King Fahd University of Petroleum & Minerals
College of Chemicals and Materials, Bioengineering Department
BIOE 337 Applied Physiology (3-0-3)
Syllabus -Term 25A

Catalog Course Description: Introduction to physiology, nervous, sensory, muscular, respiratory, renal, and cardiovascular systems, metabolic energy and homeostasis, blood flow regulation, digestive, endocrine, immune and reproductive systems, bioengineering applications of human physiology.

Course Prerequisite: BIOE 201 **Co-requisite:** N/A

Textbook: Title: Biology (from chapter 41), Authors: Raven, Johnson, Losos, Masen, Duncan. Publisher: Mc Graw Hill, 13th Edition, 2023..

Instructor: Prof. Alexis Nzila /B7-R120-3/ Phone: 7716/ alexisnzila@kfupm.edu.sa

Office Hours: U-T: 11 AM-12 PM; M: 13-14 PM and by appointment

Course Learning Outcome

1. Describe the structure and function of major human organ systems
2. Describe the mechanisms of homeostasis and the role of hormones/neuro-hormones in regulating physiological processes
3. Identify and evaluate resources to learn independently
4. Conduct thorough and relevant literature surveys using appropriate methods/tools

Important Notes:

- The students may use any AI tool provided they highlight the parts written by this AI tool. A proper citation for the exact name and version of the tool should be given.
- Each student must be vigilant about academic integrity at all times.
- Only official excuses obtained from the Deanship of Students Affairs are accepted.
- If a student reaches more than 20% of unexcused absences (10 absences of the 45-lecture class or 7 absences of the 30-lecture class), a DN grade will be issued.
- For every unexcused absence, 0.5 points will be deducted from the attendance marks.
- Excuses for officially authorized absences must be presented no later than one week following the resumption of class attendance.
- No makeup will be accommodated for missed quizzes or exams.
- Late assignments will not be accepted.
- A student caught cheating in any of the assignments will get ZERO in all assignments and other proper action will be taken that may eventually lead to the transfer of the student to student affairs.
- The instructor reserves the right to modify the course outline and policies mentioned in this syllabus at any time during the semester.
- Refer to the registrar website for the academic calendar and important deadlines: https://registrar.kfupm.edu.sa/academic-calendar/current-semester/

Week	List of Topics
1-2	**Introduction to Physiology:** Physiology is an Integrated Science, Tissue and organ organization, Integration, and Homeostasis
3-4	**Nervous Systems:** Overview of Physiology & Neural Function: Restoration and Repair, Neurons and Neuronal Signaling, Ion Channels and Resting Membrane Potentials, Resting Membrane Potential, the Passive Propagation of Electrical Signals, Action Potentials and Active Conductances, Synaptic Potentials and Intercellular Communication
5	**Sensory Systems:** Overview of CNS, PNS, and Sensory Systems; Somatosensory Sensory Systems
6	**Somatic Neuromuscular Systems:** Skeletal Muscle, Neural Control of Movement: Overview, Spinal Reflexes, Neural Control of Movement **Smooth Muscle**, Autonomic Nervous System, ANS 2: Control of Target Tissues
7	**Bone and skeleton**: Microscopic structure, skull and skeleton,
8	**Cardiovascular System & Circulation:** Electrophysiology, Overview of CV System and Heart Anatomy, Electrophysiology of Cardiac Cells, Electrical Propagation in Cardiac Tissues, Whole Heart Electrophysiology, Regulation of Heart Rate, Cardiac Excitation-Contraction Coupling, Cardiac Cycle and the Pumping Heart, Regulation of Cardiac Function, The Electrocardiogram (ECG)
9	**Renal (Kidney) System:** Kidneys Overview and Filtration, Reabsorption & Secretion; Fluid and Osmotic Balance; Artificial Kidney
10	**Respiratory System:** Respiration Overview & Mechanics, Gas Laws & Ventilation, Gas Exchange & Transport
11	**Digestive System:** Anatomy of the digestive system, regulation of GI function, cephalic, gastric, and intestinal phases, immune functions of the GI tract
12-13	**Endocrine System- Metabolism and Energy balance:** Classification of hormones, control of hormone release, hormone interaction, endocrine pathologies, and hormone evolution; Fed-state metabolism, fasted-state metabolism, homeostatic control of metabolism
13-14	**Immune System:** Anatomy of the immune system, development of immune cells, antigen-presenting and recognition molecules, pathogens of the human body, integrated immune response, neuro-endocrine-immune interaction
15	**Reproductive System:** Sex determination, basic patterns of reproduction, male and female reproduction, procreation, pregnancy and parturition, growth, and aging

Grading Policy

- Class activities: **30 %**
  - Quizzes = **10 %**
  - Home assignment **7.5 %**
  - Term paper **7.5%**
  - Participation **2.5 %**
  - Attendance **2.5 %** Total = **100%**
- First Major: **20 %** [Thursday 26th September, from 18H00]
- Second Major: **20 %** [Thursday 30th October, from 18H00]
- Final: **30 %** [TBA by the registrar]

The final exam will be comprehensive