

SYLLABUS

QUARTER: SPRING 2009

NAME OF COURSE: Cell Physiology - PHYS. 115

LENGTH OF COURSE: 44 hours, 4 units (4 hours lecture/week)

COURSE DESCRIPTION: The structure and function of the cell and all its organelles are described, illustrating how life processes in the cell are reflected in the functioning of the whole body. Topics covered in detail are: the structure and function of cell membranes, transport of material across membranes, protein structure and function, motility in cells (microfilaments and microtubules), carbohydrates and cellular respiration, ATP, nucleic acids, protein synthesis, mitosis and meiosis.

PREREQUISITES: NONE

COURSE OFFERED BY: Physiology/Pathology Dept.
Sue Ray, M.S., Department Chair

COURSE INSTRUCTOR: [Dave Straub, M.S.](#)
Email: dstraub@lifewest.edu
Phone: 780-4500 x 2271
Room: 171

OFFICE HOURS: Mon 12:00-1:00 & Tues 12:00-1:00
Wed 12:00-1:00 & Thurs 12:00-1:00

REQUIRED TEXT: Cell Physiology Class Notes

RECOMMENDED TEXTS: Marieb EN. *Human Anatomy & Physiology*. 7th ed. 2007
(7th ed. Due 6/06)
Becker WM. *The World of the Cell*. 3rd ed. 1996

MATERIALS: NONE

METHOD OF INSTRUCTION: Lecture, transparencies, videos.

ATTENDANCE:

Instructors are required to record student attendance. Roll can be taken at any time during the class period. The instructor may call names, pass a roll sheet, use submitted classroom assignments, or observe the students. If the instructor calls roll, a student who is not present when his or her name is called is absent. If the instructor uses a roll sheet, students have 15 minutes to sign in.

If a student arrives after attendance has been taken but within the first 15 minutes of the start of the class session, the student must see the instructor at the end of the class hour to request that his or her absence be changed to a tardy. Three tardies attendance constitute one hour of absence. Failure to notify the instructor will result in the absence mark remaining on the attendance sheet. This cannot be changed later. **No additional assignments can be used to compensate for absences except as outlined in the college course overlap policy.**

If a student leaves after attendance has been taken, the instructor can change the attendance record to indicate an absence for the class period. Any request to leave class early must be approved by the instructor before the class session.

A student who misses more than 10% of the class hours will be over-cut from the class. If the student presents documentation to the dean verifying a documented emergency or other excusable reason that prevented attendance for 15% of the class hours, the dean may permit him or her to continue attending the class. In determining whether or not to permit a student to continue attending a class, the dean will consider the student's overall attendance record and academic standing. Under no circumstances, regardless of any personal situation, will a student who misses 20% of the class hours receive course credit. Excused absences still count toward total absences; they only may entitle a student to make-up assignments and examinations.

A student is responsible for keeping track of his or her own attendance and absences. Instructors may but are not required to provide courtesy notices indicating that a student is approaching or has reached over-cut status.

Documented emergencies include hospitalization, accidents, or death in the family. Undocumented illness, not "feeling well," weddings, events, extended vacations or school holidays, non-school scheduled seminars, etc., are not considered excusable reasons for missing class.

GRADING: There will be two mid-term tests, each worth 25%, and a final examination worth about 50%.

A = 4.0, 90 - 100%, good	C = 2.0, 70 - 79%, average
B = 3.0, 80 - 89%, above average	D = 1.0, 60-69%, student must repeat class
	F = 0.0 student must repeat entire course

In order to maintain satisfactory academic progress, a student must maintain a 2.0 average or better in every course. **Any grade less than C must be remedied by repeating the class.**

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MAKE-UPS:

Students are expected to take all examinations and complete assignments as scheduled.

Students who have missed an exam due to a documented emergency or other excusable reason must pick up a "Request for Alternative Testing" form in the Dean's Office. At that time, they will explain the circumstances of their emergency and provide documentation to the Dean of the College. If the Dean authorizes the exam, the student must then present the form to his/her instructor to complete the necessary information. The student must then take the completed and signed request to the Student Services Office to schedule a time for the exam to be proctored. As indicated near the top of the form, Student Services requires a minimum of 5 working days to set up and schedule the approved exam.

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holidays, non-school scheduled seminars, etc., are not excusable reasons for making-up an exam or assignment.

EXTRA CREDIT: There will be no extra credit work accepted in this class.

CHEATING: A student who cheats in any way will automatically fail the course and his/her name submitted for appropriate administrative action.

CONDUCT AND RESPONSIBILITIES

It is the student's responsibility to maintain professional standards of behavior and attire while on campus. Students are expected to be prepared for instructional activities. They must bring required supplies/equipment and dress appropriately in accordance with the instructor's directions. Failure to do so can result in the student being marked absent for the class session. Any disruptive activity (e.g. use of cell phones, side conversations) in the classroom is prohibited. If the instructor requires a disruptive student to leave the classroom, the student remains responsible for all information and will be marked absent for the class session. The dean will impose sanctions for unprofessional behavior. Any form of deceit, fraud, plagiarism, unauthorized collaboration, or theft will result in failure of the course and referral to the dean for disciplinary sanctions.

INDEPENDENT STUDENT WORK

All assignments and exams must be the product of the individual student's original efforts for this class. Collaboration is prohibited.

PROCEDURES FOR REVIEWING EXAMS

The instructor has not authorized distribution of old exams. Any possession of old exams is prohibited. The instructor may either conduct review sessions in class or may meet with a student to review his or her exam during office hours for two weeks following the exam (unless there is a shorter time period until the last scheduled office hour during the last week of classes.) Students may not review mid-term exams during final exam week. The possession of any exam other than during a review session constitutes unprofessional conduct.

REQUEST FOR TESTING ACCOMMODATIONS

The student must notify the instructor of any authorized testing accommodations at least one week prior to the exam. Once arrangements have been made, they cannot be changed without approval from the instructor and the office of student services.

The student must notify the instructor of any schedule conflicts during final exam week at least one week prior to the beginning of final exams. Appropriate paperwork must be completed and submitted to the office of student services. Once arrangements have been made, they cannot be changed without approval from the instructor and the office of student services.

COURSE OBJECTIVES:

1. To review basic chemistry, learn the chemical components of the cell, understanding how they are assembled to form the structure of cell membranes and organelles.
2. To understand structure and function of the phospholipid bilayer in cell membranes and know the details of the "fluid mosaic model" of membrane structure.
3. To learn the different functions of proteins and glycoproteins in the cell membrane.
4. To study different types of cell junctions involved in joining cells to form tissues.
5. To differentiate between active, passive and facilitated transport across membranes and to cite several examples of each, relating these examples to cellular functions such as nutrition or conduction of nerve impulses.
6. To understand that the energy source for active transport can be supplied either from ATP, or else from exergonic (passive) movement of another molecule or ion.
7. To know how rough and smooth endoplasmic reticulum differ from each other in structure and function, and to understand how membrane material circulates throughout the cell, forming parts of one organelle after another.
8. To understand form and function of the Golgi apparatus, not only as a "packaging station" but also in the completion of glycoproteins and formation of lysosomes.
9. To know the functions of lysosomes and understand the several ways in which the cell is protected from unwanted lysosomal digestive activity.
10. To have an appreciation of the possible origins of mitochondria and peroxisomes as foreign cells invading the cell and gradually developing a symbiosis.
11. To understand the dual role of peroxisomes, (a) in protecting the cell from free radical damage caused by unwanted oxidation, and (b) in using oxidation as a way to fight against invading pathogens and to oxidize toxins and drugs.
12. To define and understand metabolism, and related concepts such as anabolism, catabolism, exergonic and endergonic reactions, oxidation and reduction.
13. To appreciate how living cells thrive despite the laws of thermodynamics.
14. To be thoroughly familiar with the structure of ATP, defining its components, knowing the difference between the phosphoester bond and the high energy phosphoanhydride bonds, and understanding why the cell needs to make ATP.
15. To be familiar with glycolysis, the Krebs cycle and electron transport chain, understanding the purpose of these pathways in the economy of the cell, and knowing the difference between substrate level phosphorylation and oxidative phosphorylation.
16. To know that carbohydrates other than glucose can be used to fuel glycolysis and the Krebs cycle, but with prior modification first.
17. To be familiar with methods used to obtain energy from other nutrients, such as beta oxidation of fatty acids, and deamination of amino acids to yield carboxylic acids.
18. To understand why mitochondrial structure is well-suited to the role of carrying out the Krebs cycle, oxidative phosphorylation and beta oxidation of fatty acids.
19. To know the similarities and differences in structure and function, between microfilaments, microtubules and intermediate filaments. To understand how these structures are used for

- cell motility, in cell division, and to form the cytoskeleton and karyoskeleton.
20. To know the structure of DNA and RNA, naming all the purines and pyrimidines, to be familiar with the double helix of DNA, base-pairing of complementary strands, use of templates, antiparallel strand orientation, B-DNA and Z-DNA, and different levels of coiling of the DNA with histones, to form chromosomes.
 21. To be familiar with the structure and functions of the nucleus, nuclear membrane, chromosomes and nucleolus.
 22. To understand the differences between roles of the three types of RNA, and to be familiar with the use of the genetic code to code for amino acid sequence.
 23. To define transcription, translation and replication, knowing where, why and how each of the processes occurs in the cell.
 24. To understand the cell cycle, knowing about the need for DNA replication and the different phases of interphase.
 25. To know what happens during each of the four phases of mitosis.
 26. To describe meiosis, understanding why it differs from mitosis, and what happens to numbers of chromosomes and amount of nuclear material at each stage.
 27. To define: genome, diploid, haploid, genotype, phenotype.

COURSE OUTLINE:

I INTRODUCTION

1. Basic chemistry review
Marieb, pages 24-38 (Week 1)
2. Introduction to biochemistry
39-42 (Week 1)
3. Biochemistry of carbohydrates
43-45 (Week 2)
4. Biochemistry of proteins
47-53 (Week 2)
5. Biochemistry of lipids
45-47 (Week 3)

II CELL STRUCTURE AND FUNCTION

1. Membranes
60-65 (Week 3)
2. Transport across cell membranes
66-75 (Week 4)
3. Intracellular structures
75-84 (Week 4)

III CELLULAR RESPIRATION

1. Structure and function of ATP
55-56 (Week 5)
2. Glycolysis
861-863 (Week 5)
3. Krebs Cycle
863-868 (Week 6)

IV INFORMATION IN THE CELL

1. Biochemistry of nucleic acids
53-55 (Week 7)
2. The nucleus, chromosomes, nucleolus, cell cycle
84-89 (Week 8)
3. Transcription and translation
89-95 (Week 9)
4. Mitosis and meiosis
90-91; 961, 963, (Week 10)