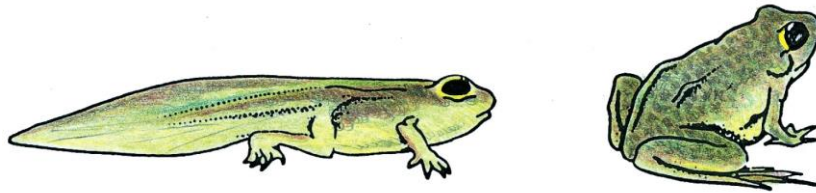


Cellular and Molecular Biochemistry



Spring 2020
CBCH-4414
CRN 23433

Lecture: M, W (3 PM-4.20 PM); Busn. 304

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

Office Hours: T and R: 3-4 PM (or through prior appointment).

TEXT: *The Molecular Biology of Cell* by Alberts, Johnson, Lewis, Raff, Roberts, Walter (6th Edition), Garland Science

Objective:

This course focuses on understanding the recent advances in Cellular and Molecular Biochemistry. We will cover topics on **protein functions**, **protein sorting**, **interorganelle protein transport**, **signaling through receptors**, **apoptosis**, **cell cycle**, and **cancer**. In addition, students will discuss research papers on each topic in a “Journal Club” format.

Examination Procedure

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

Point distributions:

Total four exams including the final. Best three will be counted	60%
<u>Journal club (journal articles)</u> <u>5 papers will be discussed by students</u> <u>Take home exams on journal clubs are</u> <u>due on the day of the final exam.</u>	13%
<u>Lab</u>	25%
<u>Attendance</u>	2%
Grand Total	100%

Notes:

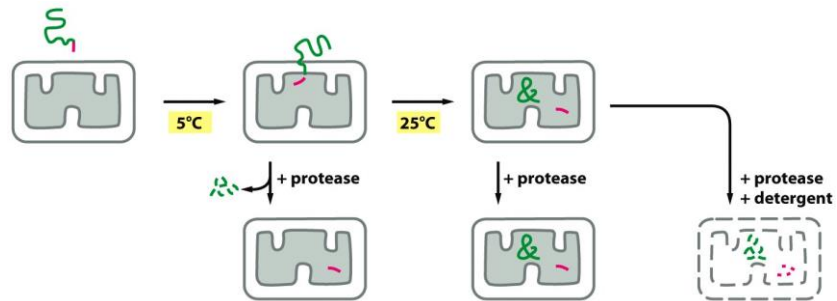
- 1) Try not to miss any exam or class without proper notification.
- 2) Attendance is must and everyone needs to sign an attendance roster (5% of your total grade).

Grading Policy

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

Course Materials

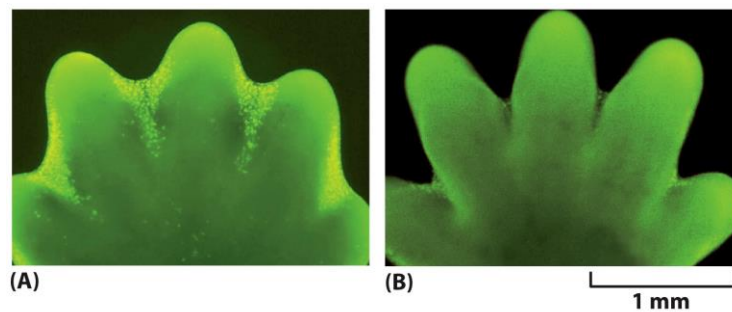
I. Intracellular Compartments and Protein Sorting
(Chapter -12)



The Compartmentalization of Cells
The Transport of Molecules between the Nucleus and Cytosol
The Transport of Proteins into Mitochondria and Chloroplasts
Peroxisomes
The Endoplasmic Reticulum

(Quiz-1 on Chapter-12)

II. 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

(Quiz-2 on Chapter 18)

Exam-1 (chapters 12 and 18)

III. Mechanism of Cell Communication (Chapter-15)

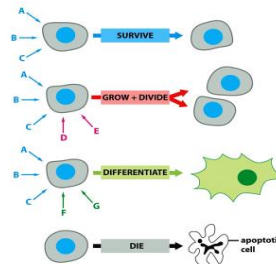


Figure 15-8 Molecular Biology of the Cell (© Garland Science 2008)

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 β Signaling
Protein Tyrosine Phosphatases
The receptor protein Notch is a latent gene regulatory protein
Hedgehog proteins

(Quiz-3 on chapter-15)

Exam-2: Chapter-15

IV. Cancer (Chapter-20)

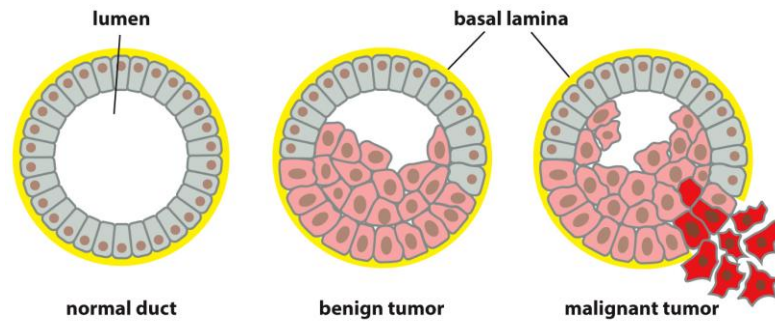


Figure 20-3 Molecular Biology of the Cell 6e (© Garland Science 2015)

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

Quiz on Chapter-20

V. Cell Cycle (Chapter-17)

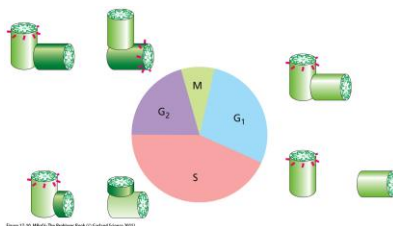


Figure 17-16 Molecular Biology of the Cell 6e (© Garland Science 2015)

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

Mitosis Cytokinesis

Quiz on chapter 17

Exam-3: Chapters 20 and 17

Journal Club

Journal Club starts after the Spring Break

Journal club paper: Maximiliano A. D'Angelo, Marcela Raices, Siler H. Panowski,1 and Martin W. Hetzer. Age-Dependent Deterioration of Nuclear Pore Complexes Causes a Loss of Nuclear Integrity in Postmitotic Cells. *Cell* 2008.

Journal club paper: Zomer A, Maynard C, Verweij FJ et al. (2015) *In vivo* imaging reveals extracellular vesicle-mediated phenocopying of metastatic behavior. *Cell* 161, 1046–1057. (Take home exam on this paper).

Journal club paper: Canman JC, Cameron LA, Maddox PS et al. (2003) Determining the position of the cell division plane. *Nature* 424, 1074–1078 (Take home quizzes on this paper).

Journal club paper: Newton K, Dugger DL, Wickliffe KE et al. (2014) Activity of protein kinase RIPK3 determines whether cells die by necroptosis or apoptosis. *Science* 343, 1357–1360. (Take home quizzes on this paper).

Journal club paper: Yongyou Zhang et al. Inhibition of the Prostaglandin Degrading Enzyme 15-PGDH Potentiates Tissue Regeneration. *Science*. 2015. Take home quizzes on this paper.

Final Exam on May 11, 2020 (1-3.45 PM)