

# Course specification for applied physiology

## **A-Administrative Information**

**Course Title:** Applied Physiology

**Department giving the course:** Medical Physiology

**Program on which the course is given:** Master . Of Pediatrics  
Hepatology

**Department offering the program:** pediatrics Hepatology

**Semester:** 1<sup>st</sup> part

### **Course specification for applied physiology**

## **A-Administrative Information**

**Course Title:** Applied Physiology

**Code:** PEDHI811

**Department giving the course:** Medical Physiology

**Program on which the course is given:** Master. Of Pediatrics

**Department offering the program:** pediatrics

**Semester:** 1<sup>st</sup> part

**Credit hours:** 2 hrs

## **B-Professional information:**

### **1-OVERALL AIMS OF THE COURSE:**

By the end of the course, students should be able to:

1. Recall all basic physiological information regarding the learned subjects.
2. Explain, on a physiological bases, the related clinical pictures seen in the field of pediatric hepatology medicine.
3. Apply course information to explain the physiological background for treatment of the related abnormal, dysfunction, or dysregulated physiological mechanisms accompanying diseases of general medicine.

### **2- INTENDED LEARNING OUTCOMES (I.L.Os):**

#### **a- Knowledge & Understanding:**

By the end of the course, students should be able to:

- A1. Name the different fluid compartments in the human body, and define moles, equivalents, and osmoles.
- A2. Define the components of blood, their origins, and their role in homeostasis.
- A3. Describe how the tonicity (osmolality) of the extracellular fluid is maintained by alterations in water intake and vasopressin secretion.

- A4. Describe how the volume of the extracellular fluid is maintained by alterations in renin and aldosterone secretion.
- A5. Name the major electrolytes in body fluids, and state their functions.
- A6. Explain how a negative feedback mechanism works, and how a positive feedback mechanism differs.
- A7. List the mechanisms by which heat is produced in and lost from the body.
- A8. List the temperature-regulating mechanisms, and describe the way in which they are integrated under hypothalamic control to maintain normal body temperature.
- A9. Define the term homeostasis, and use examples to explain its mechanism.
- A10. Describes the methods used to determine the uniformity of the distribution of the inspired gas and pulmonary blood flow.
- A11. Explains the regional differences in the matching of ventilation and perfusion of the normal upright lung.
- A12. Predicts the consequences of the regional differences in the ventilation and perfusion of the normal upright lung.
- A13. Define the special features of the circulation in the neonates, coronary vessels, and skin, and how these are regulated.
- A14. Discuss glomerular filtration and tubular reabsorption and secretion mechanisms.
- A15. Understand the functional significance of the gastrointestinal system, and in particular, its roles in nutrient assimilation, excretion, and immunity.
- A16. Recognize the bodily pools of calcium and phosphate, their rates of turnover, and the organs that play central roles in regulating movement of them between stores.
- A17. Explain the basis of conditions where pituitary function and growth hormone secretion and function are abnormal, and how they can be treated.
- A18. Name the hypophysiotropic hormones, and outline the effects that each has on anterior pituitary function.
- A19. Understand how the fetus is supplied with oxygen and nutrients in utero, and the circulatory events required for a transition to independent life after birth.

**b- Intellectual Skills:**

By the end of the course, students should be able to:

- B1. Delineate the process of hemostasis that restricts blood loss when vessels are damaged, and the adverse consequences of intravascular thrombosis.
- B2. Discuss the pathophysiology of fever.
- B3. Differentiate between pain and nociception.

- B4. Differentiate between fast and slow pain and acute and chronic pain.
- B5. Define circulatory shock, and list the compensatory processes that may arise during shock.
- B6. Suggest the primary disturbances that can account for cardiogenic, hypovolemic, anaphylactic, septic, and neurogenic shock states.
- B7. Describe how the pumping action of the heart can be compromised in the setting of specific disease states.
- B8. Identify all factors that regulate vascular tone, their sources, and their mechanisms of action.
- B9. Describe how the countercurrent mechanism in the kidney operates to produce hypertonic or hypotonic urine.
- B10. Describe the voiding reflex and draw a cystometrogram.
- B11. Interpret basic lung functions including defense and metabolic functions.
- B12. Analyze the ventilatory responses to increased CO<sub>2</sub> or decreased O<sub>2</sub> concentrations in the inspired air.
- B13. Delineate cells and their functions in bone formation and resorption.
- B14. Compare the pathway that mediates sensory input from touch, proprioceptive, and vibratory senses to that mediating information from pain and thermoreceptors.
- B15. Analyze how posture and skilled movements are planned and carried out by different parts of the CNS.

**c- Professional and Practical Skills:**

By the end of the course, students should be able to:

- C1. Diagnose and explain referred pain.
- C2. Adequately interpret cystometrogram.
- C3. Diagnose cardiac abnormalities from ECG.
- C4. Prescribe the accurate diuretics and that operate to increase urine flow in specific diseases.
- C5. Differentiate cases of alkalosis and acidosis, and predict respiratory and renal compensatory mechanisms in response to each of them.
- C6. Interpret liver function tests and reports
- C7. Diagnose abnormal thyroid function.

**d- General and Transferable Skills:**

By the end of the course, students should be able to:

- D1. Use course information effectively in the field of pediatric medicine practice.
- D2. Retrieve, manage, and manipulate course information by all means, including electronic means.
- D3. Present course information clearly in written, electronic and oral forms.

D4. Communicate ideas and arguments effectively.

D5. Analyze and use numerical data including the use of simple statistical methods

### 3-CONTENT

**Credit hours: 1 hrs**

Total	Practical	Lectures	Topics
2		2	<p><b>1. Body Fluids and Blood:</b></p> <ul style="list-style-type: none"> <li>- Body Fluid Compartments and Their Constituents.</li> <li>- Blood; White Blood Cells, Platelets, Red Blood Cells Types and Transfusion Reactions.</li> <li>- Hemoglobin; Reactions, Synthesis, and Catabolism.</li> <li>- Hemostasis and Anticoagulants</li> </ul>
1		1	<p><b>2. Water and Electrolyte Balance:</b></p> <ul style="list-style-type: none"> <li>- Defense of Tonicity: Vasopressin; Receptors, Effects, Control of Secretion, and Clinical Implications.</li> <li>- Defense of Volume: The Renin–Angiotensin System.</li> <li>- Regulation of Electrolytes</li> </ul>
1		1	<p><b>3. Homeostasis:</b></p> <ul style="list-style-type: none"> <li>- Definition of Homeostasis, Negative &amp; Positive Feedback Mechanisms</li> </ul>
1		1	<p><b>4. Body Temperature:</b></p> <ul style="list-style-type: none"> <li>- Normal Body Temperature; Heat Production &amp; Heat Loss.</li> <li>- Temperature-Regulating Mechanisms; Fever, Hypothermia.</li> </ul>
1		1	<p><b>5. Pain Sensation:</b></p> <ul style="list-style-type: none"> <li>- Nociceptors.</li> <li>- Classification of Pain; Deep, Visceral</li> </ul>

1		1	& Referred Pain <b>6. Hemorrhage and Shock:</b> - Physiologic Causes of Circulatory Shock. - Stages & Types of Circulatory Shock. - Physiology of Treatment in Shock.
1		1	<b>7. Cardiovascular System:</b> - Origin of the Heartbeat & the Electrical Activity of the Heart. - The Heart as a Pump. - Cardiovascular Regulatory Mechanisms. - Circulation through Special Regions
1		1	<b>8. Renal Physiology and Micturition:</b> - Formation of Urine; Glomerular Filtration, Tubular Reabsorption & Secretion. - Urine Concentration and Diuretics. - Micturition.
1		1	<b>9. Respiratory Physiology:</b> - Pulmonary Function. - Gas Transport & pH in the Lung. - Regulation of Respiration
2		2	<b>10. Gastrointestinal System:</b> - Overview of Gastrointestinal Function & Regulation. - Digestion, Absorption, & Nutritional Principles. - Gastrointestinal Motility. - Transport & Metabolic Functions of the Liver
2		2	<b>11. Endocrine Physiology:</b> - The Thyroid Gland. - Endocrine Functions of the Pancreas & Regulation of Carbohydrate Metabolism. - The Adrenal Medulla & Adrenal Cortex. - Hormonal Control of Calcium &

2		2	Phosphate Metabolism & the Physiology of Bone. - The Pituitary Gland <b>12. Central Nervous System:</b> - Somatosensory Pathways. - Electrical Activity of the Brain, Sleep–Wake States, & Circadian Rhythms. - Control of Posture & Movement. - Hypothalamic Regulation of Hormonal Functions
15		15	<b>Total</b>
1		1	<b>Total credit hours</b>

1 credit hour = 15 hours theoretical

#### **4-TEACHING & LEARNING METHODS:**

4.1 Lectures

4.2 Practical classes

#### **5-Student assessment methods**

5.1- Written Examination for assessment of knowledge and understanding and intellectual skills

5.2- Oral Examination for assessment of knowledge and understanding outcomes, intellectual skills, general skills and attitude.

#### **ASSESSMENT SCHEDULE:**

One written exam 3 hour in Physiology + oral exams.

#### **WEIGHING OF ASSESSMENT:**

Written exam: 70% (from 150 degree)

Oral exam:30%(from 50 degree)

Total 100%

#### **6-List of references**

##### **6.1. Text Books:**

Ganong's Review of Medical Physiology, 23<sup>rd</sup> Edition, 2010.

**6.2. Course Notes:** Not available.

##### **6.3. Suggested Readings:**

Textbook of medical physiology, Arthur C. Guyton, John E. Hall, 11<sup>th</sup> Edition, 2006.

#### **7-Resources / Facilities required for teaching and learning to achieve the above ILOs:**

7.1- Data show.

7.2- Computers

7.3- Laboratories instruments.

7.4- Internet club.

**Dean:** Prof. Dr. Magdy Khalil

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