

## SYLLABUS

**NAME OF COURSE:** Cell Physiology – PHYS-115

**LENGTH OF COURSE:** 3 units, 44 hours (4 hours theory session/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:** Basic Sciences Department

**REQUIRED TEXT:** Class notes.

**RECOMMENDED TEXTS:** Marieb EN. *Human Anatomy & Physiology*. 9<sup>th</sup> edition 2013, ISBN-10: 0321695984 | ISBN-13: 978-0321695987

Hardin j. Becker's *The World of the Cell*. 8<sup>th</sup> edition, 2012  
ISBN-10: 0321716027 | ISBN-13: 978-0321716026

Raven P. *Biology*. 9<sup>th</sup> edition, 2011 ISBN-10: 0073532223  
ISBN-13: 978-0073532226

All books on reserve in  
library

## **METHOD OF INSTRUCTION:**

Lectures and group study (Students' presentations) centered on topics related to the course contents; on-line and learning center (library) research; in-class reviews, reporting and assessments with instructor; access to CANVAS site for links to reference citations; in-class presentations; creation and maintenance of student portfolio of materials and resources. Each group is limited to FOUR students (the number of students/group is variable according to the total number of the class in each quarter); exceptions to work independently requires instructor approval.

## **STUDENTS' PRESENTATIONS:**

Student groups will select a topic of their choice related to the course contents to present to the class. As an example, students make a presentation based upon role of different types of protein in cell functions, mitochondria as power houses and its special mode of inheritance, adverse effects of high carbohydrate and fat diet, the chromosomal theory of inheritance, human genome project, cloning, gene therapy, etc. The presentations will be between 10-15 minutes. Peer-reviewed references must be provided and properly cited; if websites are cited then substantiating references for those sources from texts and the peer-reviewed literature must be provided.

The presentation must include but not limited to:

1. An introduction to the topic including a short historical background.
2. Review of literature related to the subject of presentation.
3. Recent advances in the field of the subject of presentation.
4. Clinical correlation/significance (if applicable).

Each group will upload their presentation to Canvas no later than one day following the date of your oral presentation to the class.

## **EVALUATION:**

- (1) MIDTERM EXAM (2) (Week 4 and 8): Midterm exams will cover all lectures studied up to the date of midterm exam. The exam may include any of the following types of questions: multiple choice questions (MCQs), modified essay questions (MEQs), extended matching questions (EMQs) and short essay questions (SAQs). (100Points)
- (2) ORAL PRESENTATIONS: Final presentations are scheduled in weeks 8-10 or 9-10 (Depends on student class size )and will be maximum 10 minutes in length, including set-up and Q&A. Attendance is required on the days of student presentations. Participation by attendees in discussion following the presentations is expected. Topics covered by students' presentations may be included in the final exam. (50 Points)

(4)FINAL EXAM (Week 11): Emphasis is taken from all lectures studied and the student groups' oral presentations. The exam may include any of the following types of questions: Multiple choice questions (MCQs), modified essay questions (MEQs), extended matching questions (EMQs) and short essay questions (SAQs). (100 Points)

Total = 350 Points

**GRADING:**

A = 4.0, 90 - 100%, good

C = 2.0, 70 - 79%, average

B = 3.0, 80 - 89%, above average

F = 0.0 student must repeat entire course

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

**Grades and the Grading System Final Grades** are available online through the CAMS student portal. If there are any questions on grading procedures, computation of grade point average, or the accuracy of the grade report, please contact the Registrar's Office or the Office of Academic Affairs. Grades will be reported and evaluation will be based on the Academic Policies, Procedures, & Services. Please refer to Evaluation Policy (**Policy ID: OAA.0007**)

In order to maintain **Satisfactory Academic Progress**, a student must maintain a 2.0 or better in each and every course. **Any grade less than a C must be remedied by repeating the class.** Please refer to Satisfactory Academic Progress (**Policy ID: OAA.0006**)

**Attendance:** Please refer to Attendance Policy (**Policy ID: OAA.0002**)

**Conduct and**

**Responsibilities:** Please refer to the Personal Conduct, Responsibility and Academic Responsibility Policy (**Policy ID: OAA.0003**)

**Make-up Exams:** Please refer to Make-up Assessment Policy (**Policy ID: OAA.0001**)

**Request for**

**Special Testing:** Please refer to Request for Special Testing (**Policy ID: OAA.0004**)

**Accommodation**

**for Students with Disabilities:**

If you have approved accommodations, please make an appointment to meet with your instructor as soon as possible. If you believe you require an accommodation, but do not have an approved accommodation letter, please see the Academic Counselor Lori Pino in the Office of Academic Affairs. Contact info: [Lpino@lifewest.edu](mailto:Lpino@lifewest.edu) or 510-780-4500 ext. 2061. Please refer to Service for Students with Disabilities Policy (**Policy ID: OAA.0005**)

**Electronic Course Management:**

**Canvas** is LCCW's Learning Management System (LMS). Canvas will be used throughout the quarter during this course. Lectures, reminders, and messages will be posted. In addition, documents such as the course syllabus and helpful information about the class project will be posted. Students are expected to check Canvas at least once a week in order to keep updated. The website address for Canvas is <https://lifewest.instructure.com/login/canvas> Please refer to the Educational Technologies Policy (**Policy ID: OAA.0009**)

## **COURSE OBJECTIVES:**

1. 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. Describe structure and function of the phospholipid bilayer in cell membranes and know the details of the "fluid mosaic model" of membrane structure.
3. Describe the different functions of proteins and glycoproteins in the cell membrane.
4. Describe different types of cell junctions involved in joining cells to form tissues.
5. 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. Explain 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. Describe how rough and smooth endoplasmic reticulum differs 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. Describe 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. Describe the functions of lysosomes and list the several ways in which the cell is protected from unwanted lysosomal digestive activity.
10. Define dual role of peroxisomes in protecting the cell from free radical damage caused by unwanted oxidation, and in using oxidation as a way to fight against invading pathogens and to oxidize toxins and drugs.
11. Define and describe metabolism, and related concepts such as anabolism, catabolism, exergonic and endergonic reactions, oxidation and reduction.
12. Describe the structure of ATP, defining its components, and explaining why the cell needs to make ATP.
13. Describe the reactions of glycolysis, the Krebs cycle and electron transport chain, explain the purpose of these pathways in the economy of the cell, and distinguish the difference between substrate level phosphorylation and oxidative phosphorylation.
14. Explain why mitochondrial structure is well-suited to the role of carrying out the Krebs cycle, oxidative phosphorylation and beta oxidation of fatty acids.
15. Compare the similarities and differences in structure and function, between microfilaments, microtubules and intermediate filaments. Explain how these structures are used for cell motility, in cell division, and to form the cytoskeleton and karyoskeleton.

16. Describe the structure of DNA and RNA, identifying 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.
17. Describe the structure and functions of the nucleus, nuclear membrane, chromosomes and nucleolus.
18. Compare between roles of the three types of RNA, and explain how the genetic code to code for amino acid sequence.
19. Define transcription, translation and replication; explain where, why and how each of the processes occurs in the cell.
20. Describe the cell cycle; explain the need for DNA replication and the different phases of interphase.
21. Describe the events of each phase of mitosis.
22. Describe meiosis, compare between mitosis and meiosis, and explain how the amount of DNA and the number of chromosomes are reduced in meiosis.
23. Define the terms: genome, diploid, haploid, genotype, and phenotype.

#### **STUDENT LEARNING OUTCOMES:**

1. Student will be able to describe the chemical structure of the cell and cell membrane.(PLO1,3,5,8)
2. Student will be able to explain the mechanisms of cellular transport, cellular junctions and signaling methods. (PLO 1,3,5,8)
3. Student will be able to describe cellular metabolism.(PLO 1,2,3,5,8)
4. Student will be able to describe the cellular organelles and their functions. (PLO1,2,3,6)
5. Student will be able to explain the mechanism of cell division, basic cellular genetics, protein synthesis and basic mechanisms of regulation at a genetic and protein level.(PLO1,2,3,5,6,8,10)

**Program Learning Outcomes (PLO):** Students graduating with a Doctor of Chiropractic degree will be proficient in the following:

1. **ASSESSMENT AND DIAGNOSIS:** An assessment and diagnosis requires developed clinical reasoning skills. Clinical reasoning consists of data gathering and interpretation, hypothesis generation and testing, and critical evaluation of diagnostic strategies. It is a dynamic process that occurs before, during, and after the collection of data through history, physical examination, imaging, laboratory tests and case-related clinical services.
2. **MANAGEMENT PLAN:** Management involves the development, implementation and documentation of a patient care plan for positively impacting a patient's health and well-being, including specific therapeutic goals and prognoses. It may include case follow-up, referral, and/or collaborative care.
3. **HEALTH PROMOTION AND DISEASE PREVENTION:** Health promotion and disease prevention requires an understanding and application of epidemiological principles regarding the nature and identification of health issues in diverse populations and recognizes the impact of biological, chemical, behavioral, structural, psychosocial and environmental factors on general health.
4. **COMMUNICATION AND RECORD KEEPING:** Effective communication includes oral, written and nonverbal skills with appropriate sensitivity, clarity and control for a wide range of healthcare related activities, to include patient care, professional communication, health education, and record keeping and reporting.
5. **PROFESSIONAL ETHICS AND JURISPRUDENCE:** Professionals comply with the law and exhibit ethical behavior.
6. **INFORMATION AND TECHNOLOGY LITERACY:** Information literacy is a set of abilities, including the use of technology, to locate, evaluate and integrate research and other types of evidence to manage patient care.
7. **CHIROPRACTIC ADJUSTMENT/MANIPULATION:** Doctors of chiropractic employ the adjustment/manipulation to

address joint and neurophysiologic dysfunction. The adjustment/manipulation is a precise procedure requiring the discrimination and identification of dysfunction, interpretation and application of clinical knowledge; and, the use of cognitive and psychomotor skills.

8. **INTERPROFESSIONAL EDUCATION:** Students have the knowledge, skills and values necessary to function as part of an inter-professional team to provide patient-centered collaborative care. Inter-professional teamwork may be demonstrated in didactic, clinical or simulated learning environments.
9. **BUSINESS:** Assessing personal skills and attributes, developing leadership skills, leveraging talents and strengths that provide an achievable expectation for graduate success. Adopting a systems-based approach to business operations. Networking with practitioners in associated fields with chiropractic, alternative medicine and allopathic medicine. Experiencing and acquiring the hard business skills required to open and operate an on-going business concern. Participating in practical, real time events that promote business building and quantifiable marketing research outcomes
10. **PHILOSOPHY:** Demonstrates an ability to incorporate a philosophically based Chiropractic paradigm in approach to patient care. Demonstrates an understanding of both traditional and contemporary Chiropractic philosophic concepts and principles. Demonstrates an understanding of the concepts of philosophy, science, and art in chiropractic principles and their importance to chiropractic practice.