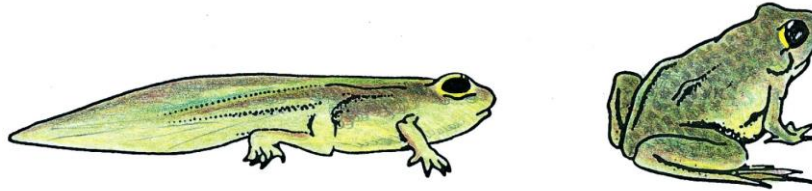


## Cellular and Molecular Biochemistry



Spring 2023  
**CBCH-4414**  
**CRN 26223**

**Lecture:** M, W (1.30 PM-2.50 PM)  
UGLC 342

**Professor:** Dr. Sid Das  
**Office:** Biosciences Building 5.128 (747-6896)  
**E-mail:** [sdas@utep.edu](mailto:sdas@utep.edu).

**Office Hours:** M and W: 3.20- 4.20 PM (or through prior appointment).  
Biosciences 5.128 (face to face, e-mail or phone X8896)

**TEXT:** 1) *The Molecular Biology of Cell* by Alberts, Johnson, Lewis, Raff, Roberts, Walter (6<sup>th</sup> Edition), Garland Science  
2) Research articles (should be provided by the instructor)

### Guidelines:

Both classroom teaching and Blackboard will be used as the primary platforms for online instructional activities.

Non-synchronous alternative such as recordings of lectures will be provided.  
No webcams are required by students.

The schedule assigned by the Goldmine will be followed.

Inform the instructor beforehand if you abstain from the class, facing technical difficulties or need some additional assistance.

## Objective:

This course focuses on understanding the recent advances in cellular and molecular biochemistry, **signaling through receptors**, **apoptosis**, **cell cycle**, **cancer**, **pathogenesis** and **stem cells**.

## Examination Procedure

There will be three class exams and a final. In addition, there will be practice quizzes. Your grades will be as follows:

### Point distributions:

Total four exams including the final. Best two and final exams will be counted.	75%
Lab	20%
Attendance	5%
<b>Grand Total</b>	<b>100%</b>

### Grading Policy

A = 90-100  
B = 80-89  
C = 70-79  
D = 60-69  
F = Below 60

**January 17th: Spring classes begin**

**March 13th-17th: Spring Break**

**March 30th : Drop Deadline**

**March 31st: Cesar Chavez Holiday-No classes**

**May 5th: Dead Day**

**May 10th: Final Exam (4 PM-6.45 PM)**

## Course Materials

**January 18, 23, 25, 30:** Mechanism of Cell Communication (Chapter-15)

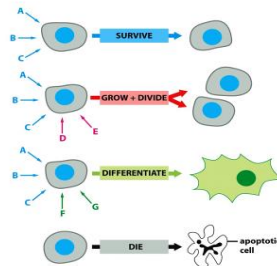


Figure 15-8. Molecular Biology of the Cell (© Garland Science 2008)

General principles of cell communication

Signaling through G-protein-coupled

Signaling through enzyme-coupled receptors

Phosphorylation of Receptor Tyrosine Kinases (RTKs)

RTKs serve as Docking Sites for Intracellular Signaling Proteins

SH2 Domains of RTKs

Activation of RTKs

PI-3-Kinase Lipid docking and RTKs

Cytoplasmic Tyrosine Kinases

Jak-Stat Pathways

TGF $\beta$  Signaling

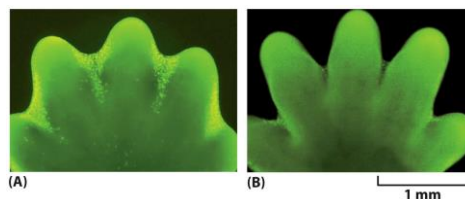
Protein Tyrosine Phosphatases

The receptor protein Notch is a latent gene regulatory protein

Hedgehog proteins

**February-1:** Exam-1

**February 6, 8, 13, 15:** Apoptosis (Chapter-18)



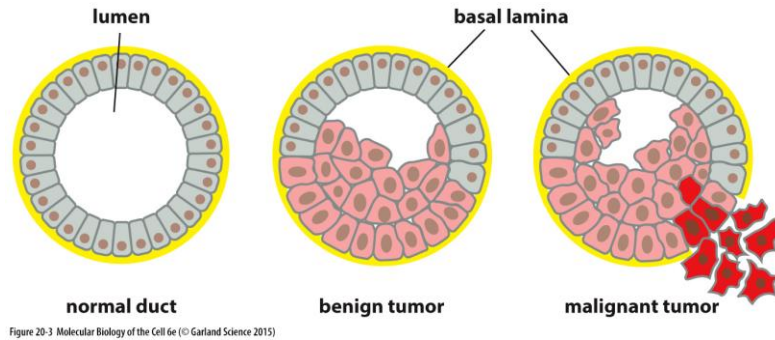
Programmed cell death eliminates Unwanted Cells

Apoptotic cells are biochemically recognizable

Intracellular Proteolytic Cascade and Apoptosis

Death Receptor  
Mitochondria and Apoptosis  
Bcl2 and apoptosis  
Extracellular Survival Factors Inhibit Apoptosis in Various ways

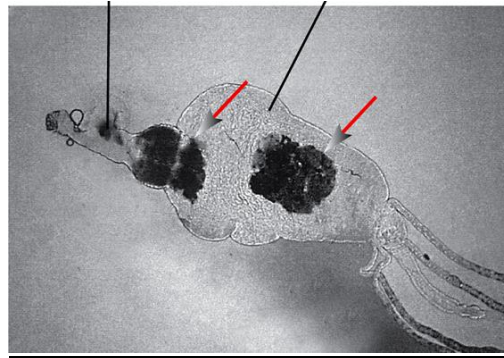
**February 15, 20, 22, 27:** Cancer (Chapter-20)



Cancer as a microevolutionary process  
Cancer cells reproduce without restraint and colonize others  
Most cancers derive from a single abnormal cell  
Cancer cells contain somatic mutations  
A single mutation is not enough to cause cancer  
Cancers develop gradually from increasingly aberrant cells  
The epigenetic changes that accumulate in cancer cells involve inherited chromatin structures and DNA methylation  
Tumors induce angiogenesis  
The Preventable Causes of Cancer

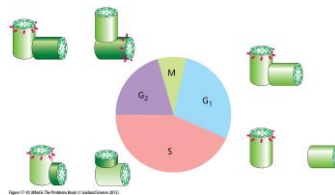
**March 1:** Exam-2: Chapters 18 and 20.

**March 6-22:** Pathogens and Infection (Ch-23)



Introduction to pathogens and human microbiota  
Pathogens can contribute to cancer, cardiovascular disease  
Pathogens can be viruses, bacteria or eukaryotes  
Fungal and Protozoans involving multiple multiple forms  
Cell biology of infection

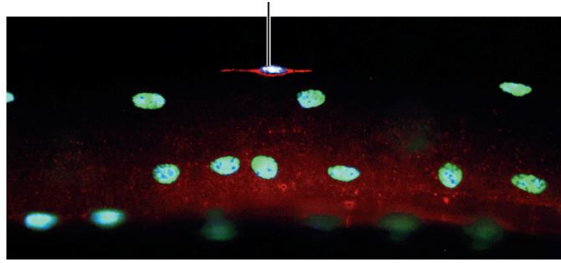
**March 27-April 5<sup>th</sup>:** Cell Cycle (Chapter-17)



Overview of the cell cycle  
The cell cycle control system  
S-phase  
Mitosis  
Cytokinesis

**April 10<sup>th</sup>:** Exam-3 (on chapter 23 and 17)

**April 12, 17, 19 and May 1:** Stem Cells and Tissue Regeneration



Stem cells and renewal in epithelial tissues  
Fibroblasts and their transformations  
Genesis and regeneration of skeletal muscle  
Blood vessels, lymphatics and endothelial cells  
A hierarchical stem cell system: blood cell formation  
Regeneration and repair  
Cell programming and pluripotent stem cells

**Final Exam on May 10<sup>th</sup> (4 PM-6.45 PM)**

Prepared on January 16, 2023