



يونيڤرسيتي سلطان زين العابدين  
**Unisza**  
UNIVERSITI SULTAN ZAINAL ABIDIN


## **FACULTY OF MEDICINE**

**Student Guide Semester 1 year 1**  
**Course Code: BMS10203**  
**Physiology for Health Professional**

**Date of Course: Oct 2023 - Jan 2024**

**Session 2023\_24**

**Prepared by:**

  
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(signature)

Date: 2 OCT 2023

**DR. NOOR AZLINA ABU BAKAR**  
Course Coordinator  
Nursing and Medical Assistant programme  
Faculty of Medicine

# **FACULTY OF MEDICINE**

## **VISION**

Faculty of Medicine aspires to be an excellent institution in producing high quality health professionals, research, and community services.

## **MISSION**

Faculty of Medicine shall provide dynamic curricula guided by excellent educators in conducive environment, nurture sustainable research culture and inculcate community-focused activities.

### **Head of School of Basic Medical Sciences**

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### **Teaching Lecturers**

Initial	Lecturer	H/P	E-mail
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## **COURSE BMS 10203: PHYSIOLOGY FOR HEALTH PROFESSIONAL**

**Course Coordinator: Dr. Noor Azlina Abu Bakar**

**H/P: 017-4700395**

### **CONTENT SYNOPSIS:**

This course will enable students to apply physiological knowledge to their respective professions, through an integrated approach. The lecture will provide a framework of basic concepts in the physiology of cells, body fluids, tissues, cardiovascular and blood, respiratory system, central nervous system, endocrine system, musculoskeletal, genitourinary mechanism and reproductive system. Throughout the course, students will be exposed to interactive lectures, practical, small group discussions and assignments to complete the course. The students will be expected to understand and appreciate the basic physiology of the human body, display clinical procedures related to the system and demonstrate interpersonal skills.

### **OBJECTIVES/INTENDED LEARNING OUTCOMES:**

At the end of this module the students are expected to be able to:

<b>CLO</b>	<b>DESCRIPTION</b>	<b>TAX</b>	<b>MQF</b>	<b>WEIGHTAGE (100%)</b>	<b>DELIVERY</b>
CLO1	Explain the normal functions of structure cells, tissues, organs and systems in human body for healthcare practices.	C2	MQF1	90%	LECTURE, E-LEARNING, presentation, SGD
CLO2	Demonstrate interpersonal skills during group discussion while expressing respect to other's opinions.	A3	MQF2 (3b)	10%	SGD

## **ASSESSMENT METHODS**

<b>CLO1</b>			<b>80%</b>
<b>Category title</b>	<b>Tool</b>	<b>Examination format</b>	<b>Weightage (%)</b>
Final examination	MCQ	Final assessment	50
Final examination	Structured essay	Final assessment	10
Quiz	MCQ	Continuous assessment	20
Assessment	Presentation	Continuous assessment	10
<b>CLO2</b>			<b>10%</b>
<b>Category title</b>	<b>Tool</b>	<b>Examination format</b>	<b>Weightage (%)</b>
Peer assessment	SGD	Continuous assessment	10

## **TEACHING AND LEARNING METHODS**

L : Lecture  
e-Learning : e-Learning  
Presentation : Student presentation  
SGD : Small Group Discussion

## OUTLINE OF COURSE CONTENT (LECTURES/e-LEARNING/SGD)

Lecture	Lecturer	Title	Learning outcome
<b>INTRODUCTION TO HUMAN BODY</b>			
L1	NAS	Homeostasis and cell membrane	<ol style="list-style-type: none"> <li>1. Explain the negative and positive feedback mechanisms of homeostasis regulation.</li> <li>2. Explain the different fluid compartments, total fluid in the compartment and composition of ions in the human body.</li> <li>3. Explain the mechanism, factors affecting and physiological application of passive and active transports.</li> <li>4. Describe the mechanism and importance of endocytosis, exocytosis and transcytosis.</li> </ol>
L2	NAS	Excitation and conduction	<ol style="list-style-type: none"> <li>1. List the excitable tissues of the body.</li> <li>2. Define RMP, AP, Electrotonic potentials, local response, and firing level.</li> <li>3. Explain the phrase that AP obey All-or-Non-Law.</li> <li>4. Describe the ionic basis of RMP and the different phases of AP.</li> <li>5. Explain the process of nerve impulse conduction.</li> </ol>
<b>BASIC TISSUE</b>			
L3	NAAB	Sympathetic and Parasympathetic nervous system	<ol style="list-style-type: none"> <li>1. Describe the organizational and functional similarities and differences between the sympathetic and parasympathetic nervous systems</li> <li>2. Describe the key functions of the sympathetic and the parasympathetic nervous system</li> <li>3. State some examples of clinical disturbances of autonomic function.</li> </ol>
<b>HAEMOTOLOGY</b>			
L4	NAAB	Constituent of blood	<ol style="list-style-type: none"> <li>1. List the components of blood and their function.</li> <li>2. Describe the physical properties and chemical components of blood.</li> <li>3. Discuss 'hemopoiesis' and the importance of erythropoietin.</li> <li>4. Outline the chemical components of normal haemoglobin variants.</li> </ol>
L5	NAAB	Red cell physiology	<ol style="list-style-type: none"> <li>1. Discuss the shape, size, normal count, contents and functions of a red blood cell.</li> <li>2. Explain the advantages of the biconcave shape of erythrocytes.</li> <li>3. Describe haemoglobin structure, amount, types and normal values.</li> <li>4. Outline physiological and pathological variations</li> </ol>

L6	NAS	Haemopoiesis	<ol style="list-style-type: none"> <li>1. Describe the stages of erythropoiesis and its regulation.</li> <li>2. Describe the stages of leukopoiesis and its regulation.</li> <li>3. Describe the stages of thrombopoiesis and its regulation.</li> <li>4. State the normal blood counts and their physiological variations.</li> </ol>
L7	NAS	Platelet	<ol style="list-style-type: none"> <li>1. State the function of platelets</li> <li>2. Define haemostasis</li> <li>3. Describe the formation of a temporary haemostatic plug</li> <li>4. Describe the role of platelets in haemostasis</li> </ol>
<b>CARDIOVASCULAR SYSTEM</b>			
L8	NAAB	Physiological properties of cardiac muscle	<ol style="list-style-type: none"> <li>1. Explain the properties of cardiac muscle</li> <li>2. Explain the myocardial contractile system</li> <li>3. Explain the Frank-Starling law of the heart and its mechanism.</li> <li>4. Describe the importance of cardiac vagal tone and sympathetic tone.</li> <li>5. Describe the importance of the all-or-none law, compensatory pause, staircase phenomenon, length-tension relationship, frequency-force relationship and load-velocity relationship</li> </ol>
L9	NAAB	Electrical and Mechanical activities of the heart	<ol style="list-style-type: none"> <li>1. Define systole and diastole periods</li> <li>2. Calculate duration of cardiac cycle from heart rate and vice versa</li> <li>3. Describe the electrical and mechanical events of the cardiac cycle and basis of heart sounds</li> <li>4. Correlate the cardiac cycle events and pressure changes in atria, ventricles, aorta, pulmonary arteries, jugular vein, ECG.</li> </ol>
L10	NAAB	Cardiac output and haemodynamics	<ol style="list-style-type: none"> <li>1. Define the cardiac output.</li> <li>2. Explain the factors that governed cardiac output.</li> <li>3. Explain the relationship between blood flow, pressure and resistance.</li> <li>4. Define blood pressures and their measurements.</li> <li>5. Explain the factors affecting blood pressures.</li> </ol>
<b>RESPIRATORY SYSTEM</b>			
L11	NAAB	Mechanic of breathing and regulation	<ol style="list-style-type: none"> <li>1. Explain the alveolar and intrapleural pressure changes during inspiration and expiration</li> <li>2. Explain lung volume and lung compliance Discuss relaxation pressure-volume curve of lungs</li> <li>3. Discuss the regulation of respiration</li> </ol>



L12	NAAB	Pulmonary circulation and ventilation perfusion ratio	<ol style="list-style-type: none"> <li>1. Explain the mechanism of filtration across pulmonary capillaries and genesis of pulmonary oedema</li> <li>2. Explain the importance of ventilation-perfusion ratio</li> <li>3. Explain the basic difference in ventilation-perfusion ratio in apex and base of the lungs and its physiological and clinical importance.</li> <li>4. Discuss the physiology of bronchial circulation.</li> </ol>
L13	NAAB	Gases transport and exchange	<ol style="list-style-type: none"> <li>1. Describe the processes of O<sub>2</sub> and CO<sub>2</sub> transports in blood.</li> <li>2. Explain the O<sub>2</sub>-haemoglobin dissociation curve</li> <li>3. Explain dead space and its normal value</li> <li>4. Explain the importance of alveolar ventilation</li> <li>5. Explain gas exchange through alveolar-capillary membrane</li> </ol>
<b>GASTROINTESTINAL SYSTEM</b>			
L14	NAS	Regulation of gastrointestinal function and its motility	<ol style="list-style-type: none"> <li>1. Describe the properties, composition and functions of the saliva and explain its regulation</li> <li>2. Describe the composition, properties and functions of gastric juice and explain its regulation</li> <li>3. Describe the properties, composition and functions of the intestinal secretions and its regulation</li> <li>4. Describe the GI motility</li> </ol>
L15	NAS	Physiology of exocrine pancreas and gastrointestinal hormones	<ol style="list-style-type: none"> <li>1. Describe the functional structure of the exocrine pancreas</li> <li>2. Explain the composition, properties and functions of pancreatic juice</li> <li>3. Discuss the control of pancreatic secretion</li> <li>4. Explain the action and regulation of gastrointestinal hormones</li> </ol>
L16	NAS	Vomiting and defaecation reflexes	<ol style="list-style-type: none"> <li>1. Explain the physiological mechanisms involving vomiting and defecation reflexes</li> <li>2. Discuss the importance of the main gastrointestinal reflexes</li> <li>3. Describe the types of defecation reflexes</li> </ol>
<b>NERVOUS SYSTEM</b>			
L17	NAS	Somatosensory pathways and pain	<ol style="list-style-type: none"> <li>1. Describe the classifications of somatic sensation.</li> <li>2. Describe the characteristics and explain the mechanisms of transduction of somatic sensory receptors.</li> <li>3. Describe the nociceptive system.</li> <li>4. Explain the analgesic systems and the mechanism of referred pain.</li> </ol>

L18	NAS	Control of posture and movement	<ol style="list-style-type: none"> <li>1. Describe the relationship between muscle tone, posture, locomotion and the motor cortex.</li> <li>2. Explain the mechanism for voluntary and skilled movements.</li> <li>5. Describe the consequences of motor abnormalities - hypotonia, hypertonia, rigidity, paralysis.</li> </ol>
L19	NAS	Basal ganglia and cerebellum	<ol style="list-style-type: none"> <li>1. Describe the functions of basal ganglia</li> <li>2. Explain the role of neurotransmitter in basal ganglia disorders</li> <li>3. Describe the functions of cerebellum</li> <li>6. Explain the consequences of abnormalities of cerebellar functions</li> </ol>
L20	NAS	Hypothalamus, feeding behaviour and thermoregulation	<ol style="list-style-type: none"> <li>1. Explain the role of the hypothalamus in the regulation of eating behaviour.</li> <li>2. Describe the consequence of abnormalities of eating behaviour.</li> <li>3. Describe functional structures of the hypothalamus associated with thermoregulation</li> <li>4. Explain the physiological mechanism of thermoregulation</li> <li>1. Describe the consequences of abnormalities in thermoregulation</li> </ol>
L21	NAAB	Hearing and equilibrium	<ol style="list-style-type: none"> <li>1. Describe the functional structures of hearing.</li> <li>2. Explain the physiology of hearing.</li> <li>3. Describe the consequences of hearing abnormalities.</li> <li>4. Describe the functional structure of the vestibular apparatus.</li> <li>2. Describe the consequences of abnormalities in equilibrium.</li> </ol>
L22	NAAB	Vision	<ol style="list-style-type: none"> <li>1. Describe the functional structures associated with vision.</li> <li>2. Explain the physiological mechanism of vision.</li> <li>3. Discuss the role of rhodopsin in photoreceptor mechanism</li> <li>4. Explain the components of visual reflex/visual pathways.</li> <li>3. Describe the consequences of abnormalities in vision.</li> </ol>
<b>ENDOCRINE SYSTEM</b>			

L23	NAS	The pituitary gland	<ol style="list-style-type: none"> <li>1. Explain the functional structures of the endocrine hypothalamus, anterior and posterior pituitary gland.</li> <li>2. Describe the functions of the anterior and posterior pituitary hormones</li> <li>3. Describe the regulation, synthesis, storage, release, transport and degradation of these hormones</li> </ol>
L24	NAS	Thyroid and parathyroid glands	<ol style="list-style-type: none"> <li>1. Explain the functional structures of the thyroid and parathyroid glands and their secretions.</li> <li>2. Explain the actions of thyroid and parathyroid hormones.</li> <li>3. Describe the regulation, synthesis, storage, release, transport and degradation of thyroid and parathyroid hormones</li> </ol>
L25	NAS	Adrenal medulla and adrenal cortex	<ol style="list-style-type: none"> <li>1. Describe the regulation of secretion of glucocorticoids and mineralocorticoids</li> <li>2. State the circadian variation in the secretion of hormones of the hypothalamo-hypophyseal-adrenocortical axis</li> <li>3. Describe the physiological actions, pharmacological and pathological effects of glucocorticoids</li> </ol>
<b>GENITOURINARY SYSTEM</b>			
L26	NAS	General introduction and glomerular filtration	<ol style="list-style-type: none"> <li>1. Describe the mechanism and principle of glomerular filtration.</li> <li>2. Explain the concept of clearance and its relationship with renal handling of the following substances: Glucose, PAH, Creatinine, Inulin, Free water</li> <li>3. Describe the secretions of substances into the renal tubules.</li> </ol>
L27	NAAB	Urine Concentrating Mechanism	<ol style="list-style-type: none"> <li>1. Explain the importance of urine concentrating mechanism.</li> <li>2. Describe the counter current multiplier and counter current exchanger systems.</li> <li>3. Explain the role of protein and urea in urine concentrating mechanism.</li> <li>4. Relate the pathophysiology of diuresis and polyuria.</li> </ol>
L28	NAAB	Renin-Angiotensin and Aldosterone System	<ol style="list-style-type: none"> <li>1. Describe the juxtaglomerular apparatus</li> <li>2. Explain the relationship between renin, angiotensin and aldosterone in long term regulation of blood volume and pressure</li> <li>3. Identify factors affecting renin secretion</li> <li>4. Relate the role of kidney in the pathophysiology of hypertension</li> </ol>
<b>REPRODUCTIVE SYSTEM</b>			

L29	NAAB	The male reproductive physiology	<ol style="list-style-type: none"> <li>1. Describe the spermatogenetic process and its regulation.</li> <li>2. Describe the composition and function of the seminal fluid.</li> <li>3. Describe the endocrine testis.</li> <li>4. Describe the clinical consequences of abnormal testis function.</li> </ol>
L30	NAAB	The female reproductive physiology	<ol style="list-style-type: none"> <li>1. Describe the oogenic process and its regulation.</li> <li>2. Describe the ovarian and menstrual cycle.</li> <li>3. Explain ovulatory process and indicators of ovulation.</li> <li>4. Explain the hypothalamic endocrine regulation of the ovarian and menstrual cycle.</li> </ol>
L31	NAS	Physiology of pregnancy, parturition and lactation	<ol style="list-style-type: none"> <li>1. Describe the process of ovum transport, fertilisation and implantation.</li> <li>2. Describe the physical and physiological changes associated with pregnancy.</li> <li>3. Describe the physiological mechanism of parturition.</li> <li>4. Describe the milk ejection reflex.</li> <li>5. Describe the role of hormones of during pregnancy, parturition and lactation.</li> </ol>
<b>SGD</b>			
SGD 1	NAAB, NAS	L1-L9	
SGD 2	NAAB, NAS	L10-16	
SGD 3	NAAB, NAS	L17-L24	
SGD 4	NAAB, NAS	L25-L31	

## REFERENCES:

### **Physiology**

1. Hall, J. E & Guyton, A. C. (2016). Guyton and Hall Textbook of Medical Physiology. 13<sup>th</sup> Edition. 1 – 1046. Elsevier.
2. Barrett, K. E, Barman, S.M, Boitano, S. B & Brooks, H. L. (2016). Ganong's Review of Medical Physiology. 25<sup>th</sup> edition. 1-763. McGraw Hill Education. Lange.

**TIMETABLE : BMS 10203**

**\*12 lecture topics should be delivered as e-learning\***

WEEK	DATE/DAY	TIME	Lecture	Lecturer	Title
3	16.10.23/ MON	8.00 – 9.00 AM	L1	NAS	Homeostasis and cell membrane
3	16.10.23/ MON	9.00 – 10. 00 AM	L2	NAS	Excitation and conduction
4	23.10.23/ MON	8.00 – 10.00 AM	L3	NAAB	Sympathetic and Parasympathetic nervous system
5	30.10.23/ MON	8.00 – 9.00 AM	L4	NAAB	Constituent of blood
5	30.10.23/ MON	9.00 – 10. 00 AM	L5	NAS	Haemopoiesis
5	31.11.23/ TUE	11.00 – 12.00 PM	L6	NAAB	Red cell physiology
5	31.11.23/ TUE	12.00 – 1.00 PM	L7	NAS	Platelet
6	6.11.23/ MON	8.00 – 9.00 AM	L8	NAAB	Physiological properties of cardiac muscle
6	6.11.23/ MON	9.00 – 10.00 AM	L9	NAAB	Electrical and Mechanical activities of the heart
6	9.11.23/ THU	2.00 – 4.00 PM	L1-L7	NAAB/ NAS	SGD 1
7	14.11.23/ TUE	11.00 – 12.00 AM	L10	NAS	Cardiac output and haemodynamics
7	14.11.23/ TUE	12.00 – 1.00 PM	L11	NAAB	Mechanic of breathing and regulation
7	14.11.23/ TUE	4.00 – 6.00 PM	L8-12	NAAB, NAS	SGD 2
7	16.11.23/ THU	4.00 – 5.00 PM	L12	NAAB	Pulmonary circulation and ventilation perfusion ratio

7	16.11.23/ THU	5.00 – 6.00 PM	L13	NAAB	Gases transport and exchange
8	20.11.23/ MON	8.00 – 9.00 AM	L14	NAS	Regulation of gastrointestinal function and its motility
8	20.11.23/ MON	9.00 – 10.00 AM	L15	NAS	Physiology of exocrine pancreas and gastrointestinal hormones
8	21.11.23/ TUE	11.00 – 12.00 PM	L16	NAS	Vomiting and defaecation reflexes
8	21.11.23/ TUE	12.00 – 1.00 PM	L17	NAS	Somatosensory pathways and pain
8	22.11.23/ WED	4.00 – 6.00 PM	L13-L16	NAAB/ NAS	SGD 3
8	23.11.23/ THU	2.00 – 4.00 PM	L1-L13	NAAB/ NAS	QUIZ 1 (10%)
10	4.12.23/ MON	8.00 – 9.00 AM	L18	NAS	Control of posture and movement
10	4.12.23/ MON	9.00 – 10.00 AM	L19	NAS	Basal ganglia and cerebellum
11	11.12.23/ MON	8.00 – 9.00 AM	L20	NAS	Hypothalamus, feeding behaviour and thermoregulation
11	11.12.23/ MON	9.00 – 10.00 AM	L21	NAS	Hearing and equilibrium
12	18.12.23/ MON	8.00 – 9.00 AM	L22	NAS	Vision
12	18.12.23/ MON	9.00 – 10.00 AM	L23	NAS	The pituitary gland
12	21.12.23/ THU	2.00 – 4.00 PM	L17-L21	NAAB/ NAS	SGD 4
13	26.12.23/ TUE	11.00 – 12.00 PM	L24	NAS	Thyroid and parathyroid glands

14	1.1.24/ MON	8.00 – 9.00 AM	L25	NAS	Adrenal medulla and adrenal cortex
14	1.1.24/ MON	9.00 – 10.00 AM	L26	NAAB	General introduction and glomerular filtration
14	4.1.24/ THU	4.00 – 5.00 PM	L27	NAAB	Urine Concentrating Mechanism
14	4.1.24/ THU	5.00 – 6.00 PM	L28	NAAB	Renin-Angiotensin and Aldosterone System
15	8.1.24/ MON	8.00 – 9.00 AM	L29	NAAB	The male reproductive physiology
15	8.1.24/ MON	9.00 – 10.00 AM	L30	NAAB	The female reproductive physiology
15	11.1.24/ THU	2.00 – 3.00 PM	L14-L28	NAAB, NAS	QUIZ 2 (10%)
16	15.1.24/ MON	8.00 – 9.00 AM	L31	NAS	Physiology of pregnancy, parturition and lactation



