNBY 499. Senior Undergraduate Research Capstone Course. 3 Hours.
In this major, students will be required to undertake a research project and register for 6 credit hours of CNBY 495 Undergraduate Research, as well as this CNBY 499 Senior Research Capstone course during their final semester of research. This latter course will serve as the opportunity for students to write their research into a manuscript for publication, present a poster or give an oral presentation describing their research for presentation at the UAB EXPO or another scientific meeting. Students will work closely with faculty mentors to ensure quality of research and writing.
Prerequisites: CNBY 495 [Min Grade: P]