

SANKALCHAND PATEL UNIVERSITY, VISNAGAR

**FACULTY OF MEDICINE
BACHELOR OF MEDICINE AND BACHELOR OF SURGERY
(M.B.B.S.)**



**PHYSIOLOGY
CURRICULUM / SYLLABUS
&
ASSESSMENT**

**(AS PER COMPETENCY BASED MEDICAL EDUCATION CURRICULUM FOR THE INDIAN
MEDICAL GRADUATE-2024, NATIONAL MEDICAL COMMISSION)**

PREAMBLE

The new Graduate Medical Education Regulations attempts to stand on the shoulder of the contributions and the efforts of resource persons, teachers and students (past and present). It intends to take the learner to provide health care to the evolving needs of the nation and the world.

Human Physiology explores the complex mechanisms that regulate the normal functioning of the human body. Understanding physiology forms the foundation of medical education, as it provides insight into how the body's organ systems work independently and in coordination to maintain homeostasis. Since ancient times, the human mind has sought to understand the processes that sustain life, health, and the changes that lead to disease.

Medical physiology is the study of the functions of cells, tissues, and organ systems, focusing on how they interact to sustain life. It helps in understanding the physiological basis of health and disease, enabling the development of effective diagnostic, preventive, and therapeutic strategies. Through this knowledge, medical professionals can identify physiological abnormalities, predict disease progression, and apply appropriate treatment methods.

The subject of Physiology has been divided into the following broad areas: In each of these broad areas, specific topics have been defined to provide a comprehensive understanding of the normal physiological functions of the body and their clinical relevance.

1. General Physiology
2. Blood and Immune System
3. Nerve and Muscle Physiology
4. Gastrointestinal System
5. Cardiovascular System
6. Respiratory System
7. Renal System
8. Endocrine System
9. Reproductive System
10. Central Nervous System
11. Special Senses
12. Integrated Physiology

GOAL:

The broad goal of the teaching of undergraduate students in physiology aims at providing the student comprehensive knowledge of the normal functions of the organ systems of the body to facilitate an understanding of the physiological basis of health and diseases.

OBJECTIVES:**A) Knowledge**

By the end of the course, the student will be able to:

1. Explain the normal functioning of all organ systems and their coordinated interactions for maintaining overall body function.
2. Assess the contribution of each organ system to the maintenance of the body's internal environment (milieu intérieur).
3. Describe the physiological aspects of normal growth and development.
4. Explain the physiological responses and adaptations to environmental stress.
5. Outline the physiological principles underlying the pathogenesis and treatment of diseases.

B) Skills

By the end of the course, the student will be able to:

1. Conduct experiments to study physiological processes.
2. Analyze and interpret experimental and investigative data.
3. Differentiate between normal and abnormal findings from tests performed and observed in the laboratory.

C) Attitude, Ethics, and Communication Skills (AETCOM)

By the end of the course, the student will be able to:

1. Show respect and professionalism toward individuals volunteering for clinical examination.
2. Communicate effectively with peers and teachers.
3. Demonstrate teamwork and collaborative skills.
4. Build professional relationships with peers, teachers, and the community that are respectful, empathetic, ethical, and trustworthy.
5. Understand and apply empathy and other human values to the care of the patient

D) Integration

By the end of the integrated teaching, the student will:

1. Develop a unified understanding of organ structure, function, and regulatory mechanisms.
2. Establish connections between different blocks of knowledge and apply them in clinical and physiological contexts.

E) Early Clinical Exposure

By the end of the course, the student will be able to:

1. Recognize the relevance of basic sciences in diagnosis, patient care, and treatment.
2. Apply basic science knowledge in a clinical context.
3. Relate patient experiences to motivate deeper learning.
4. Understand the importance of attitude, ethics, and professionalism in the doctor-patient relationship.
5. Appreciate the socio-cultural factors influencing disease through the study of medical humanities.

Teaching & Evaluation Scheme

Semester/Year: First Year M.B.B.S.
Program Name: Bachelor of Medicine and Bachelor of Surgery
Effective from Academic Year: 2024-2025
Program Code: MB01

Course Code	Course Name	Hrs/Week			UA		IA		Total	
		L	P	Total	Max	Min	Max	Min	Max	Min
2PY101	Physiology-I	4	-	4	100	80	-	-	200	150
2PY102	Physiology-II	4	-	4	100		-	-		
2PY103	Physiology Practical	-	9	9	100	40	-	-	100	
2PY104	Physiology IA Theory	-	-	-	-	-	100	40	200	100
2PY105	Physiology IA Practical	-	-	-	-	-	100	40		

(UA: University Assessment, IA: Internal Assessment)

Note:

- Minimum to pass in Internal Assessment: 50% combined in theory and practical, and must secure at least 40% separately in Theory and Practical of Internal Assessment to be eligible for appearing for University Examinations**
- Pass Criteria:**
 - A candidate shall obtain a cumulative 50% marks in University conducted examination including theory and practical and not less than 40% separately in Theory and in Practical in order to be declared as passed in that subject.**
 - In subjects that have two papers, the learner must secure a minimum 40% marks in aggregate (both theory papers together) to pass in the said subject**

SYLLABUS / COMPETENCIES WITH TEACHING LEARNING METHODS

Comp. No	Competency	Teaching Learning Method
TOPIC 1: GENERAL PHYSIOLOGY		
PY1.1	Describe the structure and functions of a cell, intercellular communication and their applications in Clinical care and research	Lecture / Integrated Teaching
PY1.2	Discuss the principles of homeostasis and feedback mechanism	Lecture / Integrated Teaching
PY1.3	Describe apoptosis (programmed cell death), explain its mechanism of action and physiological significance.	Small Group Teaching (SGT) / Tutorials
PY1.4	Describe and discuss various transport mechanisms across cell membranes	Lecture / Self Directed Learning (SDL)
PY1.5	Describe the fluid compartments of the body, its ionic composition & measurement methods	Lecture/ Integrated Teaching
PY1.6	Describe the concept of pH & Buffer systems in the body	Small Group Teaching (SGT) / Tutorials
PY1.7	Describe the molecular basis of resting membrane potential (RMP) and generation of action potential in a nerve fiber	Lecture / Small Group Teaching (SGT) / Tutorials
TOPIC 2: HAEMATOLOGY		
PY2.1	Describe the composition and functions of blood and its components	Lecture / Integrated Teaching
PY2.2	Discuss the origin, forms, variations and functions of plasma proteins and its clinical implications	Lecture / Small Group Teaching (SGT)
PY2.3	Describe the physiological structure, synthesis, functions and breakdown of Hemoglobin. Discuss its variants and clinical significance.	Lecture / Self Directed Learning (SDL)
PY2.4	Describe Erythropoiesis & discuss its regulation in physiological and pathological situations	Lecture / Self Directed Learning (SDL)
PY2.5	Describe anemias, polycythemia & jaundice and discuss its physiological principles of management	Early Clinical Exposure (ECE)
PY2.6	Describe the formation of WBC (Leucopoiesis), structure and function of various WBC types and their regulatory mechanisms	Lecture / Small Group Teaching (SGT)
PY2.7	Discuss 'Immunity' in terms of its types, development, regulation and physiological significance	Lecture / Small Group Teaching (SGT)
PY2.8	Describe the formation of platelets (thrombopoiesis), structure, functions and variations.	Lecture / Small Group Teaching (SGT)
PY2.9	Describe hemostasis, coagulation pathways, mechanism of action of anticoagulants and briefly discuss pathophysiological aspects of bleeding & clotting disorders (e.g. hemophilia, purpura)	Lecture / Integrated Teaching
PY2.10	Discuss types of blood groups, clinical importance of blood grouping, blood banking and transfusion	Lecture / Small Group Teaching (SGT)
PY2.11	Estimate Hb, RBC, TLC, DLC, Blood groups, BT/CT, RBC indices	Demonstration Observation Assistance Performance (DOAPs)
PY2.12	Describe the test to measure Erythrocyte Sedimentation Rate (ESR), Osmotic fragility, Hematocrit, and interpret its findings	Demonstration
PY2.13	Describe steps for reticulocyte and platelet count	Demonstration

Comp. No	Competency	Teaching Learning Method
TOPIC 3: NERVE & MUSCLE PHYSIOLOGY		
PY3.1	Describe the structure and functions of a neuron and neuroglia; Discuss nerve growth factors	Lecture / Small Group Teaching (SGT)
PY3.2	Describe the types, functions, properties of nerve fibers including strength duration curve, chronaxie and rheobase	Lecture / Small Group Teaching (SGT)
PY3.3	Classify nerve injury and discuss the mechanism of degeneration and regeneration in peripheral nerves	Lecture / Small Group Teaching (SGT)
PY3.4	Describe the microscopic structure of neuro-muscular junction (NMJ) and mechanism of neuromuscular transmission	Lecture / Small Group Teaching (SGT)
PY3.5	Discuss the applied aspects of neuromuscular junction: myasthenia gravis, Lambert Eaton syndrome and neuromuscular blocking agents.	Early Clinical Exposure (ECE)
PY3.6	Describe the different types of muscle fibers, their structure and physiological basis of action potential	Lecture / Small Group Teaching (SGT)
PY3.7	Describe properties, action potential and molecular basis of muscle contraction in skeletal muscle	Lecture / Small Group Teaching (SGT)
PY3.8	Describe properties, action potential and molecular basis of muscle contraction in smooth muscle	Lecture / Small Group Teaching (SGT)
PY3.9	Describe the mode of muscle contraction (isometric and isotonic), energy source, muscle metabolism and gradation of muscular activity	Lecture / Small Group Teaching (SGT)
PY3.10	Enumerate and briefly discuss myopathies	Lecture / Self Directed Learning (SDL)
PY3.11	Perform Ergography and calculate the work done by a skeletal muscle	Demonstration Observation Assistance Performance (DOAPs)
PY3.12	Observe with Computer assisted learning (i) Amphibian nerve -muscle experiments (ii) Amphibian cardiac experiments	Demonstration Observation Assistance Performance (DOAPs)

Comp. No	Competency	Teaching Learning Method
TOPIC 4: GASTRO-INTESTINAL PHYSIOLOGY		
PY4.1	Describe the functional anatomy of digestive system	Lecture / Small Group Teaching (SGT)
PY4.2	Enumerate various Gastrointestinal hormones (GI) hormones, discuss their functions and regulation	Lecture / Small Group Teaching (SGT)
PY4.3	Describe the composition, mechanism of secretion, functions, and regulation of saliva	Lecture / Small Group Teaching (SGT)
PY4.4	Describe the composition, mechanism of secretion, functions, and regulation of gastric juice. Discuss various gastric function tests	Lecture / Small Group Teaching (SGT)
PY4.5	Describe the composition, mechanism of secretion, functions, and regulation of pancreatic juice including various pancreatic exocrine function tests	Lecture / Small Group Teaching (SGT)
PY4.6	Describe the composition, mechanism of secretion, functions, and regulation of intestinal juices	Lecture / Small Group Teaching (SGT)
PY4.7	Describe the physiology of digestion and absorption of nutrients	Lecture / Small Group Teaching (SGT)
PY4.8	Describe GIT movements, its regulation and physiological significance including defecation reflex and the role of dietary fibers	Lecture / Small Group Teaching (SGT)
PY4.9	Describe the structure , functions and secretion of liver and gallbladder with elaboration of various liver function tests	Lecture / Small Group Teaching (SGT)
PY4.10	Describe the Gut-Brain Axis and its physiological significance	Lecture / Self Directed Learning (SDL)
PY4.11	Discuss (in brief) the applied physiology of GIT viz. Peptic ulcer, gastroesophageal reflux disease, vomiting, diarrhoea, constipation, Adynamic ileus, Hirschsprung's disease	Small Group Teaching (SGT) / Early Clinical Exposure (ECE)
PY4.12	Obtain relevant history and conduct correct General and Clinical examination of the abdomen in a normal volunteer or simulated environment	Demonstration Observation Assistance Performance (DOAPs)

Comp. No	Competency	Teaching Learning Method
TOPIC 5: CARDIO VASCULAR PHYSIOLOGY		
PY5.1	Describe the functional anatomy of heart including chambers and coronary circulation	Lecture / Small Group Teaching (SGT)
PY5.2	Describe the properties of cardiac muscle including its morphology, electrical, mechanical and metabolic functions	Lecture / Small Group Teaching (SGT)
PY5.3	Describe generation and conduction of cardiac impulse along with the conduction pathway (including pacemaker potential).	Lecture / Small Group Teaching (SGT)
PY5.4	Discuss the physiological events occurring during the cardiac cycle, concurrent pressure volume changes, generation of heart sounds and murmur	Lecture / Small Group Teaching (SGT)
PY5.5	Describe the physiology of electrocardiogram (E.C.G), the cardiac axis and its applications	Lecture/ Early Clinical Exposure (ECE)
PY5.6	Discuss physiological variations in ECG waveforms, abnormal waveforms and intervals , arrhythmias, heart blocks and myocardial Infarction	Small Group Teaching (SGT) / Early Clinical Exposure (ECE)
PY5.7	Discuss hemodynamics of circulatory system	Lecture / Small Group Teaching (SGT)
PY5.8	Describe and discuss local and systemic cardiovascular regulatory mechanisms	Lecture / Small Group Teaching (SGT)
PY5.9	Describe heart rate, factors affecting heart rate, and its regulation	Lecture / Small Group Teaching (SGT)
PY5.10	Describe cardiac output, factors affecting cardiac output and its regulation.	Lecture / Self Directed Learning (SDL)
PY5.11	Describe blood pressure, factors affecting blood pressure and its regulation	Lecture / Self Directed Learning (SDL)
PY5.12	Describe & discuss regional circulation including microcirculation, lymphatic circulation, cerebral, capillary, skin, foetal, pulmonary and splanchnic circulation	Lecture / Small Group Teaching (SGT)
PY5.13	Describe the patho-physiology of shock, syncope heart failure with physiological basis of its management	Small Group Teaching (SGT) / Early Clinical Exposure (ECE)
PY5.14	Record blood pressure & pulse at rest and in different grades of exercise and postures in a volunteer or simulated environment	Demonstration Observation Assistance Performance (DOAPs)
PY5.15	Record and interpret normal ECG in a volunteer or simulated environment	Demonstration Observation Assistance Performance (DOAPs)
PY5.16	Obtain relevant history and conduct General and Clinical examination of the cardiovascular system in a normal volunteer or simulated environment	Demonstration Observation Assistance Performance (DOAPs)

Comp. No	Competency	Teaching Learning Method
TOPIC 6: RESPIRATORY PHYSIOLOGY		
PY6.1	Describe the functional anatomy of respiratory tract and non-respiratory functions of lungs	Lecture / Small Group Teaching (SGT)
PY6.2	Describe the mechanics of normal respiration, pressure changes during ventilation, lung volume and capacities (Static and Dynamic)	Lecture / Small Group Teaching (SGT)
PY6.3	Describe the alveolar surface tension, compliance, airway resistance, ventilation, V/P ratio, diffusion capacity of lungs	Lecture / Small Group Teaching (SGT)
PY6.4	Discuss the transport of respiratory gases viz Oxygen and Carbon dioxide across lungs and whole body	Lecture / Small Group Teaching (SGT)
PY6.5	Describe the chemoreceptors (peripheral and central) and neural centres of respiration including chemical and neural regulation of respiration	Lecture / Small Group Teaching (SGT)
PY6.6	Describe and discuss the pathophysiology of dyspnoea, hypoxia, cyanosis, asphyxia, drowning, periodic breathing and oxygen therapy	Lecture / Small Group Teaching (SGT)
PY6.7	Discuss various lung function tests and their clinical significance in obstructive and restrictive lung diseases	Lecture / Small Group Teaching (SGT)
PY6.8	Discuss the physiology of high altitude and acclimatization	Lecture / Small Group Teaching (SGT)
PY6.9	Discuss the physiology of deep sea diving and decompression sickness	Lecture / Small Group Teaching (SGT)
PY6.10	Perform Spirometry and interpret the findings (Digital / Manual)	Demonstration Observation Assistance Performance (DOAPs)
PY6.11	Describe principles and methods of artificial respiration	Demonstration Observation Assistance Performance (DOAPs)
PY6.12	Obtain relevant history and conduct correct General and Clinical examination of the respiratory system in a normal volunteer or simulated environment	Demonstration Observation Assistance Performance (DOAPs)
PY6.13	Demonstrate the correct technique to perform measurement of peak expiratory flow rate in a normal volunteer or simulated environment	Demonstration Observation Assistance Performance (DOAPs)

Comp. No	Competency	Teaching Learning Method
TOPIC 7: RENAL PHYSIOLOGY		
PY7.1	Describe the functional anatomy of kidney and non-excretory functions of kidney	Lecture / Small Group Teaching (SGT)
PY7.2	Describe the structure and functions of juxta glomerular apparatus and role of renin-angiotensin system	Lecture / Small Group Teaching (SGT)
PY7.3	Describe the mechanism of urine formation involving processes of filtration (Glomerular filtration), tubular reabsorption & secretion.	Small Group Teaching (SGT) / Self Directed Learning (SDL)
PY7.4	Describe the mechanism of urine concentration and dilution (Counter current Multiplier & Exchanger)	Lecture / Small Group Teaching (SGT)
PY7.5	Describe the renal regulation of fluid and electrolytes & acid-base balance	Lecture / Small Group Teaching (SGT)
PY7.6	Describe the innervations of urinary bladder, physiology of micturition and its abnormalities	Lecture / Small Group Teaching (SGT)
PY7.7	Describe cystometry and discuss the normal cystometrogram	Lecture / Small Group Teaching (SGT)
PY7.8	Discuss various Renal Function Tests with its physiological significance and clinical implication of Renal clearance	Small Group Teaching (SGT) / Early Clinical Exposure (ECE)
PY7.9	Discuss the role of artificial kidneys, dialysis and indications of renal transplant	Lecture / Small Group Teaching (SGT)
TOPIC 8: ENDOCRINE PHYSIOLOGY		
PY8.1	Describe the functional anatomy of endocrine glands, mechanism of hormonal action (steroid and peptide) and hypothalamus pituitary axis {HPA}	Lecture / Small Group Teaching (SGT)
PY8.2	Describe the synthesis, secretion, transport, physiological actions, regulation and effect of altered (hypo and hyper) secretion of pituitary gland	Lecture / Small Group Teaching (SGT)
PY8.3	Describe the synthesis, secretion, transport, physiological actions, regulation and effect of altered (hypo and hyper) secretion of thyroid gland including thyroid function tests	Lecture / Small Group Teaching (SGT)/
PY8.4	Describe the synthesis, secretion, transport, physiological actions, regulation and effect of altered (hypo and hyper) secretion of adrenal gland and its function tests	Lecture / Small Group Teaching (SGT) / Early Clinical Exposure (ECE)
PY8.5	Describe the synthesis, secretion, transport, physiological actions, regulation and effect of altered (hypo and hyper) secretion of parathyroid gland with emphasis of physiology of bone and calcium metabolism	Lecture / Small Group Teaching (SGT)
PY8.6	Describe the synthesis, secretion, transport, physiological actions, regulation and effect of altered (hypo and hyper) secretion of pancreatic gland including pancreatic function tests	Lecture / Small Group Teaching (SGT)
PY8.7	Describe the physiology of Thymus & Pineal Gland	Lecture / Small Group Teaching (SGT)

Comp. No	Competency	Teaching Learning Method
TOPIC 9: REPRODUCTIVE PHYSIOLOGY		
PY9.1	Explain sex determination, sex differentiation and their abnormalities and discuss the effects of removal of gonads on physiological functions	Lecture / Small Group Teaching (SGT)
PY9.2	Describe and discuss puberty: onset, progression, stages; early and delayed puberty.	Lecture / Small Group Teaching (SGT)
PY9.3	Describe the functional anatomy of male reproductive system, functions of testis, spermatogenesis and discuss the functions and regulations of testosterone hormone	Lecture / Small Group Teaching (SGT)
PY9.4	Describe the functional anatomy of female reproductive system: functions of ovary and its hormones (estrogen and progesterone) ; hormonal regulation by hypothalamic pituitary gonadal (HPG axis)	Small Group Teaching (SGT) / Self Directed Learning (SDL)
PY9.5	Discuss the menstrual cycle, uterine and ovarian changes, hormonal regulation and its implications in reproductive physiology	Small Group Teaching (SGT) / Self Directed Learning (SDL) / Early Clinical Exposure (ECE)
PY9.6	Enumerate male and female contraceptive methods, rationale of its prescription, side effects and its advantages & disadvantages	Small Group Teaching (SGT) / Self Directed Learning (SDL) / Early Clinical Exposure (ECE)
PY9.7	Discuss the physiology of pregnancy, parturition & lactation.	Lecture / Small Group Teaching (SGT)
PY9.8	Discuss the physiological basis of various pregnancy tests	Lecture / Small Group Teaching (SGT)
PY9.9	Discuss the hormonal changes and their effects during perimenopause and menopause	Lecture / Small Group Teaching (SGT)
PY9.10	Discuss the common causes of infertility in a couple and role of IVF in managing a case of infertility	Lecture / Small Group Teaching (SGT)

Comp. No	Competency	Teaching Learning Method
TOPIC 10: CENTRAL NERVOUS SYSTEM PHYSIOLOGY		
PY10.1	Describe and discuss the functional organization of central nervous system (brain and spinal cord)	Lecture / Small Group Teaching (SGT)
PY10.2	Describe the functional anatomy of peripheral nervous system (including autonomic nervous system)	Lecture / Small Group Teaching (SGT)
PY10.3	Classify the neurotransmitters and discuss the chemical transmission in the nervous system.	Lecture / Small Group Teaching (SGT)
PY10.4	Discuss the classification, functions and properties of synapse	Lecture / Small Group Teaching (SGT) / SDL
PY10.5	Discuss the classification, functions and properties of reflex	Lecture / Small Group Teaching (SGT) / SDL
PY10.6	Discuss the classification, functions and properties of receptors	Lecture / Small Group Teaching (SGT) / SDL
PY10.7	Discuss somatic sensations, ascending tracts, (sensory tracts) and applied aspects of sensory system	Lecture / Small Group Teaching (SGT)
PY10.8	Discuss Physiology of pain including pain pathways and its modulation with special emphasis on gate control theory of pain	Lecture / Small Group Teaching (SGT)
PY10.9	Describe the course of descending tracts (pyramidal and extra pyramidal), its clinical implications including difference in Upper motor neuron (UMN) and lower motor neuron (LMN) lesions	Lecture / Small Group Teaching (SGT)
PY10.10	Discuss types and clinical features of spinal cord lesions (complete, incomplete transection and hemisection - Brown Sequard syndrome)	Lecture / Small Group Teaching (SGT) / ECE
PY10.11	Describe functional anatomy of cerebellum, its connections, functions and clinical abnormalities.	Lecture / Small Group Teaching (SGT)
PY10.12	Discuss functional anatomy of basal ganglia, its connections, functions and Clinical abnormalities.	Lecture / Small Group Teaching (SGT)
PY10.13	Discuss the mechanism of maintenance of tone, posture and control of body movements	Lecture / Small Group Teaching (SGT)
PY10.14	Discuss functional anatomy of thalamus, its connections, functions and clinical abnormalities.	Lecture / Small Group Teaching (SGT)
PY10.15	Discuss functional anatomy of hypothalamus and limbic system, its connections, functions and clinical abnormalities.	Lecture / Small Group Teaching (SGT)
PY10.16	Discuss functional anatomy of cerebral cortex, its connections, functions and Clinical abnormalities	Lecture / Small Group Teaching (SGT)
PY10.17	Discuss the structure and functions of reticular activating system, sleep physiology and EEG waveforms during sleep wake cycle	Lecture / Small Group Teaching (SGT)
PY10.18	Discuss the physiological basis of memory, learning and speech and clinical alterations in speech	Lecture / Small Group Teaching (SGT)
PY10.19	Obtain relevant history and conduct correct General and Clinical examination of the nervous system: Higher functions, sensory system, motor system, reflexes in a normal volunteer or simulated environment	Demonstration Observation Assistance Performance (DOAPs)
PY10.20	Obtain relevant history and conduct correct General and Clinical examination of the cranial nerves in a normal volunteer or simulated environment	Demonstration Observation Assistance Performance (DOAPs)

Comp. No	Competency	Teaching Learning Method
TOPIC 11: SPECIAL SENSES		
PY11.1	Describe and discuss physiology of smell and its applied aspects	Lecture / Small Group Teaching (SGT)
PY11.2	Describe and discuss physiology of taste sensation and applied aspects	Lecture / Small Group Teaching (SGT)
PY11.3	Describe and discuss functional anatomy of ear and auditory pathways, vestibular apparatus and equilibrium	Lecture / Small Group Teaching (SGT)
PY11.4	Discuss physiology of hearing, pathophysiology of deafness and hearing tests	Lecture / Small Group Teaching (SGT)
PY11.5	Discuss functional anatomy of eye, visual pathway, light and pupillary reflex and clinical implication of lesions in visual pathway	Lecture / Small Group Teaching (SGT)
PY11.6	Discuss physiology of image formation, refractive errors and physiological principles of its management	Small Group Teaching (SGT) / Early Clinical Exposure (ECE)
PY11.7	Discuss physiology of vision including color vision and color blindness	Lecture / Small Group Teaching (SGT)
TOPIC 11: INTEGRATED PHYSIOLOGY		
PY12.1	Describe physiological mechanism of temperature regulation	Lecture / Small Group Teaching (SGT)
PY12.2	Discuss adaptation to altered temperature (heat and cold) and mechanism of fever, cold injuries and heat stroke	Lecture / Small Group Teaching (SGT)
PY12.3	Discuss cardio-respiratory and metabolic adjustments during exercise (isometric and isotonic), effects of physical training under different environmental conditions (heat and cold)	Lecture / Small Group Teaching (SGT)
PY12.4	Discuss physiological consequences of sedentary lifestyle; metabolic and endocrinal consequences of obesity & metabolic syndrome.	Lecture / Small Group Teaching (SGT)
PY12.5	Describe physiology of Infancy, Interpret growth charts and anthropometric assessment of infants	Small Group Teaching (SGT) / Early Clinical Exposure (ECE)
PY12.6	Describe and discuss physiology of aging, role of free radicals and antioxidants	Lecture / Small Group Teaching (SGT)
PY12.7	Discuss the concept, criteria for diagnosis of Brain death and its implications	Lecture / Small Group Teaching (SGT)
PY12.8	Discuss the physiology of yoga and meditation	Lecture / Small Group Teaching (SGT)
PY12.9	Obtain history and perform general examination in the volunteer/ simulated environment	Demonstration Observation Assistance Performance (DOAPs)
PY12.10	Demonstrate Basic Life Support in a simulated environment	Demonstration Observation Assistance Performance (DOAPs)

AETCOM (ATTITUDE, ETHICS, AND COMMUNICATION MODULE)

Module No	Topic	Assessment
1.2	What does it mean to be a Patient	Brief Answer Question in Paper-I
1.3	Doctor - Patient Relationship	Brief Answer Question in Paper-II

TIME ALLOTMENT FOR VARIOUS TEACHING LEARNING METHODS

No	Curricular Component	Time Allocation (Hours)
1	Lectures	130
2	Small Group Teaching/Tutorials / Practical/Seminars	305
3	Self-directed learning (SDL)	10
4	Early Clinical Exposure (ECE)	09
5	AETCOM	08
TOTAL		462

To be noted:

- The number of hours mentioned above are rough guidelines that can be modified to suit the specific requirements of a medical college.
- It is recommended that didactic teaching be restricted to less than one third of the total time allotted for that discipline.
- Greater emphasis is to be laid on hands-on training, symposia, seminars, small group discussions, problem-oriented and problem-based discussions and self- directed learning.
- Students must be encourage to take active participation and share responsibility for their learning.

ASSESSMENT

A. INTERNAL ASSESSMENT

Scheme of Internal Examination

No	Examination		Theory Marks			Practical Marks
			Section A	Section B	Total	
1	First Internal Examination		50	50	100	100
2	Second Internal Examination		50	50	100	100
3	Preliminary Examination	Paper-I	50	50	100	100
		Paper-II	50	50	100	
4	Remedial Examination	Paper-I	50	50	100	100
		Paper-II	50	50	100	

Calculation of Internal Marks

Theory Internal (2PY104)	Maximum Marks	Practical Internal (2PY105)	Maximum Marks
1st Internal Examination (20% of total marks obtained)	20	1st Terminal Examination (20% of total marks obtained)	20
2nd Internal Examination (20% of total marks obtained)	20	2nd Terminal Examination (20% of total marks obtained)	20
Preliminary Examination (20% of total marks obtained in Paper-I) (20% of total marks obtained in Paper-II)	40	Preliminary Examination (40% of total marks obtained)	40
Day to day assessment Attendance/Journal/Logbook	20	Day to day assessment Attendance/Journal/Logbook	20
TOTAL	100	TOTAL	100

Note:

- Only the final marks out of 100 needs to be submitted to the University, separately for theory and practical for each internal assessment
- Internal assessment should be based on competencies and skills.
- Regular periodic examinations shall be conducted throughout the course.
- There shall be three internal assessment examinations.
- The third internal examination is the preliminary examination to be conducted on the lines of the university examination.
- A candidate must secure at least 50% marks of the total marks (combined in theory and practical / clinical; not less than 40 % marks in theory and practical separately) assigned for internal assessment in a particular subject in order to be eligible for appearing at the final University examination of that subject.
- Day to day records and log book (including required skill certifications) should be given importance in internal assessment.
- Level of participation in self-directed learning (SDL), assignments, seminars, clinical case presentation, and project work will be assessed and importance will be given in internal assessment.
- Internal assessment marks will not be added to university examination marks and will reflect as a separate head of passing at the summative examination.
- The results of internal assessment should be displayed on the notice board within 1-2 weeks of the test.
- Students must secure at least 75% in theory and 80% in practical /clinical of total attendance for eligibility to appear for the examinations in that subject.
- Remedial examination should be taken after the results of preliminary examination for the students who are not eligible for university are declared and before submission of internal assessment marks to the University.
- The internal and formative assessments provide ideal opportunities for students and teachers to identify learning gaps. Teachers should provide high quality feedback to each student to enable them to bridge these learning gaps.

- Formative assessments also enable the early identification of students who are struggling to achieve the intended learning outcomes. Early and appropriate targeted remediation must be planned for such students.

B. EXTERNAL / UNIVERSITY ASSESSMENT:

Scheme of External Assessment

No	Assessment Type		Code	Marks		
				Section A	Section B	Total
1	Physiology Theory	Physiology-I	2PY101	50	50	100
		Physiology-II	2PY102	50	50	100
2	Physiology Practical		2PY103			100

Theory Examination Syllabus Distribution

Physiology Paper-I	Physiology Paper-II
General Physiology (PY1.1 to PY1.7)	Gastrointestinal Physiology (PY4.1 to PY4.11)
Hematology (PY2.1 to PY2.10)	Renal Physiology (PY7.1 to PY7.9)
Nerve & Muscle Physiology (PY3.1 to PY3.10)	Endocrine Physiology (PY8.1 to PY8.7)
Cardiovascular Physiology (PY5.1 to PY5.13)	Reproductive Physiology (PY9.1 to PY9.10)
Respiratory Physiology (PY6.1 to PY6.9)	Neurophysiology (PY10.1 to PY10.18)
Integrated Physiology (PY12.1 to PY12.4)	Special Senses (PY11.1 to PY11.7)
AETCOM Module 1.2	Integrated Physiology (PY12.5 to PY12.8)
	AETCOM Module 1.3

Theory Examination Paper Style

Section-A (Physiology Paper-I & Physiology Paper-II)		Marks
Q-1	Structured / Case Based Long Question (Any 1 out of 2)	1x10=10
Q-2	Short Question (Any 6 out of 7) (One Question is compulsory from AETCOM Module 1.2 in Paper-I) (One Question is compulsory from AETCOM Module 1.3 in Paper-II)	6x5=30
Q-3	Short Question in one or two sentences. (Any 5 out of 6)	5x2=10
Total		50
Section-B (Physiology Paper-I & Physiology Paper-II)		Marks
Q-4	Structured / Case Based Long Question (Any 1 out of 2)	1x10=10
Q-5	Short Question (Any 6 out of 7)	6x5=30
Q-6	Multiple Choice Questions (MCQs) (All Compulsory) (Each MCQ 1 Mark)	10x1=10
Total		50

Practical Examination Scheme

No	Type of Exercise	Total Marks	
1	Hematology	Major Exercise	20
		Minor Exercise	10
2	Clinical Physiology	Major Exercise	20
		Minor Exercise	10
3	Amphibian Graphs, Charts, Instruments, Clinical Photographs	15	
4	Objective Structured Practical Examination (OSPE)	10	
5	Viva Voce (Theory Viva)	15	
Total		100	

Passing Criteria: Minimum **40%** marks must be secured in Theory as well as Practical **Separately** and minimum **50%** marks must be secured in **Combined** Theory as well as Practical

Recommended Books

Theory Books

No	Title	Edition	Author
1	Guyton & Hall - Textbook of Medical Physiology	14 th	John E. Hall
2	Ganong's Review of Medical Physiology	27 th	Kim E. Barrett
3	Textbook of Physiology (2 Volume)	10 th	A. K. Jain
4	Medical Physiology for Undergraduate Student	3 rd	Indu Khurana
5	Textbook of Medical Physiology	4 th	Indu Khurana
6	Textbook of Medical Physiology (2 Volume)	4 th	G. K. Pal
7	Fundamentals of Medical Physiology	2 nd	Sabyasachi Sircar
8	Best & Taylor's Physiological Basis of Medical Practice	13 th	O. P. Tondon
9	Samson Wright's Applied Physiology	13 th	Cyril A Keele
10	Tortora's Principle of Anatomy & Physiology	15 th	Gerard Tortora
11	LPR's Fundamentals of Medical Physiology (2 Volume)	9 th	L Prakasam Reddy
12	Berne & Levy Physiology	8 th	Bruce M Koeppen
13	Boron & Boulpaep Medical Physiology	4 th	Walter F Boron
14	Human Physiology An Integrated Approach	8 th	Dee Unglaub Silverthorn
15	Human Physiology From Cells to Systems	9 th	Lauralee Sherwood
16	Vander's Human Physiology The Mechanism of Body Function	15 th	Eric P Widmaier

Practical Books

No	Title	Edition	Author
1	Textbook of Practical Physiology	5 th	G. K. Pal
2	Ghai's Textbook of Practical Physiology	10 th	V. P. Varshney
3	Manual of Practical Physiology for MBBS	7 th	A. K. Jain
4	Practical Physiology Book	2 nd	M. Chandrasekar