King Saud University جامعة الملك سعود



College of Medicineكلية الطب

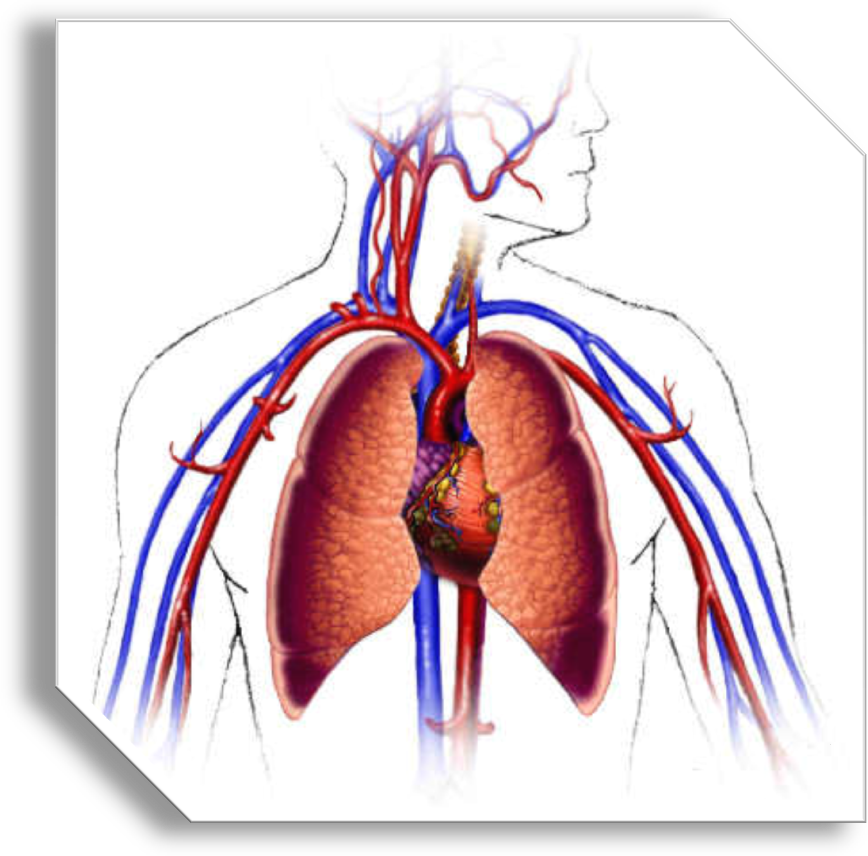
قسم وظائف الأعَضاء

Department of Physiology

PHL 215 males

FIRST SEMESTER

(1434- 1435)



PHYSIOLOGY CURRICULUM

**THE DEPARTMENT**

**CHAIRMAN**

# Dr. MOHAMMAD aL-zOGHAIBI

**COURSE DIRECTOR**

# Dr. MOHAMMAD aL-zOGHAIBI

**COURSE ORGANIZER**

DR. SALAH AHMED ELTAYEB

# Staff Members

|  |  |
| --- | --- |
| * **Prof. Sultan Ayub Meo** * **Dr. Taha Sadig** * **Dr. Syed Shahid Habib** * **Dr. Khalid Al Regaiey** | * **Dr. Abdulrhman Al-Hiwaikan** * **Dr. Mustafa Kamal** * **Dr. Aurangzeb Taj Halepota** |

**LAB STAFF**

|  |  |
| --- | --- |
| Mr. Timhar Amlih  Mr. Jaruni Majod  Mr. James Chu | Mr. Sabirin |
| **COURSE Textbook:** |  |
| Physiology  Linda S. Costa  4th Edition |  |

Foreword

This booklet contains the whole semester program, for PHL - 215 for the year (1434-1435), including the course schedule, lecture contents and details of all examinations for the academic year 1434- 1435(2013 - 2014). You are advised to always keep this booklet with you for reference.

STUDENTS ARE ADVISED TO:

Read the concerned topic from your textbook Physiology

Linda S. Costa 4th Edition for each lecture before coming to class.

* After lectures check whether you have achieved the intended instructional objective.
* Attend all lectures, practical classes and tutorials; do not miss any quizzes. One of the objectives of quizzes is to signal to the student, at each stage, whether he is satisfactorily running along with the program or whether he is lagging behind.
* Actively participate in all classes.
* Do not depend on handouts, but develop an attitude of self-learning.

CHAIRMAN

DEPARTMENT of physiology

**OBJECTIVES OF THE COURSE:**

This course is intended to help the student to:

* Acquire a comprehensive and balanced understanding of physiology from the cellular and molecular to the whole organism level.
* Understand the physiological mechanisms underlying the normal functioning of various Systems of the human body, from applied and practical viewpoints.
* Appreciate the logical consequences of derangement of these systems by understanding the functional abnormalities that occur in various lesions which can involve these systems.
* Develop the ability of deductive thinking, analysis and data interpretation.
* Develop academic competence at the highest level attainable leading them to the forefront of current knowledge in physiology.
* Develop the capacity for individual work and teamwork.

**INSTRUCTIONAL METHODS:**

The instructional methods employed comprise lectures, tutorials and student activities (seminars).

**Attendance:**

Attendance is compulsory in all classes. The student is encouraged to actively participate in all activities.

**Examinations:**

There will be two continuous assessment exams, two take home assignment and a final exam at the end of the year.

**Total Marks: 100**

* 1stCAT = 25 marks Continuous
* Take home assignments = 10 marks Assessment
* 2ndCAT = 25 marks
* **Final Examination = 40 marks**

**N.B:** The final examination **INCLUDES** all topics covered during whole Term.

**Summary of marks distribution:**

* Continuous Assessments = 60 marks
  + Final Examination = 40 marks

**Grading:**

The minimum passing marks are 60 % of the total course performance.

**Marks Grades التقدير**

95 – 100 A+ **أ+**

**90 – 94 A أ**

**85 – 89 B+ ب+**

**80 – 84 B ب**

**75 – 79 C+ ج+**

**70 – 74 C ج**

**65 – 69 D+ د+**

**60 – 64 D د**

**Lectures** (3 Hours Every Week)**:**

|  |  |  |
| --- | --- | --- |
| **DAYS** | **TIME** | **LECTURE THEATER** |
| Monday | 11:00-11:50 am | 115-2A |
| Wednesday | 11:00-11:50 am | 115-2A |
| Thursday | 11:00-11:50 am | 115-2A |

**EXAMINATIONS**:

|  |  |  |  |
| --- | --- | --- | --- |
| **NAME OF EXAM** | **MARKS** | **DAY &**  **DATE** | **WEEK** |
| CAT 1 | 25 | **Thursday: 05.12.1434**  10.10.2013 | 6 |
| Assignment 1 | 5 |  | 6or7 |
| CAT 2 | 25 | **Thursday:25.01.1435** 28.11.2013 | 12 |
| Assignment 2 | 5 |  | 12or13 |
| Final Examination | 40 | Sunday: 11.03.1435 |  |

**Course CONTENT**(6 Units):

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr.**  **No.** | **Unit** | Teacher | **No. of Lect** |
| 1 | Introduction and Cell Physiology; Body Fluids & Membrane Transport | Dr. Salah Eltayeb | 3 |
| 2 | Nerve & Muscle Physiology | Dr.Khalid Alregaiey | 6 |
| 3 | Blood Physiology | Dr. Salah Eltayeb | 5 |
| 4 | Autonomic Nervous System | Dr. Abdulrhman Alhiwaikan | 6 |
| 5 | Heart and Circulation | Dr. Khalid Al Regaiey | 10 |
| 6 | Respiratory System | Dr. Abdul Majeed Al Drees | 6 |

**LECTURE OBJECTIVES:**

The Lecture Program has been carefully designed to present the important features of human physiology in a clear and concise manner. A portion of the Lectures will be devoted for recent and applied aspect of physiology. This will help students to understand the basic mechanism involved and be able to explain some clinical problems.

## LECTURES

**The following topics will be covered:**

***Introduction, Body Fluids, Blood, Autonomic Nervous System, Muscle and Nerve, Cardiovascular System & Respiratory system****.*

1. During introductory classes, the students will learn about cell biology, body fluids and the mechanisms of transport across the cell membrane.
2. Blood physiology teaching will include details about the formed elements, basic immunity and body defense, blood groups, blood transfusion and the mechanisms of Hemostasis.
3. Autonomic nervous system will include anatomical organization and the effects of sympathetic and parasympathetic stimulation on different systems.
4. Lectures on muscle and nerve will help students to understand the basic electrophysiology e.g., membrane potentials, action potentials. The molecular basis of muscle contraction will also be covered in detail.
5. Cardiovascular system will be covered in five parts namely heart as a pump, vascular system hemodynamics, regional circulation and pathophysiology of few abnormal states e.g. hypotension, shock and cardiac failure.
6. Respiratory system lectures will discuss the relevant anatomical aspects and their role in respiration. Lectures will cover physiology of gases exchange and transport.

**Lecture Objectives**

**INTRODUCTION TO PHYSIOLOGY**

**LECTURE 1:**

**At the end of this session, the students should be able to:**

1. Appreciate the level of development of human being from cells to tissues to organs and organ systems and their co-relations to physiological functions.
2. Identify and describe the internal environment.
3. Identify and describe the homeostasis control be physiological processes.

**LECTURE 2: Cell membrane structure and transport across cell membrane.**

**At the end of this session, the students should be able to:**

1. Describe the fluid mosaic model of membrane structure and function.
2. Define permeability and list factors influencing permeability.
3. Identify and describe carried-mediated transport processes: Primary active transport, secondary active transport, facilitates diffusion.

**LECTURE 3: Body fluids and Electrolytes**

**At the end of this session, the students should be able to:**

1. Identify and describe daily intake and output of water and maintenance of water balance.
2. List and describe of body fluid compartments as intra-cellular fluid (ICF) Extra-cellular fluid (ECF), interstitial fluid, trans-cellular fluid and total body water.
3. Describe the composition of each fluid compartment, in terms of volume and ions and represent them in graphic forms.
4. Physiology factor: age, sex, adipose tissue, etc. Pathological factors: Dehydration, fluid infusion.

**LECTURE OBJECTIVES**

**NERVE & MUSCLE**

**LECTURE 1: Neurons and (RMP)**

By the end of this lecture, the student should be able to:

1. Identify and describe structural components of neurons and ascribe functions.
2. Identify and describe in equal or unequal distribution of ions across the cell membrane creating concentration and electrical gradients.
3. Classify neurons by using letters or numbers on basis of diameters and velocity.
4. RESTING MEMBRANE POTENTIAL (RMP)
5. Identify describe genesis of resting membrane potential (RMP) and the roles of ions channels, Na+ - K+ pump..
6. Appreciate the effect of changes in ionic composition and/or permeability on resting membrane potential.

**LECTURE 2: Action Potential (AP)**

1. Define and draw action potential giving membrane potential in mV and time course in m.sec and label all components such as latency, threshold (firing level), spike overshoot, after depolarization and after hyper-polarization.
2. Account the above changes in excitability in terms of conductance changes of Na+ and K+.
3. Correlate the conductance changes with opening (activation) or closing (inactivation) of relevant gates.
4. Distinguish between a local potential and an action potential.

**Lecture 3: Properties of nerve fibers**

At the end of this lecture, the student should be able to.

1. Describe the highest excitability of nerve cell compared to all other excitable cells in terms of rapid change over of selected ions across the membrane.
2. Define absolute and relative refractory period and give their ionic basis.
3. Describe differences in the propagation of action potential in myelinated and unmyelinated nerve fibers.
4. Appreciate effects of local anesthetic, cooling, hypoxia, acidosis and alkalosis on nerve conduction.

**Lecture 4: Neuromuscular transmission**

At the end of this lecture, the student should be able to.

1. Describe the pre junction and post-junction event in sequence in the neuromuscular transmission and appreciate special roles of transmitter, receptor, esterase and calcium.
2. List neuromuscular blocking agents and state site and action.
3. Identify the pathogenesis of myasthenia gravis and appreciate the rationality.

**Lecture 5: Molecular basis of muscle contraction:**

By the end of this lecture, the student should be able to:

1. Classify muscles on histological and functional basis.
2. Describe microscopic and ultramicroscopic structures.
3. Describe isometric and isotonic contraction.
4. Response to exercise and oxygen debt and muscle fatigue.
5. Define motor unit
6. Describe steps in sequence in excitation–contraction coupling
7. Describes sliding filaments theory of muscle contraction.
8. Describe molecular structures of muscle proteins and their arrangements at resting phase, contraction and relaxation phase.

**Lecture 6: Smooth and cardiac muscles:**

By the end of this lecture, the student should be able to make comparison of the properties of skeletal, cardiac and smooth muscles.

**LECTURE OBJECTIVES**

**BLOOD**

**LECTURE 1:** **Composition and function of blood**

At the end of this session, the students should be able to describe:

* 1. Functions of blood
  2. Composition of blood
  3. Plasma, it’s content and function

**LECTURE 2:** **RBC & Anemia**

At the end of this session, the students should be able to describe:

1. RBC (Erythrocytes)
2. RBC formation (Erythropoiesis)
3. Control of Erythropoiesis, iron metabolism
4. Hemoglobin
5. ANAEMIA

**LECTURE 3:** **White Blood Cells & Immunity**

At the end of this session, the students should be able to describe:

1. Classification of WHITE BLOOD CELLS and their counts
2. Formation of leucocytes
3. Abnormal counts: leucopenia, Leukocytosis, leukemia
4. Functions of leucocytes
5. Immunity
   * Basis of immunity: Immune system and Immunocompetent cells
   * Types of immunity: Innate immunity, Acquired immunity
   * Immune response (primary and secondary)
   * Humoral immunity and Cellular immunity
   * Clinical application of immunity e.g. AIDS

**LECTURE 4: Platelets &Haemostasis**

At the end of this session, the students should be able to describe:

1. Platelets: their count, physiology and function
2. Definition of Haemostasis
3. Mechanisms which prevents bleeding from cut wound

* Vasoconstriction, Platelets Plug, Blood Clot formation (Intrinsic Pathway & Extrinsic pathway)

1. Fibrinolysis system
2. Anticoagulants
3. Bleeding and thrombotic disorders

**LECTURE 5: Blood groups and blood transfusion**

At the end of this session, the students should be able to describe:

1. ABO blood group system

* RBC Agglutinogen, Plasma agglutinins, Inheritance of blood groups

2. Rh blood groups and its application in Hemolytic disease of the newborn

3. Blood transfusion

**LECTURE OBJECTIVES**

**ANS**

**LECTURE 1**

At the end of this lecture the students should be able to:

* Understand the main differences between the somatic and autonomic nervous system.
* Describe organization of Autonomic Nervous System

**LECTURE 2**

At the end of this lecture the students should be able to:

* Somatic and Autonomic Reflexes
* Contrast the sympathetic and parasympathetic branches of the autonomic nervous system, based on:
  + Spinal cord division of origin, length of pre-ganglionic and post-ganglionic neurons, neurotransmitters and receptors at the ganglionic and target organ synapses.

**LECTURE 3**

At the end of this lecture, the student should be able to:

List the sensory input of the ANS, and the responses of different organs in the body to sympathetic and parasympathetic stimulation

**LECTURE 4**

At the end of this lecture, the student should be able to:

List the major central nervous system control centers of the ANS

**LECTURE 5**

At the end of this lecture, the student should be able to:

Describe the functional effects of normal and abnormal ANS activity or lack of activity.

Effects of various drugs on the activity of the ANS.

**LECTURE OBJECTIVES**

**CVS**

**LECTURE 1: Heart Introduction**

* Functional anatomy of the heart
* Functions of different components of the vascular system
* Pulmonary and systemic circulation

**LECTURE 2: Properties of the cardiac muscle:**

* Excitability and the electrical properties of the heart
* Definition/ mechanism and factors affecting excitability
* Conductivity
* Rhythmicity:
* Starling's law

**LECTURE 3:  Cardiac Cycle I**

* Definition and different phases of the cardiac cycle
* Pressure changes during the cycle (atrial, ventricular, aortic and pulmonary)

**LECTURE 4:  Cardiac Cycle II**

* Volume changes during the cycle
* Heart sounds and murmur

**LECTURE 5:  Electrocardiogram (ECG)**

* Genesis and understanding of the normal ECG pattern
* Interpretation and information derived from normal ECG

**LECTURE 6:  Blood Vessels Circulation**

* Peripheral resistance (diameters of arterioles and blood viscosity) and elasticity of aorta and large blood vessels
* Physiological variations affecting blood pressure e.g. age, sex, emotion, race, respiratory movements, exercise, gravity, posture and sleep
* Factors that determine the normal B.P. e.g. heart rate, stroke Volume, blood volume

**LECTURE 7:  Cardiac Output & Venous Return**

* Cardiac output:
* Definition
* Factors controlling cardiac output: extrinsic control (nervous and chemical)
* Preload, after-load and contractility: intrinsic control.
* Cardiac function and systemic function curves and their importance
* Venous circulation and factors affecting venous return
* Venous return curves: Jugular venous pulse (causes and clinical importance).

**LECTURE 8:  Regulation of Blood Pressure I**

* Nervous regulation of the cardiovascular system
* Short term regulation of arterial pressure  by Baroreceptors and chemoreceptors

**LECTURE 9 :  Regulation of Blood Pressure II**

* Intermediate regulatory mechanisms of arterial Pressure
* Long term regulatory mechanism

**LECTURE 10:  Applied CVS Physiology**

* Coronary Circulation
* Hypertension

**LECTURE 11: Applied CVS Physiology**

* Circulatory Shock

LECTURE OBJECTIVES

**RESPIRATORY SYSTEM.**

**LECTURE 1: Functions and Organization of the Respiratory System**

By the end of this lecture the Students should be able to: -

1- Understand the difference between internal and external respiration.

2- Describe the structures and functions of the conductive and respiratory zones.

3- Understand functions of the respiratory system, including non- respiratory functions, like clearance mechanism by mucus and cilia, production of surfactant and converting enzyme.

**LECTURE 2: Mechanics of breathing**

1- List the muscles of respiration and describe their roles during inspiration and expiration.

2- Understand the importance of the following pressures in respiration:

Atmospheric, alveolar, intrapleural, and Transpulmonary

3- Describe the pressure and volume relationships in a single respiratory cycle.

4- Define lung compliance and list the determinants of compliance.

5- Describe the physiological significance of surfactant and provide an example of abnormal lung function due to a deficiency of surfactant.

6- Define the various Lung Volumes and capacities and provide typical values for each.

**LECTURE 3: Gas Transfer**

1- Define partial pressure of a gas.

5- Describe the components of the alveolar-capillary membrane (i.e., what does a molecule of gas pass through).

6- Knew the various factors determining gas transfer: -

Surface area, thickness, partial pressure difference, and diffusion coefficient of gas

1. State the partial pressures of oxygen and Carbon dioxide in the atmosphere, alveolar gas, at the end of the pulmonary capillary, in systemic capillaries, and at the beginning of a pulmonary capillary.

**LECTURE 4: Oxygen & Carbon dioxide Transport**

By the end of this lecture the students should be able to: -

1- Understand the forms of oxygen transport in the blood, the importance of each form and,

2- Describe the relationship between PO2 and % saturation of hemoglobin with oxygen, and the significance of the shape of this relationship

3- Describe the three forms of Carbon dioxide that are transported in the blood, and the chloride shift.

**LECTURE 5: Regulation of Respiration**

Regulatory centers of respiration

Mechanism of regulation

PHL – 215 Lecture Schedule

**Time: 11- 11:50 Place Hall no. 2A-115**

|  |  |  |
| --- | --- | --- |
| **WEEK –1** | | |
| CELL & BODY FLUID DR.SALAH | | |
| MON | **26.10.1434**  02.09.2013 | INTRODUCTION TO PHYSIOLOGY COURSE |
| WED | **28.10.1434**  04.09.2013 | LECT - 1 |
| THU | **29.10.1434**  05.09.2013 | LECT - 2 |
| **WEEK - 2** | | |
| **NERVE & MUSCLE DR.KHALID** | | |
| MON | **03.11.1434**  09.09.2013 | **LECT - 1** |
| WED | **05.11.1434**  11.09.2013 | **LECT - 2** |
| THU | **06.11.1434**  12.09.2013 | LECT - 3 |
| **WEEK – 3** | | |
| MON | **10.11.1434**  16.09.2013 | **LECT - 4** |
| WED | **12.11.1434**  18.09.2013 | LECT - 5 |
| THU | **13.11.1434**  19.09.2013 | **LECT - 6** |
| **WEEK - 4** | | |
| **BLOOD DR. SALAH** | | |
| MON | **17.11.1434**  23.09.2013 | **LECT - 1** |
| WED | **19.11.1434**  25.09.2013 | **LECT - 2** |
| THU | **20.11.1434**  26.09.2013 | **LECT - 3** |
| **WEEK - 5** | | |
| MON | **24.11.1434**  30.09.2013 | **LECT - 4** |
| WED | **26.11.1434**  02.10.2013 | LECT - 5 |
| AUTONOMIC NERVOUS SYSTEM DR. AL-OTAIBI | | |
| THU | **27.11.1434**  03.10.2013 | **LECT - 1** |
| **WEEK - 6** | | |
| MON | **02.12.1434**  07.10.2013 | LECT - 2 |
| WED | **04.12.1434**  09.10.2013 | **LECT - 3** |
| THU | **05.12.1434**  10.10.2013 | **CAT 1** |
| Eid Holidays from 6/12/1434 to 15/12/1434 | | |
| **WEEK - 7** | | |
| MON | **16.12.1434**  21.10.2013 | **LECT – 4** |
| WED | **18.12.1434**  23.10.2013 | LECT - 5 |
| THU | **19.12.1434**  24.10.2013 | LECT - 6 |
| CARDIOVASCULAR SYSTEM(CVS) DR. KHALID | | |
| **WEEK - 8** | | |
| MON | **23.12.1434**  28.10.2013 | **LECT – 1** |
|  | | |
| WED | **25.12.1434**  30.10.2013 | **LECT – 2** |
| THU | **26.12.1434**  31.10.2013 | **LECT – 3** |
| **WEEK - 9** | | |
| MON | **01.01.1435**  04.11.2013 | **LECT – 4** |
| WED | **03.01.1435**  06.11.2013 | **LECT – 5** |
| THU | **04.01.1435**  07.11.2013 | **LECT – 6** |
| **WEEK – 10** | | |
| MON | **08.01.1435**  11.11.2013 | **LECT - 7** |
| WED | **10.01.1435**  13.11.2013 | **LECT - 8** |
| THU | **11.01.1435**  14.11.2013 | **LECT - 9** |
| **WEEK – 11** | | |
| MON | **15.01.1435**  18.11.2013 | **LECT - 10** |
| WED | **17.01.1435**  20.11.2013 | **LECT – 11** |
| **RESPIRATORY SYSTEM DR: ABDULMAJEED** | | |
| THU | **18.01.1435**  21.11.2013 | **LECT - 1** |
| **WEEK – 12** | | |
| MON | **22.01.1435**  25.11.2013 | **LECT - 2** |
| WED | **24.01.1435**  27.11.2013 | **LECT - 3** |
| THU | **25.01.1435**  28.11.2013 | **CAT II** |
| **WEEK – 13** | | |
| MON | **29.01.1435**  02.12.2013 | **LECT - 4** |
| WED | **01.02.1435**  04.12.2013 | **LECT - 5** |
| THU | **02.02.1435**  05.12.2013 | **LECT - 6** |

**DEPARTMENT OF PHYSIOLOGY**

**FACULTY CONTACT DETAILS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Staff Dr. | Room # | Ext # | email |
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| 2 | Dr. Abdulmajeed Al-Drees | 05-3146 | 7-1615 | physlogy@ksu.edu.sa |
| 4 | Dr. Khalid Al Regaiey | 04-2109 | 7-1040 | kalregai@gmail.com |
| 7 | Dr. Salah Ahmed Eltayeb | 05-3145 | 7-1608 | Salah.elmalik2@gmail.com |
| 8 | Mr. Idrees Zakary (Secretary) | 04-2127 | 7-0848 | ae\_1397@hotmail.com |