Cell Physiology (6305)
(CRN # 16227)
Course Syllabus, Fall 2023
TTH: 9:00-10:20 pm
Worrell Hall 205

Instructor: Dr. Manuel Miranda
Office: Bioscience 2.166
e-mail: mmiranda3@utep.edu
Office Hours: Open door policy

TEXTBOOKS

1. Hille, B. Ion Channels of Excitable Membranes, 3th Ed. Sinauer Associates, Inc.
2. Gerald Karp. Cell and Molecular Biology: Concepts and Experiments. 4th Edition. Wiley

There will be discussion of scientific reviews and research manuscripts and handouts provided throughout the semester

OBJECTIVES:
Upon completion of this class, students should be able to:

1. To study mammalian and bacterial cell structures and function. Review essential proteins for cell function and survival. Biophysical properties of cell membranes and organelles.
2. To gain an understanding of modern experimental techniques used in cell physiology research
3. To gain critical thinking and integrative skills required for the cellular aspects of your research project

IMPORTANT DATES

First day of classes	Monday, August 28th
Census Day:	September 13th
Course Drop Deadline:	**Nov 3rd**
Last day of classes	Dec 7th
Final Exam:	Dec 11th, 10 am

EXAMINATION PROCEDURE

- There will be two take-home exams during the semester.
- There will be a comprehensive Final Examination of all the information that we have covered in the class during the semester.
- In addition to the above, there will be several student presentations
- **Attendance is required, two unjustified missed lectures will drop you grade a letter grade.**

GRADING POLICY

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

GRADE DISTRIBUTION

Exams (2)	40%
Final Exam	10%
Student presentation	50%

This syllabus is tentative and may be changed during the semester

LECTURE	DATE	TOPIC	Required Reading
	8/29	Overview and review of basic cell structure function and cell diversity in mammals	Basic review
	8/31	Review - The cell membrane	Paper discussion
	9/7	The plasma membrane and internal membranes	Paper discussion
	9/12	Osmolarity and regulation of homeostasis Transport across biological membranes: NaK-ATPase, gastric H-ATPase	Paper discussion
	9/14	Transport across biological membranes: The Ca^{++}-ATPase, H-ATPase and other membrane ATPases	Paper discussion
	9/19	Transport across biological membranes: Oxidative phosphorylation in the mitochondria and E. coli plasma membrane	Paper discussion
	9/21	Oxidative phosphorylation in Chloroplast	
	9/26	The rotatory F_1F_0- ATP synthase and the Vacuolar V-ATPase	Paper discussion
	9/28	Transport across biological membranes: Molecular structure or carrier proteins, biophysics and regulation of physiological process	Paper discussion and handout
	10/3	Production and control of oxidative stress	Paper discussion
	10/5	Transport processes: Uniport, antiport and symport	Paper discussion
	10/10	The Nerst equation, Membrane voltage-gated ion channels: molecular structure, biophysics and regulation of physiological process	Paper discussion
	10/12	Electrophysiology of Excitation & Conduction Ionic Basis of Excitation	Paper discussion

	10/17	Neurons and glia, Ligand-gated ion channels,	Paper discussion
	10/19	Neurons and glia, Ligand-gated ion channels, Synaptic Transmission	Paper discussion and handout
	10/24	SFN meeting- no class	
	10/26	Transmission Neurotransmitters and Transporters and Receptors	Paper discussion
	10/31	Transmission Neurotransmitters and Transporters and Receptors	
	11/2	Type of membrane receptors	
	11/7	Optogenetics – turning on and off brain circuits	Paper discussion
	11/9	Growth Factors and Neurotrophins	Paper discussion and handout
	11/14	Cell-to-cell signaling: hormones, receptors and intracellular messengers	Paper discussion and handout
	11/16	Cell-to-cell signaling: hormones, receptors and intracellular messengers	Paper discussion
	11/21	Mechanisms of Protein & Peptide Hormone Action	Paper discussion
	11/23	Thanksgiving – No class	
	11/28	Mechanisms of Protein & Peptide Hormone Action	Paper discussion
	11/30	Extracellular matrix and cell-cell interaction (Neurexin, neuroligin, CAM, etc.)	Paper discussion and handout
	12/5	Lysosome: mechanisms	Paper discussion
	12/11	Final Exam	