PLEASE INDICATE

	Non-Credit		
	College Credit Non-Transfer		
	College Credit Transfer	Requested	Granted X

Course Objectives/Learning Outcomes

Upon completion of this course, students will:

1. Understand the origin of cells and the evolution of metabolism.

2. Be able to explain the composition and function of carbohydrates, lipids, proteins and nucleic acids in the cell.

3. Be able to explain how DNA provides a mechanism for heredity and to understand the flow of genetic information from DNA to RNA to protein.

4. Be able to describe the structure of the nuclear envelope and explain the mechanisms which allow for traffic of molecules between nucleus and cytoplasm.

5. Understand the structure and function of the plasma membrane and to be able to explain its role in active and passive transport and cell signalling and apply these concepts to explain cancer.

6. Be able to explain the processes by which proteins destined for peroxisomes, mitochondria and chloroplasts are synthesized and imported into these organelles and explain how this differs from translocation of protein into endoplasmic reticulum, Golgi apparatus, lysosomes and plasma membrane.

7. Understand the structure and organization of the different components of the cytoskeleton and relate them to cell movement.

8. Be able to describe the phases of the cell cycle and explain the experimental data that has identified the regulators of cell cycle progression.

9. Be able to use general principles of cell biology to discuss current issues.

10. Be familiar with and able to perform experiments using the common tools of cell and molecular biology, including light microscopy, fluorescence microscopy, sub-cellular fractioning, culture of animal and plant cells, immunoassays, electrophoresis, restriction enzyme mapping.

Course Content

The major topics in the course include the following:

1. INTRODUCTION
-origin and evolution of cells
-characteristics of prokaryotic and eukaryotic cells
-development of multicellular organisms
-cells as experimental models
-tools of cell biology
2. CHEMICAL COMPONENTS OF CELLS
-water
-carbohydrates
-lipids
-nucleic acids
-proteins
3. FUNDAMENTALS OF MOLECULAR BIOLOGY
-heredity, genes and DNA
-structure of DNA
-organization of eukaryotic and prokaryotic genomes
4. FLOW OF GENETIC INFORMATION
-DNA replication
-DNA repair
-transcription in prokaryotes

-mechanism of oxidative phosphorylation
-structure and function of chloroplasts
-photosynthesis
-structure and function of peroxisomes

9. CYTOSKELETON

-structure and organization of actin filaments
-actin, myosin and cell movement
-intermediate filaments
-microtubules
-microtubule motors and movements

10. CELL SIGNALLING

-modes of cell-cell signalling
-G protein-coupled receptors
-receptor protein-tyrosine kinases
-cytokine receptors and nonreceptor protein
-pathways of intracellular signal transduction

11. THE CELL CYCLE

-phases of the cell cycle
-regulation of the cell cycle by cell growth and extracellular signals
-cell cycle checkpoints
-regulators of cell cycle progression
-stages of mitosis
-cell differentiation
-programmed cell death
-development and causes of cancer

Methods of Instruction

This course involves four hours of lecture and/or tutorial/week and three hours of laboratory work. The information content is integrated with laboratory experiments, and textbook and scientific journal readings.

Textbooks and Materials to be Purchased by Students

Cooper, G. M. The Cell, A Molecular Approach. 2nd Ed. ASM Press, Sinauer Associates Inc. Massachusetts. 2000.

Means of Assessment

TYPE OF EVALUATION	POINTS
Class Tests	5-15

Laboratory	15
Term paper	5-15
Examinations	
-Term exam/s	15-30
-Final exam	35
TOTAL	100

Notes:
Laboratory:
Students will be evaluated based on their performance in