King Saud University جامعة الملك سعود

College of Medicine كلية الطب

قسم وظائف الأعَضاء

Department of Physiology

PHL 226 males

semester-II 2013 - 2014(1434-1435)

PHYSIOLOGY CURRICULUM

**DEPARTMENT STAFF**

**CHAIRMAN**

**Dr. MOHAMMAD AL-ZOGHAIBI**

**COURSE DIRECTOR**

 **Dr. KHALID AL- REGAIEY**

**COURSE ORGANIZER**

**DR. SALAH AHMED ELTAYEB**

**Staff Members**

|  |  |
| --- | --- |
| * **Prof.Sultan Ayoub Meo**
* **Prof. Syed Shahid Habib**
* **Dr. Taha Sadig**
* **Dr. Adulmajeed Al-Drees**
* **Dr. Abdulrhman Alhwaikan**
* **Dr. Mohammad Al-Otaibi**
 | * **Dr. Mustafa Kamal**
* **Dr. Aurangzeb T Halepota**
 |

**ATTENDANCE COORDINATOR: Mr. JAMES**

**LAB. STAFF**

|  |  |
| --- | --- |
| Mr. Mohammad Ahmad HamidMr. Lugman Gasm Al-SayedMr. Sahipa Sabturani Sabirin  | Mr. Timhar AmlihMr. Jaruni MajodMr. James |
| **COURSE Textbook:**  |  |
| Physiology Linda S. Costa4th Edition |  |

Foreword:

This booklet contains the whole semester program, for PHL - 226 SEMESTER II (1434 - 1435), including the course schedule, lecture contents and details of all examinations for the academic year. You are advised to keep this booklet always 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 & exams.
* 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, and student activities (seminars, Assignments).

**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 and a final exam at the end of the year.

**Total Marks: 100**

* 1st CAT = 25 marks
* 2nd CAT = 25 marks
* TWO ASSIGNMENTS 5 MARKS FOR EACH **=** 10 marks
* FINAL EXAM = 40 MARKS

N. B.: The final examination is comprehensive for lecture 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**

95 – 100 A+

90 – 94 A

85 – 89 B+

80 – 84 B

75 – 79 C+

70 – 74 C

65 – 69 D+

 60 – 64 D

**Lectures** (2 Hours Every Week)**:**

|  |  |  |
| --- | --- | --- |
| **DAYS** | **TIME** | **LECTURE THEATER** |
| SUNDAY | 08:00 TO 09:00 AM | **A 115** |
| TUESDAY | 08:00 TO 09:00 AM | **A 115** |

**EXAMINATIONS**:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NAME OF EXAM** | **MARKS** | **DAY** | **DATE** | **WEEK** |
| **CAT 1** | 25 | Sunday: **15.05.1435**16.03.2014 | 8 |
| **CAT 2** | 25 | Sunday: **05.07.1435**04.05.2014 | 14 |
| **Final Examination** | 40 | Wed:**22/07/1435** | 16 |

**Course CONTENT** (5 Units):

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr.No** | **Unit** | Teacher | **No. of Lect** |
| 1 | GIT | Dr. Mohmmad al-zoghaibi  | 6 |
| 2 | Endocrinology | Dr. Mohammad Al-Otaibi | 5 |
| 3 | Reproduction | Dr. Khalid Al Regaiey | 2 |
| 4 | Renal System &Acid Base balance | Dr. Khalid Al Regaiey | 5 |
| 5 | Nervous System | Dr. Salah Eltayeb | 7 |

**LECTURE OBJECTIVES:**

The Lecture Programme 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:**

*GIT, Endocrine, Reproduction Renal system & Acid Base Balance, Nervous system.*

1. Gastrointestinal teaching will enable the students to understand the complex processes occurring along the gastrointestinal tract, secretory, absorptive and motility. Emphasis is made on the mechanisms by which these functions are controlled
2. Endocrine system teaching will include glands like pituitary, thyroid, parathyroid, adrenal and pancreas. Hormonal actions, regulation of secretion and disorder of function of each gland will be discussed.
3. Reproductive system will be taught so that the students will be able to understand sex determination and differentiation, menstrual cycle, pregnancy and the action of hormones in both the sexes.

1. Kidneys and excretory system lectures will cover the functional anatomy, filtration, reabsorption and secretion. The concept of clearance and urine concentration mechanism will be explained.
2. Acid base balance regulation by the body will be explained and abnormalities in the form of acidosis and alkalosis will be discussed.
3. Lectures in Nervous system will cover the functional anatomy and physiological basis of nervous system functioning

**GIT** **INSTRUCTIONAL OBJECTIVES**

**Lecture 1: General organization and functions of the G. I. T**

 At the end of 'this session 'the student should be able to:

a- Describe the overall role of the G.I. system with respect to the whole body balance water, electrolytes, carbohydrates, fats and proteins; include the processes of digestion, secretion, motility and absorption, in respect of its contribution to maintenance of internal environment of cells.

b- Identify the characteristic features and functional significance of ANS innervation of the tract. And the role of the gut hormones in controlling G.I. T. functions.

c- Identify the basic types of movements in the GIT, their characteristics and their significance.

d- Describe the blood flow to the tract and its functions.

e- Predict the changes from normal physiology that might occur with anatomical Iesions at any level of the tract and with interruption of any of the normal functions.

**Lecture 2: Mastication (chewing) and salivary secretion.**

At the end of this session the student should be able to:

a- Define mastication.

b- Identify and describe the control of mastication and its importance

d- Identify and list the salivary glands

e:- List the secretory products in saliva and define their functions

f- Describe the neural and reflex control of salivary secretion.

9- List some disease states that can affect salivary secretion, e.g. xerostomia

 (Congenital absence of salivation)

**Lecture 3: Deglutition (swallowing)**

At the end of this session the student should be able to:

a- Describe the innervations and muscle types of the esophagus and oropharynx.

b- Describe the sequence of events in a swallow and appreciate their physiological significance.

c- Define the differences between a primary and a secondary swallow (peristalsis).

d- Explain the relationship between the resting esophageal pressure and atmospheric pressure at different levels in the esophagus and upper stomach.

e- Describe the origin and consequence of a high basal tone found in the upper esophageal sphincter and lower esophageal sphincter.

f- Explain how gastric reflux occurs.

g- Appreciate some clinical co-relate *e.g.*

 - Ingestion of corrosive agents can cause esophageal strictures.

 - Incompetent lower esophageal sphincter can cause esophageal stricture.

**Lecture 4**: **The stomach -Gastric secretions**

At the end of this session the student should be able to:

a- Describe the anatomy of the stomach in the term of regions, secretory epithelium and individual types of secretory cells.

b- List the secretions of the stomach, their cells of origin and their function.

c- Discuss the various factors that stimulate and inhibit the secretory activity of the parietal cells.

d- Discuss the long and short neural reflexes that influence HCI secretion.

e- Discuss the hormonal influence on HCI secretion

f- Describe the secretion of HCI in terms of the three phases and appreciate the rationale of treatment of peptic ulcer.

g- describe the control of the secretion of pepsinogen.

h- Discuss the potentially damaging effects of HCl on gastric and esophageal mucosa.

i- Describe the effects of the absence of parietal cells.

j- Describe some of the causes of ulcer formation in the stomach and small intestine.

**Lecture 5: (Gastric motility & Gastric emptying -vomiting)**

 At the end of this session the student should be able to:

a- Describe the innervation of the stomach and the sphincters.

b- Describe various regions of the stomach and the electrical and contractile activity of each.

c- Define the basic rate of contractions.

d- Describe the progression of contractile waves *across* the stomach and correlate this with the effects on the contents of the stomach.

e. Discuss the Role of the pylorus and the influences on its contractile state.

f- Discuss the factors that influence and control gastric emptying.

g- Describe the characteristics of the migrating motor complex (MMC), when it occurs, its function and how it is controlled

h- List the possible causes of vomiting.

i- Describe the neural control of vomiting reflex.

j- Describe the process of vomiting and appreciate clinical correlates.

k- Describe how examination of the vomitus may provide clues about the causes.

1- Predict the systemic physiological changes that could occur as a result of vomiting.

m- Describe gastric function tests.

**Lecture 6:** **Hepatobiliary function**

At the end of this session the student should be able to:

a- List the main functions of the liver.

b- Describe the anatomic structure of the liver in terms of functional units, blood flow, bile production, bile secretion and structure of the biliary system.

c- Describe the functional significance of bile secretion.

d- List the major organic and inorganic compounds secreted in bile.

f - Describe the enterohepatic circulation of bile.

h -Describe the storage and secretion of bile.

I - Describe the handling of bilirubin by the liver.

j - Contrast conjugated and unconjugated bilirubin.

k- Discuss the possible causes for altered bilirubin metabolism.

1- Predict the consequences of hepatic disease including obstruction, cellular damage and portal hypertension.

**RENAL PHYSIOLOGY INSTRUCTIONAL OBJECTIVES**

**Lecture 1:** **Functional Anatomy of the kidney**

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

* Make a list of general functions of the kidney
* Identify and describe that the nephron is the structural and function Unit of the kidney
* Correlate the structures with functions
* Compare and contrast Cortical with Juxtamedullary nephron
* Identify and describe juxtamedullary apparatus and its function

**Glomerular filtration:**

* Identify and describe that the mechanism of urine formation include three basic processes; glomerular filtration, tubular reabsorption and tubular secretion
* Identify and describe the ultramicroscopic structures of the glomerular filtration membrane
* Identify and explain why the capillary hydrostatic pressure is highest in the kidney compared to all other systemic capillaries and given the data. Calculate the net filtration pressure using parameters of Starling forces

**Glomerular filtration rate**

* Define GFR and quote normal value in men and women
* Identify and describe the factors controlling GFR in terms of starling forces, permeability with respect to size, shape and electrical charges and ultra-filtration coeffici

**Lecture3:** **Tubular Transportation & Na+ Reabsorption**

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

* Define tubular reabsorption and tubular secretion
* Identify and describe mechanisms of tubular transport
* Describe tubular reabsorption of sodium and water
* Identify and describe mechanism involved in Glucose reabsorptio
* Identify the tubular site and describe how Amino Acids, HCO3-, P04- and Urea are reabsorped
* Identify and describe the characteristic of loop of Henle, distal convoluted tubule and collecting ducts for reabsorption and secretion
* Understand the role of ADH in the reabsorption of water and urea
* Identify the site and describe the influence of aldosterone on reabsorption of Na+ in the late distal tubules.
* List and explain the factors that control aldosterone and ADH release

**Lecture 4: Concentration of Urine & Countercurrent mechanism**

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

* Identify and describe that the loop of Henle is referred to as countercurrent multiplier and the loop and vasa recta as countercurrent exchange systems in concentrating and diluting urine
* Explain what happens to osmolarity of tubular fluid in the various segments of the loop of Henle when concentrated urine is being produced.
* Explain the factors that determine the ability of loop of Henle to make a concentrated medullary gradient
* Differentiate between water diuresis and osmotic diuresis

**Lecture 5 & 6: Acid Base Balance**

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

* Identify and describe the various acids and bases and their role in body
* Mechanisms of acid base balance regulation
* Clinical and applied aspects.

**ENDOCRINE PHYSIOLOGY LECTURE OBJECTIVES**

**LECTURE 1 – introduction**:

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

* + Define hormone and describe the mechanism of the action of hormone.
	+ Identify and describe the hypothalamic control of the posterior pituitary through the direct hypothalamo-neurohyphophyseal tract.
	+ Identify and describe the hypothalamic control of the anterior pituitary by the releasing and inhibitory hormones through negative feedback mechanisms.
* List then anterior pituitary hormones
* Identify and describe the major effects of growth hormone on the body tissues and on lipid and carbohydrate metabolism.
* Identify and describe the role of somatomedin.
* Identify and describe the regulating mechanism of growth hormone.
* Identify and describe the characteristic feature of hypo and hyper secretion of growth hormone before and after closure of epiphysis.

**LECTURE 2 – POST. PITUITARY GLAND:**

At the end of this session the students should be able to

* List posterior pituitary hormones.
* Identify and describe the function of ADH.
* Identify and describe the regulatory mechanism, influencing factors and control of secretion of ADH.
* Identify and describe the chemical nature, target effects and function oxytocin.

**LECTURE- 3 THE THYROID GLAND**.

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

* Identify and describe the biosynthesis, storage and secretion of T3 and T4 thyroid hormone.
* Describe the function of the thyroid hormone.
* Describe the action of thyroid hormone on development and metabolism.
* Identify and describe the causes and the consequences of over secretion and under secretions of the thyroid hormone.
* Identify the regulatory mechanism controlling thyroid hormone secretion.

**LECTURE- 4 ADRENAL GLAND**

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

* Identify and describe the structure of adrenal cortex consisting o f the zona glomerulosa, zona fasciculate and zona reticularis and list the adrenal corticoid hormones secreted by zones.
* Characterize the chemical nature of the hormones.
* Identify and describe the major Glucocorticoids, their general significance and the effects o f cortisol on the carbohydrate, protein and fat metabolism.
* Identify and describe the actions and function of cortisol during states of stress and on inflammatory responses.
* Identify and describe the control of secretion of cortisol.
* Identify and describe the mineralocorticoids and the effects of aldosterone on renal functions, body fluid and cardiovascular dynamics and also sweat and salivary glands and intestinal absorption.
* Identify and describe the control of secretion of aldosterone.
* Identify and describe the feature of Cushing’s disease.
* Identify and describe the adrenal medullary hormones.

**LECTURE- 5 INSULIN**

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

* Identify and describe the cellular source, chemical nature and mechanism of action of insulin.
* Identify the role of insulin on glucose transport through cellular membranes.
* Identify and describe the effects of insulin on carbohydrate, protein and fat metabolism.
* Identify the effects of insulin lack or excess on lipid metabolism.
* Identify and describe glucagon, its target actions, factors that influence its secretions and its means of regulation.
* Identify clinical co-relation with diabetes mellitus.
* prevention and treatment.

**REPRODUCTIVE PHYSIOLOGY**

**LECTURE 1 -REPRODUCTIVE PHYSIOLOGY – MALE**

* The physiological function of the major components of the male reproductive tract.
* Spermatogenesis and the role of different cell types in this process.
* Endocrine regulation of the testicular function.
* The role of the GnRH, FSH, LH, testosterone, and inhibin.
* The causes and consequences of over-secretion and under secretion of testosterone for.
1. Prepuberty
2. Post puberty

**LECTURE 2 -REPRODUCTIVE PHYSIOLOGY – FEMALE**

* Oogenesis and the role of FSH, LH, estradiol in follicular maturation.
* Changes in the ovary and endometrium seen during the menstrual cycle and correlate these changes with changes in blood levels of FSH, LH, Estradiol, progesterone, and inhibin. Describe how the changes in ovarian steroids produce the proliferative and secretory phases of the uterine endometrium and menstruation, and the changes in basal body temperature during the menstrual cycle.
* The hormonal regulation of estrogen and progesterone biosynthesis and secretion by the ovary. Their transport, degradation and physiological actions.
* Role of estrogen, progesterone, placental lactogen, prolactin and oxytocin in the mammary gland development during puberty,
* Pregnancy and lactation.
* Inhibition of milk secretion during pregnancy and initiation of lactation after parturition.
* Control of milk secretion and ejection.
* The physiological bases for the anti fertility action of contraceptive pills.
* systems and the mechanism responsible for the changes at:
1. Puberty & Senescence

**PHL 226 Lecture Schedule**

**TIME : 08–09 AM Place: Hall No. A - 115**

 **I. GIT .(6 hours) Dr. Mohammad Al Zoghaibi**

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| --- |
| Week 1 |
| SUN | **25.03.1435**26.01.2014 | INTRODUCTION |
| TUE | **27.03.1435**28.01.2014 | GIT OVERVIEW |
| **Week 2** |
| SUN | **02.04.1435**02.02.2014 | Saliva: Functions& Swallowing (Definition and phases).  |
| TUE | **04.04.1435**04.02.2014 | Functions of the stomach:Gastric acid secretion: Cellular mechanism & control (Gastrin,Ach, Histamin) |
| **Week 3** |
| SUN | **09.04.1435**09.02.2014 | Gastro Intestinal absorption.Gastric emptying: Factors affecting.Vomiting (Definition, causes, mechanisms). |
| TUE | **11.04.1435**11.02.2014 | Functions of liver and gall bladderComposition and functions of pancreatic juice.  |

II. ENDOCRINOLOGY (5 hours)

**Dr. Mohmmad Al-Otaibi**

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| Week 4 |
| SUN | **16.04.1435**16.02.2014 | Introduction: Chemistry of hormones & mechanism of action Anterior pituitary gland (GH actions & control of secretion) |
| TUE | **18.04.1435**18.02.2014 | Posterior Pituitary (Actions of ADH & Oxytocin) |
| **Week 5** |
| SUN | **23.04.1435**23.02.2014 | Thyroid gland :Histology, synthesis of T3 &T4,& their functions.Parathyroid hormone. |
| TUE | **25.04.1435**25.02.2014 | Adrenal cortex: Actions of glucocorticoids. |
| **Week 6** |
| SUN | **01.05.1435**02.03.2014 | Insulin : Actions and control  |
| **III. REPRODUCTION .(2 hours) Dr. Khalid Al Regaiey** |
| TUE | **03.05.1435**04.03.2014 | Testosterone: functions and control. Spermatogenesis. |
| **SUN** | **08.05.1435**09.03.2014 | Female Hormones: function and control.Menstrual cycle. |
|  |
| **IV Renal Physiology /Acid-Base balance (6 hours)** **Dr. Khalid Al Regaiey** |
| **WEEK 7** |
| TUE | **10.05.1435**11.03.2014 | Introduction: Functions of Kidney, Structure of nephron, Bowman’s capsule & its pressures.Glomerular functions (GFR). |
| **week 8** |
| SUN | **15.05.1435**16.03.2014 | CATI |
| TUE | **17.05.1435**18.03.2014 | Tubular functions& diuretics |
| **SECOND HALF BREAK FROM: 20/05/1435 TO 28/05/1435** |
| **Week 9** |
| SUN | **29.05.1435**30.03.2014 | Water reabsorption.mechanisms of urine concentration |
| TUE | **01.06.1435**01.04.2014 | Physiology of Acid-Base balance1 |
| **Week 10** |
| SUN | **06.06.1435**06.04.2014 | Physiology of Acid-Base balance 2 |
| **V Central Nervous System: (7 hours)** **Dr.Salah** |
| TUE | **08.06.1435**08.04.2014 | Basic functional anatomy of CNS (cerebral cortex, lobes and their functions)Neuro transmitters: Types, receptors, functions.**Synapses & synaptic transmission** |
| **Week 11** |
| SUN | **13.06.1435**13.04.2014 | Sensory system Pain: Definition, types and pathways |
| TUE | **15.06.1435**15.04.2014 | Motor system & Functions of Basal ganglia |
| **Week 12** |
| SUN | **20.06.1435**20.04.2014 | Functions of cerebellum |
| TUE | **21.06.1435**21.04.2014 | hypothalamus |
| **Week 13** |
| SUN | **27.06.1435**27.04.2014 | Sleep: Centers, mechanism, neurotransmitters |
| TUE | **29.06.1435**29.04.2014 | Memory |
| **Week 14** |
| SUN | **05.07.1435**04.05.2014 | CAT II  |
| TUE | **0**7**.07.1435**06.05.2014 | Revision |

 **WEEK 16**

**FINAL EXAMINATION**

**DEPARTMENT OF PHYSIOLOGY**

**FACULTY CONTACT DETAILS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Staff | Room # | Ext # | email |
| 2 | Dr. Mohdammed Al Zoghaibi(Chairman) | 04-2129 | 7-0848 | zoghaibi71@yahoo.com |
| 2 | Dr. Khalid Al Regaiey | 04-2131 | 7-1041 | kalregai@gmail.com |
| 3 | Dr. Mohammad Al-Otaibi | 05-2147 | 7-1607 | mfalotaibi@ksu.edu.sa |
| 4 | Dr. Salah Ahmed Eltayeb | 05-2148 | 9-2860 | Salah.elmalik2@gmail.com |