

Programmed Cell Death (BCHB-535)(2 credits)

Lecture: Wednesday 4:00 to 6:00 pm Rm 341 Basic Science

Lab: Tuesday 1:00 to 6:00 pm Rm LD4 Basic Science

Course Director: Dr. C. Simbulan-Rosenthal

Course Description

This course provides biochemistry, biomedical, and M.S. biotechnology graduate students with a basic overview of apoptosis, or programmed cell death (PCD), as well as some hands-on experience on induction of apoptosis and analysis of morphological and biochemical markers of apoptosis.

Course Objectives:

The purpose of Programmed Cell Death is to provide in-depth background, with emphasis given to developing an understanding of the basic mechanisms of apoptosis, a form of cellular suicide important in both normal development and a number of human diseases, including cancer, as well as the practical aspects of modulating this process in the development of therapeutic approaches to cancer and neurodegenerative diseases.

Textbook : Essentials of Apoptosis (Yin, X. (ed), Humana Press)

Grading:

There will be one mid-course exam (after lecture 5) and one final exam (after lecture 10). A part of the final grade will be based upon submission of 3 lab reports for the laboratory component.

Mid-course exam	30%
Final exam	30%
Class participation	10%
Laboratory reports	30%
Total	100%

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Course Outline/Schedule:

Date: **Topics to be covered:**

Lecture 1

Introduction: course overview; apoptosis vs necrosis; morphological and molecular changes; **major players:** caspases, adaptor proteins, receptors, Bcl2 family

Lecture 2

Death Receptors and Adaptor Proteins: Fas; TNF, FADD

Lecture 3

Caspases: Structure, Activation, Substrates, Inhibitors

Lecture 4

Bcl-2 family: Regulators of Cell Death

Lecture 5

Methods in Apoptosis Research

Mid-term exam Oct. 24 (4:00 - 6:00 pm) (scope: lectures 1-5)

Lecture 6

Developmental Apoptosis: Apoptosis in Normal Physiology

Lecture 7

Neuronal Apoptosis: Neurodegenerative Mechanisms; Ischemia

Lecture 8

Neuronal Apoptosis: Neurodegenerative Diseases (Alzheimer's, Huntington's, Parkinson's Diseases, ALS), Autoimmune Diseases (SLE)

Lecture 9

Apoptosis and Disease: apoptosis induction by bacterial pathogens, viral pathogens
Apoptosis and Cancer: cell death signaling in cancer therapy

Lecture 10

Apoptosis and Cancer: Tp53 gene therapy

Final exam Dec. 14 Friday (4:00 - 6:00 pm) (scope: lectures 6-10)

Laboratory

Date: **Experiments:**

Lab 1

Induction of apoptosis by different inducers: Fas ligation, TNF α , staurosporine, etoposide, camptothecin (time course experiment); collection of samples for Lab 2 and Lab3

Lab 2

Morphological markers of apoptosis: blebbing, pyknosis, Hoechst staining for nuclear fragmentation, Annexin- PI staining (FACS analysis)

Lab 3

Biochemical markers of apoptosis: caspase-3 fluorometric assay

Submission Date for Lab Reports: Nov. 30