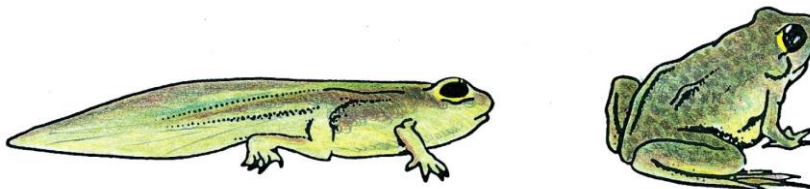


Cellular and Molecular Biochemistry



Spring 2018
CBCH-4414
CRN 23981, 27517

Lecture: M, W (3 PM-4.20 PM); BUSN 326

Professor: Sid 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 is aimed at students, who would like to learn the recent advances in Cellular Biochemistry. We will discuss the experimental methods of working with proteins, DNA, RNA and intact cells. In-depth analyses of (1) protein functions (2) protein sorting (3) signaling through receptor kinases (4) apoptosis (5) cell cycle (6) apoptosis and (7) understanding the process of cancer.

Examination Procedure

There will be three class exams and a final exam. In addition, there will be several quizzes and take-home exams, which will be counted. Your grade will be distributed as follows:

Point distributions:

Total four exams including the final. Best three will be counted	60%
<u>Quiz (total 5)</u>	15%
<u>Home works (journal articles)</u> 3-4 per/group	20%
<u>Attendance</u>	5%
Grand Total	100%

Final Grades

Lectures: 80%

Lab: 20%

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

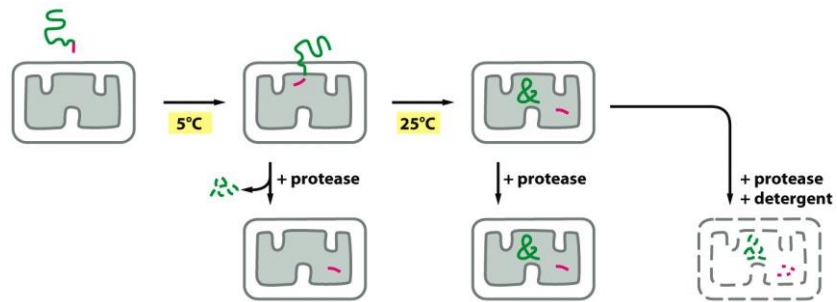
C = 70-79

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

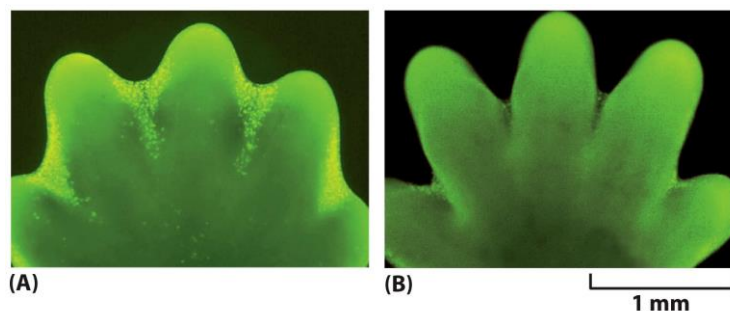
Peroxisomes

The Endoplasmic Reticulum

(Quiz on Chapter-12)

Journal Club and class discussion: 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. (Take home quizzes on the paper)

III. 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 on Chapter 18)

Journal Club: 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).

Exam-1 (chapters 12 and 18)

II. Mechanism of Cell Communication (Chapter-15)

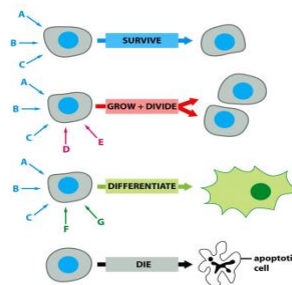


Figure 15-8 Molecular Biology of the Cell (© Garland Science 2008)

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

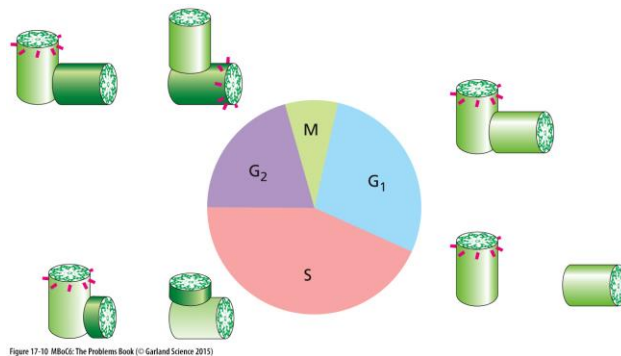
The receptor protein Notch is a latent gene regulatory protein
Hedgehog proteins

(Quiz-1 and quiz-2 on chapter-15)

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

Exam-2: Chapter-15

IV. Cell Cycle (Chapter-17)

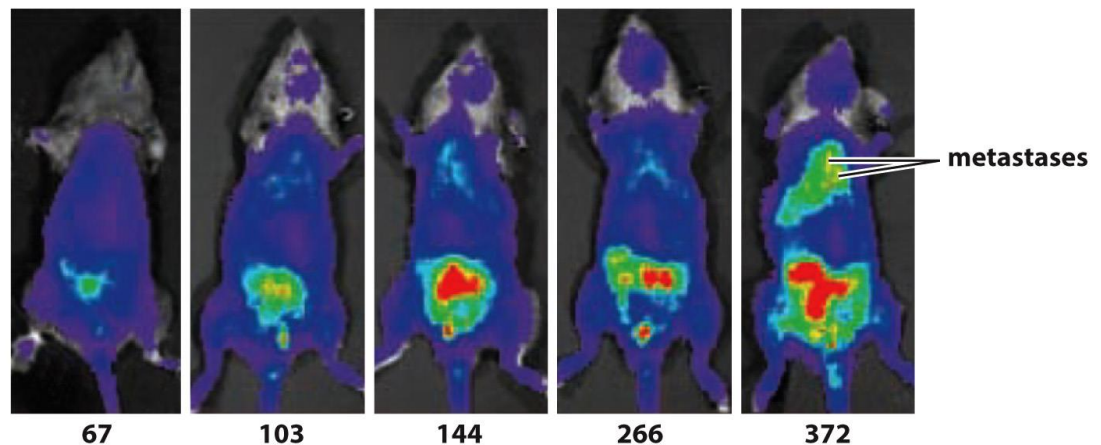


Overview of the cell cycle
The cell cycle control system
S-phase
Mitosis
Cytokinesis

Quiz on chapter 17

Journal Club: 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).

V. 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

Cancer Ge

(Quiz-3 on Chapter-20)

Journal Club: 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).

Exam-3: Chapters 17 and 20.

Final Exam on May 7th or May 9th, 2018 (1-3.45 PM)

Busn. 326