First Year study guide

Quaid-e-Azam Medical College, Bahawalpur, Pakistan.

Vision:

Our vision here at QAMC is to be a global leader in transformative medical education and healthcare delivery.

Mission:

To advance the art and science of medicine through innovative medical education, research, and compassionate healthcare delivery, within available resources, in an environment that advocates critical thinking, creativity, integrity, and professionalism.

To achieve this

We will impart core knowledge of basic sciences in interesting, compact and practical way to undergraduate students by Spiral integrated system of teaching so that they can differentiate between normal and abnormal structure at gross, microscopic and embryological level.

Objectives :

To impart: Knowledge - On the principles of pedagogy

Skills -
- Dissection & Prosection
- Surface Anatomy
- Models
- Histological techniques
- Research skills
- Communication skills
- Self directed learning
- Competency bases learning

Attitude-
- Integrated Journal
- E-Learning
- Research
- Professionalism
- Empathy
- Inter Personal Skills
- Team building skills
- Extra-Curricular activities

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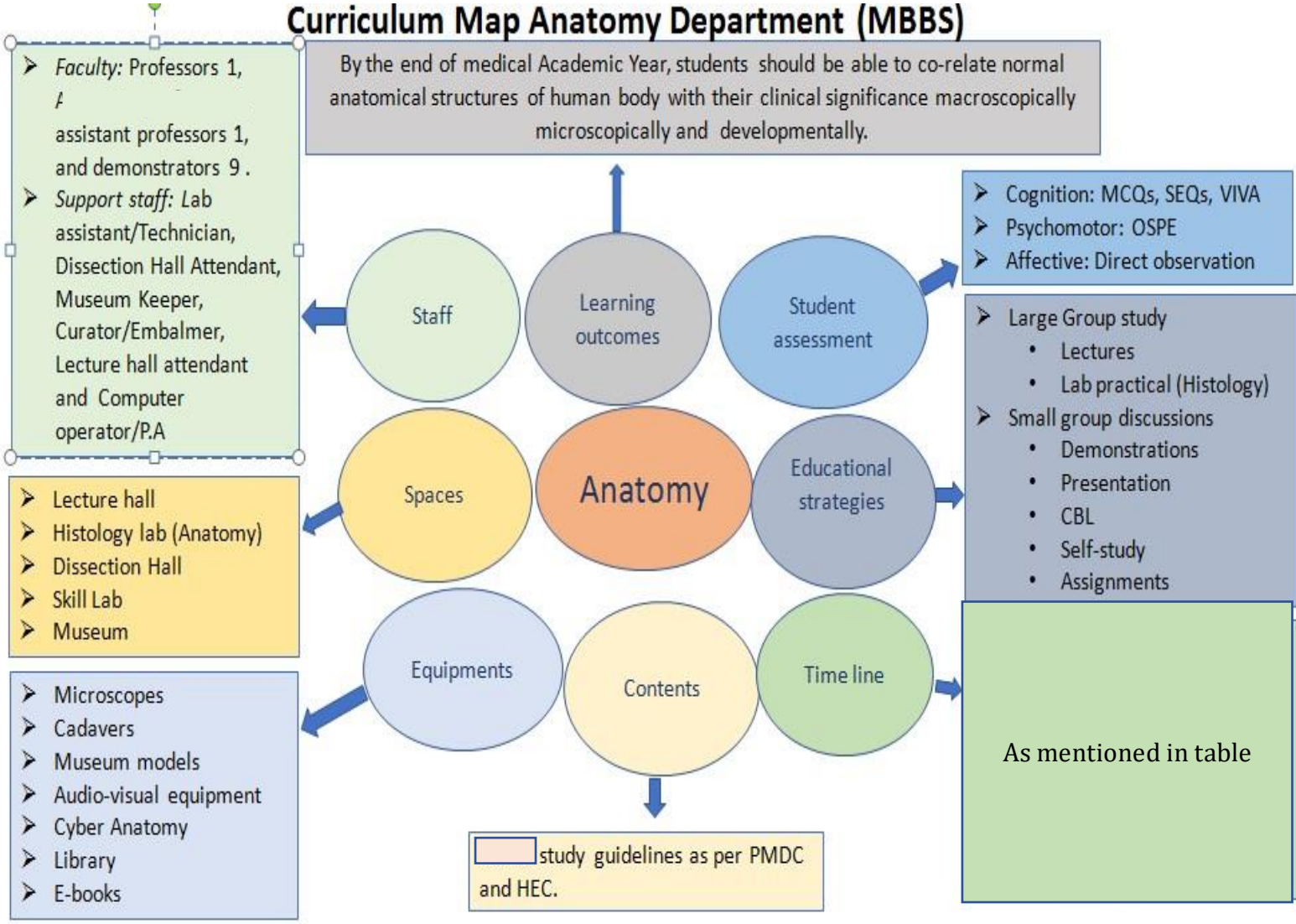
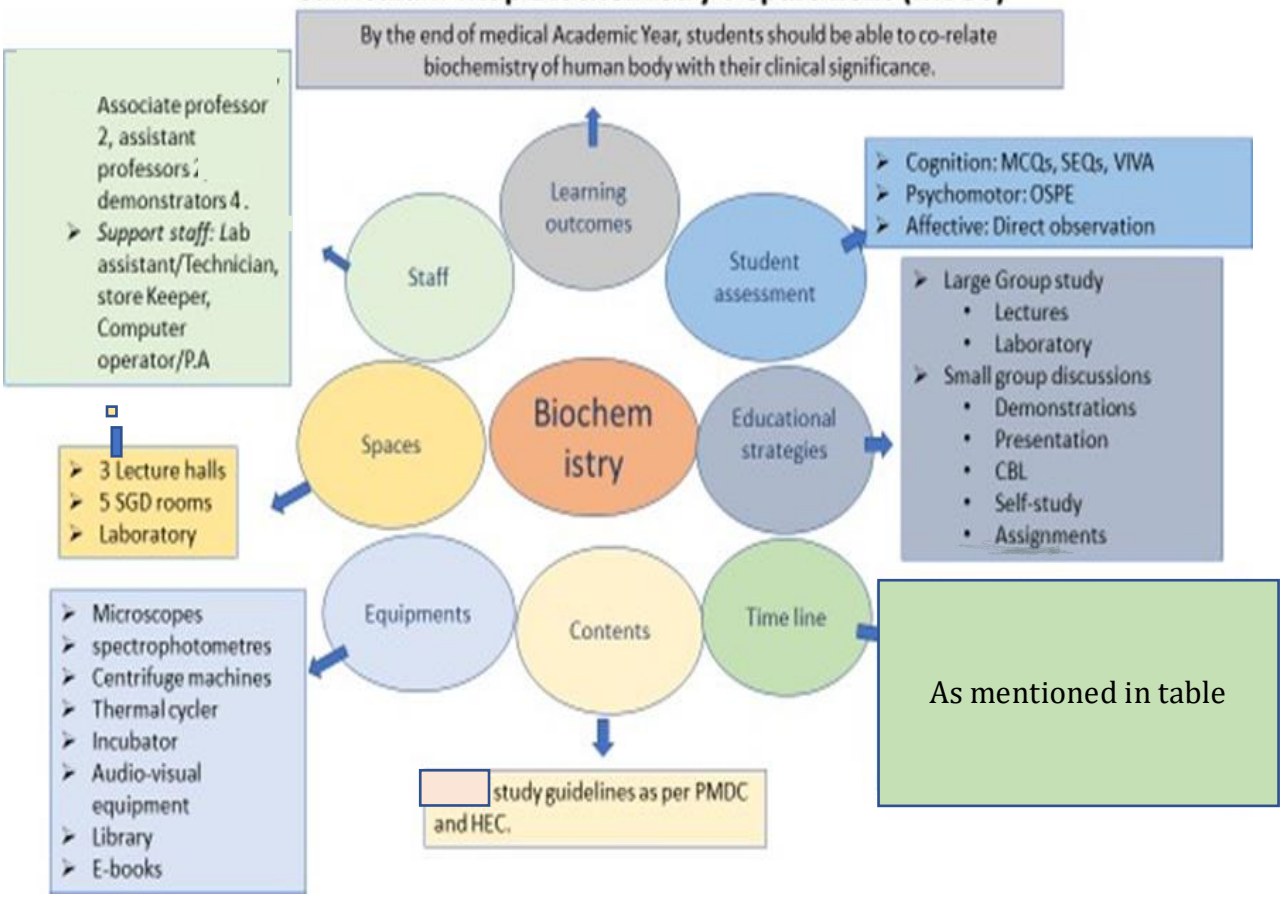
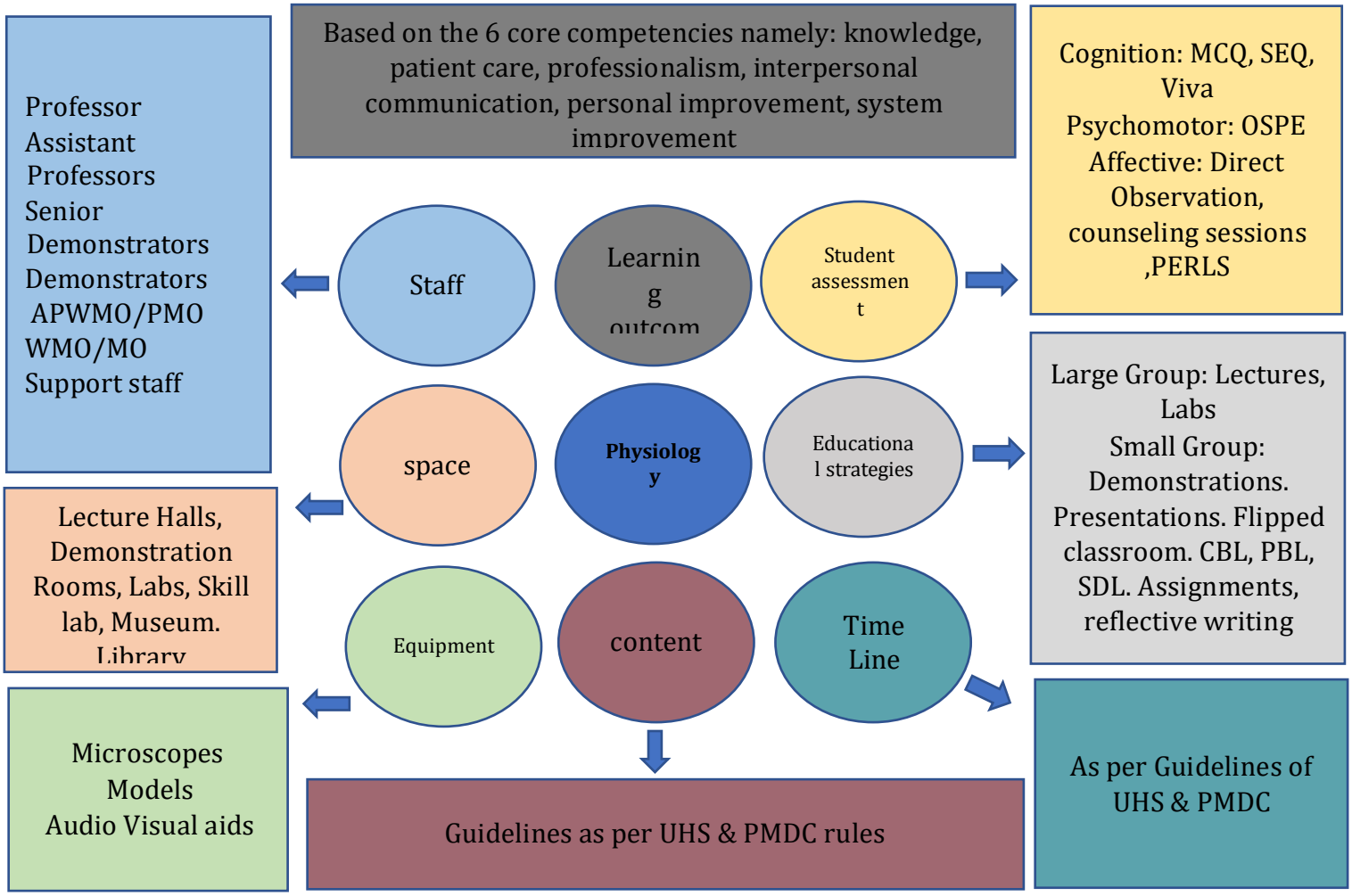
Curriculum Map Anatomy Department (MBBS)



Curriculum Map Biochemistry Department (MBBS)



Curriculum map of Physiology department



1. List of Faculty of Anatomy

Dr. Sabahat Gul	Professor & Head of Department
Dr. M. Fahad Atta	Assistant Professor
Dr Zafar Mahmood	APMO
Dr Sajid Munir Qazi	APMO
Dr Irum Alamgir	APWMO
Dr. Sobia Fatima	APWMO
Dr Ali Imram	APMO
Dr Anjum Riaz	APWMO
Dr Lasania Mushtaq	Demonstrator
Dr Sadaf Mushtaq	Demonstrator
Dr Barkat Ali	Demonstrator
Dr Asiya	Demonstrator
Dr Sidra Arshad	Demonstrator
Dr. Anum Saeed	Demonstrator
Dr Hassan Jalil	Demonstrator
Dr Hafiza Urooj	Demonstrator
Dr Zainab Haq	Demonstrator

2. List of Faculty of Physiology

Dr. Sohail Atta ur Rasool	Professor & Head of Department
Dr Tasneem Kausar	APWMO
Dr Javaria Hamid	APWMO
Dr Humaira Sobia	APWMO
Dr.Shaheena Nawab	APWMO
Dr Ayesha Masood Khan	APWMO
Dr Anila Hamayon	Sr. Demonstrator
Dr M Masood Khan	Sr. Demonstrator
Dr Abdul Razaq	Sr Demonstrator
Dr Rukun-ud-din	Demonstrator
Dr Asima Shaeef	Demonstrator
Dr Anum Farheen	Demonstrator
Dr. Anum Baig	Demonstrator
Dr Shagufta Sikandar	Demonstrator
Dr Maham Zaidi	Demonstrator
Dr Hafiz Muhammad Usama	Demonstrator
Dr Asad Ali Bubak	Demonstrator

2.List of Faculty of Biochemistry

Dr. Naveed Najeeb	Associate Professor & Head of Department
Dr. Tayyaba Batool	Associate Professor
Dr Farhat Batool	APWMO
Dr Javeria Shahbaaz	APWMO
Dr Zafar Iqbal Malik	Sr. Demonstrator
Dr Humaira Ahmed	Sr. Demonstrator
Dr Taiba Tahseen	Sr Demonstrator
Dr Asmat Bashir	Sr. Demonstrator
Dr M Akram Bhutta	Sr Demonstrator
Dr Fatima Fareed	Demonstrator
Dr. Khuzama Khan	Demonstrator
Dr Shagufta Usman	Demonstrator
Dr Sana Fayyaz	Demonstrator
Dr Amara Shabbir	Demonstrator
Dr Tahira Naz	Demonstrator
Dr Madiha Gillani	Demonstrator

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REVISED TIME TABLE FOR FIRST YEAR MBBS CLASS FOR THE SESSION 2022-2023
QUAID-E-AZAM MEDICAL COLLEGE BAHAWALPUR
WITH EFFECT FROM:14-09-2023.
MODULE-IV (FOR ..... WEEKS)

DAYS	8:00 AM to 09:00 AM	9:00 AM to 10:00 AM	10:00 to 11:00 AM	11:00 to 11:15 AM	11:15 AM to 12:15 PM	12:15 AM to 01:15 PM			01:15 PM to 02:00 PM
	Lecture	Lecture	Lecture		Lecture	Practical			Lecture
MONDAY	Dissection	Physiology	Anatomy	Recess	Physiology	Batch A (Physiology Lab)	Batch B (Biochemistry Lab)	Batch C (Histology Lab)	Pharma / Impact
TUESDAY	Dissection	Physiology	Anatomy		Physiology	Batch B (Physiology Lab)	Batch C (Biochemistry Lab)	Batch A (Histology Lab)	Community Medicine
WEDNESDAY	Dissection	Physiology	Anatomy		Physiology	Batch C (Physiology Lab)	Batch A (Biochemistry Lab)	Batch B (Histology Lab)	CSIM
THURSDAY	Dissection	Physiology	Biochemistry		Physiology	Batch A (Tutorial)	Batch B (Turorial)	Batch C (Tutorial)	CSIM
FRIDAY	Dissection	Physiology	Biochemistry		11:00 to 12:00 AM			*FRIDAY BREAK*	
					Physiology Batch B (Tutorial)	Biochemistry Batch C (Tutorial)	Anatomy Batch A (Tutorial)		
	8:00 AM to 09:00 AM	9:00 AM to 10:00 AM	10:00 to 11:00 AM	11:00 to 11:15 AM	11:15 AM to 12:15 PM			12:15 to 01: 15 PM	01:15 to 02:00 PM
SATURDAY	PERLS	Pathology	Biochemistry	Recess	Physiology Batch C (Tutorial)	Biochemistry Batch A (Tutorial)	Anatomy Batch B (Tutorial)	Islamiyat/ Community Medicine	SDL

No _____/QAMC/SS/23 Dated_____

A copy is forwarded for information and necessary action to:-

1. The Director, Department of Medical Education (DME), QAMC, Bahawalpur.
2. The Head of Basic & Clinical Departments (Concerned) QAMC, Bahawalpur.
3. The Teacher of Islamiat & Pakistan Studies QAMC, Bahawalpur.
4. College & Hostel Notice Boards QAMC, Bahawalpur.

09.09.2023

09-9-2023

For Approval

Sabahat
9-3-23

INTRODUCTION

a. Preamble

Integration has been accepted as an important educational strategy in medical education. QAMC believes in continuous curriculum revision through regular reviews and feedback of stakeholders. This curriculum is updated as per recently revised standards of Pakistan Medical & Dental Council (PM&DC) which sets Correlation as a minimum level of integration in MBBS. This curriculum is outcome based, patient centered, community relevant, promotes health and prevents disease. It has been revised by the faculty of basic and clinical sciences from constituent/affiliated colleges in collaboration with UHS and Department of Medical Education.

b. Curricular organization and structure

1) QAMC MBBS 1st yr curriculum will be delivered in a System Based Modular Format in the first years and through clinical rotations/clerkships in the years to follow.
2) System based modules will link basic science knowledge to clinical problems. Students will be taught in an integrated manner so that subjects shall be presented as a meaningful whole. Students will have better understanding of basic sciences when they repeatedly learn in relation to clinical examples.
3) There will be three blocks, each will have modules, duration of which depends upon the number and complexity of the objectives to be achieved in that module.
4) The curriculum will be delivered by modular teams of multidisciplinary basic science faculty and relevant clinical faculty. The planning and delivery will be coordinated by year coordinators

who will guide module coordinators of their respective years for efficient implementation

5) The syllabus will be integrated horizontally around systems of the body in which Anatomy, Physiology and Biochemistry will be taught with clinical relevance. Additional chunks of content will be added in a module that exactly does not fit in the central theme of the module.

6) Longitudinal themes (Behavioral Sciences, Community medicine and Research Methodology & EBM) are an integral part of year I yr.

7) Islamiat and Pakistan Studies are compulsory subjects taught throughout the year in first and second year respectively. Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

8) Professional Exams will be conducted in the form of blocks including all basic subjects with a small weightage of integrated subjects.

c. Curriculum perspective

QAMC curriculum is evolved taking into consideration Constructivist and behaviorist with some element of Cognitivist approach. It allows students to construct their own knowledge based on what they already know and to use that knowledge in purposeful activities requiring decision making, problem solving, and judgments.

d. Level of integration: Correlation i.e level 7 of Harden's level of Integration. The emphasis remains on disciplines or subjects with subject-based courses taking up most of the curriculum time. Within this framework, an integrated teaching session or course is introduced in addition to the subject-based teaching. This session brings together areas of interest common to each of the subjects. Though the teaching is discipline based, topics are correlated and taught with clinical context for better understanding and application of concepts.

e. Competencies. The focus of this curriculum is on the roles of a general physician as identified by PMDC. These are knowledgeable, skillful, community health promoter, professional critical thinker, role model, researcher and leader. Competencies focused in year I are:

1) Medical Knowledge
2) Procedural skills
3) Problem solving / critical thinker
4) Communication skills
5) Professionalism
6) Research
7) Role model and leader

f. Outcomes

By the end of years I, students should be able to:

1) Correlate the developmental and anatomical knowledge of different organ systems of human body to their physiological and biochemical basis.
2) Comprehend the significance of behavioral sciences and community medicine for medical students
3) Analyze multiple perspectives of Islamic studies or ethics and Pakistan studies
4) Discuss the basic principles of research

A Few salient features that have been incorporated in this curriculum for all the 3 domains of training, after deliberations and through an iterative process are as follows

Horizontal Integration:

The framework of Curriculum 2K23 has 44 modules spanning 05 years. The horizontal integration is evident in the modular configuration where different basic disciplines approach the themes simultaneously. Modules have been structured where all the basic disciplines are represented based on their respective weightage of content. Assessment framework ensures that the applied/clinical aspect also is inculcated in the concept development of the learner keeping the clinical relevance and context at the core.

Clinical Relevance & Themes

All module objectives are preceded by the recommended themes and clinical relevance. These are grounded in the rationale of the module so that pattern of learning could be steered for a practical professional approach. However institutional discretion does not prohibit adopting any other thematic approach provided that the program outcomes are adequately achieved.

Vertical Integration:

Spiral placement of the modules within the framework ensures a revisit of the basic sciences. In the first step the applied / clinical learning objectives orientate the learner

and the repetitive module horizontally rhymes with the clinical rotations with a backdrop of basic sciences. The final year of clerkship is the final revisit, which is primarily workplace based and principally involves the perfect integrated blend of tri-domain learning.

C-FRC Psychomotor:

Clinical Skills follow a spiral which is entirely skills dominant. This spiral is the core of psychomotor training. The first two years will be of Clinical Skills- Foundation which will represent clinical orientation. The clinical orientation will be conducted in wards, skills lab and simulation centers (depending on the available resources). The clinical orientation along with the applied/clinical component of the knowledge base will channelize the learner for the practical and professional aspect of learning. The subsequent two years the spiral will move on to Clinical Skills Rotations. The rotations in different wards will be based on foundational developmental already commenced in yesteryears. The year 3 and year 4 which have the rotations will also have the second visit of the modules which would now be more clinically inclined with a stronger base of Pharmacology and Pathology. Community oriented practices and family medicine will also be broadening the element of systems thinking and diversity of practice for a healthcare leader of tomorrow. Finally, Clinical Clerkships are aimed to be entirely facilitated in workplace environments. The clerkship model will involve the delegation of duties thus adding to the acquisition of professional accountability as a competency. The psychomotor training and skills acquisition will be the maximum in the year of clerkship. The entire process of C-FRC will be endorsed in a logbook which would be the training base of the learner for future references and exam evaluations.

PERLs:

Affective training has been formally inculcated in the curricular framework. The model of PERLs has been introduced so that the yield of doctors has a strong, resilient, ethically driven character. PERLs stands for Professionalism, Ethics, Research and Leadership skills. PERLs rounds up professional development for the effective application of the knowledge and skills base achieved. For a professional to be social accountable and to be able to play the healthcare leadership role for societal elements like advocacy, equity or resources and healthcare access, a formal training is a must. The categorical approach for this training has been achieved by rolling in the assessment of the competencies acquired along with development of portfolios. PERLs will run throughout the year via portfolio development. The portfolio development itself is a methodology which ensures student centered learning. The method of self-reflection which is integral for portfolio development places the learner in the right spot to steer his/her own learning needs. The spiral of PERLs will be monitored directly by the respective department of Medical Education. However, the teaching sessions, and mentoring process, can and will beassigned to other disciplines. For example, communication skills can have an input from the faculty of Family Medicine and research can be facilitated by the Community Medicine & Public Health faculty. Ethics can be jointly covered by the Forensic department and Behavioral sciences. Leadership is an ambit where the students will be motivated if the institutional leads themselves

get involved and can also have the input of the successful alumni. The Faculty of Medical Education will look after the entire process and will also engage in the teaching sessions, when and wherever required. Type of evidence, activities to be performed, learning situation for the acquirement of the competencies, for the portfolio should be defined and enlisted by the academic council along with the help of the department of Medical Education.

The framework of Curriculum 2K23 has certain other newer elements. These elements define our local context, our existing educational practices and conformity to evidence relating best international practices. Some will be commencing from the first year, however, rest will be a part of the following years. A few of these are:

- Quran
- Clinical Entrepreneurship
- Family Medicine
- Minimal Service Delivery Standards
- Electives
- Basic Life support

Academic calendar Year I domains of

Year 1	Modules
Block 1	Foundation-1 Hematopoietic & Lymphatic
Block 2	Musculoskeletal& Locomotion-1
Block 3	Cardiovascular-1 Respiratory-1
	PERLS Quran-1 Islamiat & Pak studies
	Clinical Skill Foundation C-FRC 1(Clinical- Foundation, Rotation ,Clerkship)

Blocks	BLOCK-I 8+3=11 weeks			BLOCK-II 8 weeks		BLOCK-III 7+4=11weeks	
Duration	**8 weeks**	**3 week s**	**1 wk**	**9 weeks**	**1 wk**	**05 Weeks**	**05 Weeks**
Modules	Foundation I	Hematopoietic & Lymphatic	**EOB**	Musculoskeletal& Locomotion-	**EOB**	Cardiovascular System	respiratory
Disciplines	Anatomy, Physiology, Biochemistry, relevant clinical disciplines						
Across the year	Behavioral Sciences, Research Methodology and Islamiat						

h. Proposed Contact Hours Distribution Yea

SUBJECTS	CONTACT HOURS
Anatomy	295
Physiology	260
Biochemistry	170
Community medicine/BS	65
Pathology	34
Pharmacology	18
Islamiyat	30
Self-Directed Learning	30
With integration	Medicine,surgery peads and obs/gynes
Total Hours	**936**

Educational Strategies (These are proposed, but institutes can use other evidence-based teaching methodologies that suit their context)

1) Interactive Lectures
2) Small group discussion
3) Lab practical
4) Skill lab
5) Problem based learning/ Case based learning
6) Tutorials
7) Integrated sessions using any of the above strategies
8) Self-directed learning (SDL) and directed self-learning (DSL)

Internal Assessment

Formative assessment (low stake) is at faculty discretion like mid module test and other class tests. There will be three end of blocks and one pre-annual examination in year I, which contributes towards the weighting of internal assessment.

Annual Professional Examination.

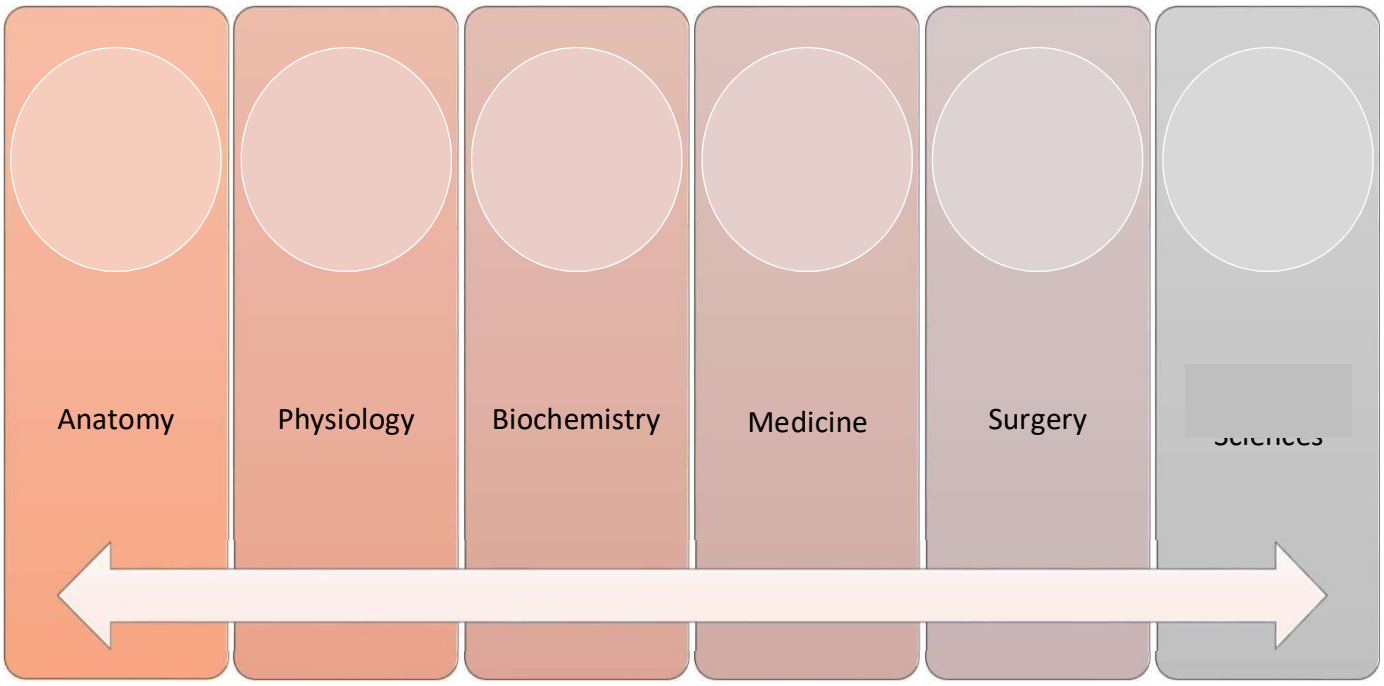
The University of Health sciences will take the first professional Examination at the end of the academic year. Annual Theory & Practical Examination will be of 200 marks for Anatomy, Physiology and Biochemistry. The passing score is 50% in theory and practical separately

evaluation of the Course.

a. The major goals of the evaluation are to monitor quality of and improve curriculum
b. Student portfolio shall be maintained in the departments in which students will give their feedback either by name or anonymously. Feedback may be taken at the end of module, online and informal student feedback during the running module.

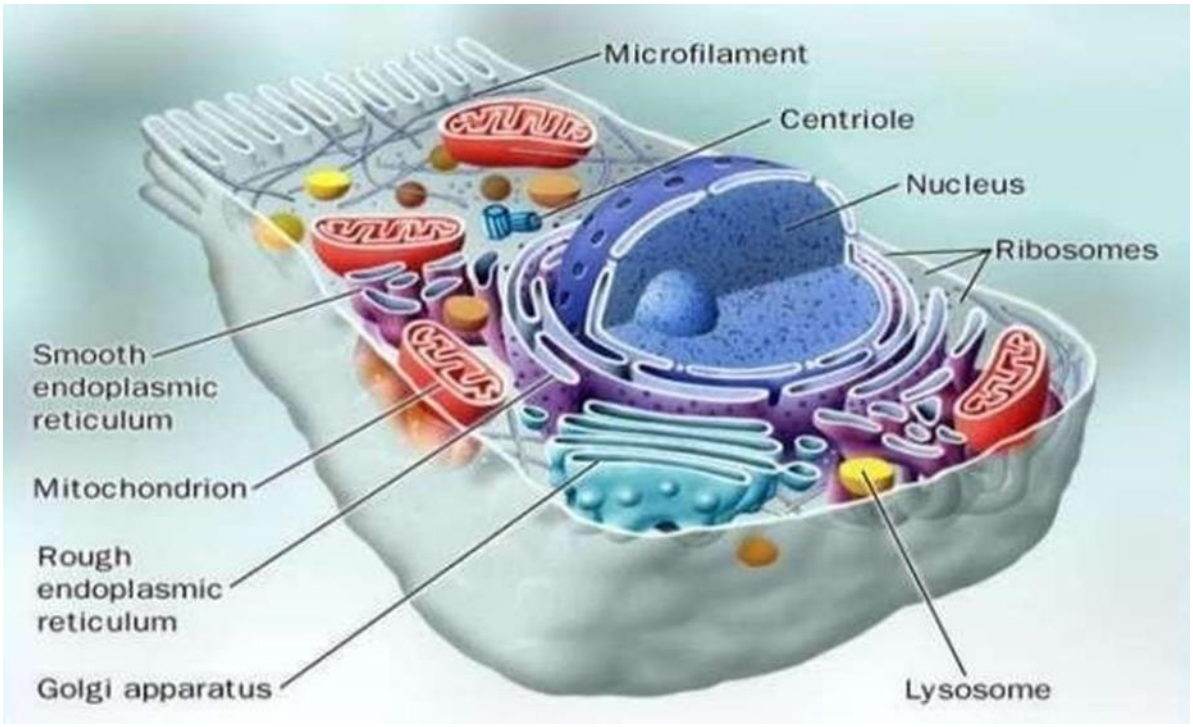
MBBS YEAR I
BLOCK I
MODULE I
FOUNDATION- I
Duration: 08 weeks

Integration of Disciplines in Foundation Module



MODULE PLANNING COMMITTEE

Module Coordinator	Prof. Dr Sabahat Gull
Members	Prof, Dr Suhail Ata Rasool & Dr Naveed Najeeb



Preamble

This module focuses on orientation of students to different disciplines to be taught in years I along with their grooming through basic themes of Behavioral Sciences. It includes basic anatomical, physiological and biochemical concepts about the human body and its development. Students will also be introduced to clinical subjects. Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

Aim

This module enables the student to recognize the role of different disciplines in studying human body and its diseases.

Learning outcomes

By the end of this module the students will be able to

- Grasp the basic concepts of sub-disciplines of Anatomy
- Operate a microscope correctly according to standard operating procedures
- Comprehend the basic concepts of Physiology
- Comprehend the basic concepts of biochemistry
- Outline the basics of Medicine
- Outline the basics of Surgery
- Outline
- Comprehend the basic concepts of Behavioral Sciences

Theory			
Sr. no	**SPECIFIC LEARNING OUTCOMES**	**DISCIPLINE**	**TOPIC**
	GROSS ANATOMY	**TOTAL HOURS = 12**	
1	Briefly describe the applied branches of anatomy Describe the "Anatomical Position" Describe the anatomical planes of body. Describe the terms of relationship, commonly used in Anatomy. Describe the anatomical terms used specifically for Limbs. Describe the terms related to movements.	General Anatomy	Introduction to General Anatomy
2	Describe, identify, and exemplify the general morphological features of bones. Describe the developmental classification of bones. Describe the regional classification of bones. Describe the structural classification of bones. Describe the morphological classification of bones. Describe and exemplify Sesamoid, Pneumatic, Wormian and Heterotopic bones. Describe the classification of bones on the basis of osteogenesis. Describe the relationship of growing end of bones with the direction of nutrient foramen Describe the blood supply, innervation and lymphatic drainage of various types of bones Describe the use of bone tissue for bone marrow biopsy and bone grafting Describe the salient features of common types of fractures	General Anatomy	Bones (Osteology)
3	Describe the general features of cartilage and its importance in gross anatomy.	General Anatomy	Cartilage (Chondrology)

	Describe the subtypes and gross features of Hyaline Cartilage Describe the gross features of Elastic Cartilage Describe the gross features of Fibrocartilage. Differentiate the three types of cartilages		
4	Describe and exemplify the structural classification of Joints (synovial, cartilaginous & fibrous) along with their sub-classification. Describe the components and characteristic features of a Synovial Joint Describe the blood supply, innervation and lymphatic drainage of Synovial Joints, cartilaginous joints, and fibrous joints. List the factors stabilizing a synovial joint. Describe the mechanism of movements	General Anatomy	Joints (Arthrology)
5	Describe the structure and function of Skin on the basis of its two layers; Epidermis and Dermis Describe the surface irregularities of the skin. Describe the structure of Hair as an appendage of skin. Describe the structure of Nail as an appendage of skin. Describe the structure of Sweat and Sebaceous Glands Describe the structure and function of Superficial Fascia Describe the structure, function, and modifications of Deep Fascia Describe and classify the burns and anatomical basis of manifestations of integumentary system	General Anatomy	Integumentary System
6	Define Muscle Classify and describe Muscle Tissue based on Structure, Function and Development Describe Somatic and Visceral Muscles Describe and differentiate the Red and White Variety of Skeletal Muscles	General Anatomy	Muscle Tissue (Myology)

	Describe Type A, B and C of Skeletal Muscles Classify and describe the skeletal muscles based on architecture. Classify skeletal muscle based on action. Describe the parts of a skeletal muscle. Describe the methods of studying skeletal muscle activity. Describe and differentiate the basic organization of innervation to skeletal, smooth, and cardiac muscle. Describe the structure of Tendons. Describe the structure of Synovial Bursae Describe the structure of Raphe. Comprehend the meaning of Paralysis, Spasm, Atrophy, Hypertrophy, Hyperplasia and Regeneration in relation to muscle tissue. Define Myasthenia Gravis and Polymyositis Define Angina pectoris and Fibrillation of Cardiac Muscle		
7	Classify the types of blood circulation. Classify and exemplify various types of blood vessels. Describe and exemplify various types of anastomoses. Explain the importance of End Arteries Define the terms: Arteriosclerosis, Atherosclerosis and Varicose Veins Describe the general organization of Lymphatic Circulation Define the terms: Lymphoid Tissue, Tissue Fluid, Lymphatic Capillaries, Lymph and Lymphatic Vessels Define the terms; Lymphangitis, Lymphadenitis, Lymphadenopathy and Lymphography	General Anatomy	Vascular System (Angiology)
8	Define neuron. Describe the anatomical structure of a neuron. Classify neurons based on morphology with examples.	General Anatomy	Nervous Tissue (Neurology)

	Classify neurons based on function. Describe the components of the central nervous system. Describe the components of the peripheral nervous system. Name the supporting cells (neuroglia) of the central nervous system. Describe the structure and functions of the neuroglia of the central nervous system. Enumerate the supporting cells (neuroglia) of the peripheral nervous system. Describe the structure and functions of the neuroglia of the peripheral nervous system. Describe the gross and/or microscopic anatomy of the following structures: Nerve, Nerve fiber, Ganglion, Tract, Fasciculus, Funiculus and Lemniscus Enlist the cranial nerves I to XII Describe the types of nerve fibers carried by and distribution of the cranial nerves. Describe the formation, types of modalities carried by, and distribution of the spinal nerves. Define and explain Dermatome (s) Define and explain Myotome (s) Describe the formation of Plexuses. Differentiate between Somatic and Visceral nervous system. Define Receptors Describe the functions of receptors. Classify sensory receptors based on modality (with location) Define Effectors Describe the functions of effectors. Describe ANS and differentiate between sympathetic and parasympathetic nervous system		
9	Identify displacement of fracture segments of the bone Identify dislocation of joints	Integrate with Radiology	Imaging in Anatomy

	Describe the basic concept behind taking a biopsy of a tissue.		
	EMBRYOLOGY & POST-NATAL DEVELOPMENT	**TOTAL HOURS = 20**	
10	Describe the cell cycle Enlist different stages of Mitosis and Meiosis Compare and contrast mitosis and Meiosis Enlist the numerical chromosomal anomalies Describe the anatomical basis for numerical chromosomal abnormalities Describe the clinical presentation of numerical chromosomal abnormalities and justify them Embryologically Describe the clinical presentation of structural chromosomal abnormalities and justify them Embryologically list the structural chromosomal anomalies Describe the anatomical basis for structural chromosomal abnormalities Describe the anatomical basis for the structural and numerical chromosomal anomalies Describe the embryological basis for mosaicism Describe the embryological basis for teratoma Describe the clinical presentation of common numerical chromosomal abnormalities	Embryology	Cell cycle and Gametogenesis
11	Describe the Process of spermatogenesis and spermiogenesis Describe the embryological basis for Abnormal gametes Discuss the embryological basis of male infertility	Embryology	Spermatogenesis
12	Describe the Prenatal and postnatal maturation of oocyte	Integrate with Gynecology	Oogenesis
13	Describe the significance of arrested development of oocyte	Embryology	Oogenesis

	Describe the hormonal control of oocyte maturation Discuss the embryological basis of female infertility		
14	Compare and contrast oogenesis and spermatogenesis		Gametogenesis
15	Enlist and briefly describe the female reproductive organs		Female Reproductive organs
16	Describe the hormonal control of female reproductive cycles Enumerate and describe the steps of the ovarian cycle Describe the process of ovulation Describe the formation, function and fate of corpus luteum Describe the anatomical and physiological basis of the following: Mittelschmerz, Anovulation, Menopause Define menstrual cycle Describe the phases of menstrual cycle Describe the anatomical and physiological basis of an-ovulatory menstrual cycle	Integrate with Gynecology	Female Reproductive Cycle
17	Describe the transportation of male and female gametes Describe viability of gametes Explain the anatomical basis of diaspermy, triploidy		Transportation of gametes
18	Define fertilization Describe the phases of fertilization Draw and label a diagram illustrating the phases of fertilization Enumerate and describe the results of fertilization Describe the anatomical and physiological basis of sex determination of the embryo	Embryology	Fertilization
19	Define contraception Explain the mechanisms of following contraceptive techniques: 1. Barrier methods 2. Hormonal methods	Integrate with physiology	Contraception

	3. Intrauterine device (IUD) 4. Emergency contraceptive pills (ECPs) 5. Male and female sterilization		
20	Describe the anatomical and physiological basis of male and female infertility Describe the role of clomiphine citrate in inducing ovulation Define assisted reproductive techniques Describe the mechanisms of following reproductive techniques: 1. In vitro fertilization (IVF) and embryo transfer 2. Cryopreservation of embryo 3. Intra-cytoplasmic sperm injection (ICSI) 4. Assisted in vivo fertilization 5. Surrogacy Explain the correlation of multiple births with assisted reproductive techniques	Integrate with Gynecology	Infertility & assisted reproductive techniques
21	Describe the process of cleavage of embryo and blastocyst formation Describe the differentiation of embryo blast into epiblast and hypoblast Describe the establishment of cranial-caudal embryonic axis Describe pre-implantation genetic diagnosis Describe the origin and uses of embryonic stem cells and the techniques of obtaining these cells from the embryo (reproductive cloning & therapeutic cloning) Explain the embryological basis of spontaneous abortion Describe the events and factors influencing the cleavage of zygote	Embryology	Cleavage, blastocyst formation
	Describe the sequence of events pertaining to formation of blastocyst Compare and contrast the villi	Integrate with Gynaecology	
	Describe the process of Compaction Describe the Formation of morula (division into inner and outer cell mass)	Embryology	

	Describe the anatomical basis for the preimplantation genetic diagnosis Describe the formation of amniotic cavity, embryonic disc, and umbilical vesicle Describe the formation of chorionic sac		
22	Describe the Uterus at the time of implantation (decidua reaction) Illustrate the concept of Implantation Describe the differentiation of inner and outer cell mass Describe the Abnormal implantation/ extra uterine implantations Enumerate the factors responsible for inhibition of implantation	Embryology	Implantation
23	Describe the Molar pregnancy		Molar pregnancy
24	Describe the Establishment of utero-placental circulation		Utero-placental circulation
25	Describe the embryological basis of abortions and its types	Integrate with Gynaecology	Abortion
26	Describe the Formation & fate of primitive streak Draw a concept map highlighting the sequence of events responsible for transformation of bilaminar germ disc into trilaminar germ disc Describe the embryology behind sacrococcygeal teratoma and justify its clinical picture Describe the molecular factors responsible for gastrulation	Embryology Integrate with Gynaecology	Gastrulation
27	Describe the Invagination and movement of prenotochordal cells Describe the Notochordal plate formation Describe the Neuroenteric canal formation Describe the fate of the notochord Describe the Establishment of body axis Draw and label the fate map establishment Describe the Fate map establishment Describe the molecular basis for notochord formation	Embryology	Formation of notochord

	Describe the role of notochord as an inducer Describe the embryological basis for situs inversus		
28	Describe the Formation of neural tube from neural plate. Justify embryologically the clinical picture seen in various neural tube defects Describe the process of Migration of neural crest cells Enlist the Derivatives of neural tube and describe the fate of each Enlist the Derivatives of neural crest cells Enlist the ectodermal derivatives Describe the molecular and genetic factors for the process of neurulation	Embryology	Derivatives of ectoderm
29	Describe the Differentiation of mesoderm into its constituting components Describe the Somite formation and its fate Describe the Estimation of age by somites Describe the formation of intra-embryonic coelom	Integrate with pediatrics	Mesodermal derivatives
30	Describe the processes of vasculogenesis & angiogenesis Explain the features of primordial cardiovascular system Describe the anatomical justification for Capillary hemangiomas	Integrate with Cardiology	Early development of CVS
31	Enlist the derivatives of germ layers	Embryology	Germ layer derivatives
32	Describe the formation and functions of chorionic villi		Chorionic Villi
33	Describe the Cephalo-caudal folding Describe the Lateral folding	Integrate with Gynaecology	Folding of embryo
34	Enlist and Describe the Derivatives of intermediate and lateral plate mesoderm Enlist & Describe the Derivatives of endoderm	Embryology	Germ layer derivatives
	Enlist & describe the derivatives of ectoderm	Integrate with Gynaecology/ pediatrics	

35	Describe the factors influencing the embryonic development	Embryology	Control of the embryonic development
36	Enlist the characteristic features of the embryo during 4th 8th weeks. Describe the criteria for estimating the developmental staging in human embryos Explain the estimation of gestational & embryonic age		Folding of Embryo Embryonic period
37	Explain the trimesters of Pregnancy. Explain the estimation of fetal age Explain the measurement and characteristics of fetus. Describe the Overview of the monthly changes in External appearance of fetus (9th-38th weeks) Describe Viability of fetuses and low birth weight babies Explain the factors influencing fetal growth Describe the clinical problems encountered by babies born with IUGR and post maturity		Fetal period
37a	Tabulate the criteria for estimating fertilization age during the fetal period Describe the post maturity syndrome Describe the procedures for assessing fetal status Describe the clinical picture of IUGR & factors resulting in IUGR	Integrate with Gynaecology	
	Correlate the levels of alpha fetoprotein essay and fetal anomalies	Integrate with Gynaecology/ Radiology	
38	List the fetal membranes Describe the macroscopic & microscopic features of Decidua Enlist the various parts of decidua Functionally correlate the parts of the decidua with its structure Describe the Changes in the trophoblast leading to the development of placenta Describe the Structure (macroscopic & microscopic) of placenta	Integrate with Gynaecology	Placenta

	Enlist & correlate the Functions of placenta with its structure Describe the Microscopic anatomy of Placental membrane Describe the Placental circulation (fetal & maternal) Embryologically justify the hemolytic disease of the neonate Describe the functions of placenta Describe Placenta as an allograft & as an invasive tumor-like structure Describe the placental anomalies and their clinical picture (placenta previa, placenta ecreta, placenta percreta, battledore placenta, membranous placenta, pre-eclampsia) Describe the role of placenta as an allograft Describe the stages of labor		
39	Describe the Formation & fate of Umbilical cord Describe the Cord abnormalities Justify embryologically the clinical features observed in Absence of umbilical artery Describe the formation and circulation of Amniotic fluid Enlist the components of amniotic fluid Describe the Procedure of diagnostic amniocentesis Explain the significance of amniotic fluid Describe the factors responsible for Polyhydramnios and oligohydramnios Describe the characteristic signs and symptoms of oligohydramnios and polyhydramnios and justify embryologically Explain the clinical picture of umbilical band syndrome and justify it embryologically Explain the formation and fate of umbilical vesicle (yolk sac) Explain the formation and fate of Allantois	Integrate with Gynecology	Fetal membranes

	Describe the clinical picture of allantoic cyst & sinus and justify it Embryologically		
40	Describe the development of Dizygotic twins Describe the development of Monozygotic twins Describe the fetal membranes in twin pregnancy Describe the twin transfusion syndrome Explain the zygosity of the twins Describe the characteristics of various types of conjoined monozygotic twins	Embryology	Multiple pregnancies
41	Describe the Various methods of pre- natal diagnosis Describe the Fetal therapy		Prenatal diagnosis and fetal therapy
42	Define morphogens, protein kinases, notch delta pathway, transcription factors, epigenetics Define stem cells and pluripotency Define the human disorders associated with genetic mutations		Molecular regulations and signaling pathways
43	Define teratology: classification and causes of birth defects Define genomic imprinting Describe birth defects caused by genetic factors: numerical and structural anomalies Define and enlist the teratogens Describe the role of following in causing teratogenicity in humans: Drugs Environmental agents Chemicals & heavy metals Infectious agents Radiation Hormones Maternal diseases Describe the basis for male-mediated teratogens		Teratogenicity
	Microscopic Anatomy (Histology and Pathology)	**Total Hours = 08**	

44	Describe different types of microscopies Describe Staining methods and their significance Describe the basis of enzyme histochemistry	Basic techniques in histology	Introduction to microscopy & staining techniques
45	Describe the electron microscopic structure and fluid mosaic model of plasma membrane Draw the fluid mosaic model of plasma membrane Draw and label the structure and function of glycocalyx coat and lipid raft Describe the structure of glycocalyx coat and lipid raft and correlate it with function Describe different types of membrane proteins and their functions	Basic Histology	Cell membrane
	Explain different modes of transport across the cell membrane Describe the signal reception and transduction through different routes Tabulate the mechanisms of transport across the cell membrane Explain the following disorders related to cell membrane: Pseudohypoparathyroidism and Dwarfism	Integrate with pathology	
46	List the membranous and non- membranous cellular organelles Draw and label the light and electron microscopic structure and functions of the cellular organelles Describe the structure of the following cellular organelles and correlate with their function: • Ribosomes • Endoplasmic reticulum (rough & smooth) • Golgi apparatus • Lysosomes Proteasomes • Mitochondria • Peroxisomes		Cell organelles

	Describe the clinical presentation of lysosomal storage diseases and correlate with their histological basis Describe the structural components of cytoskeleton, and correlate them with their functions Explain the histological basis of immotile cilia syndrome		
46a	Describe the histological features of cytoplasmic inclusions	Integrate with pathology	
46b	Describe the structure of nuclear envelope and nuclear pores	Integrate with Physiology	Cell nucleus
47	Describe the structure of chromatin Describe the structure of chromosome Draw and label the structure of nucleolus Describe the structure of nucleolus Describe the structure and types of DNA and RNA Describe the histological basis for apoptosis and necrosis	Histology	
	Describe the clinical presentation of the following diseases and correlate with its histology. • Laminopathies • Malignancy	Integrate with pathology	
	Describe the correlation of cell cycle with the following diseases. • Retinoblastoma • Malignancy		
	Describe the histological structure and function of basement membrane (light and electron) Describe the mechanism of ciliary movements		Epithelium
48	Draw and label a diagram illustrating the electron microscopic structure of basement membrane Describe the basal surface modifications of epithelia Describe the electron microscopic structure and functions of intercellular junctions (lateral surface modifications) and give their locations	Histology	

	Describe the Biochemical composition of the basolateral modifications Explain the correlation of intercellular junctions with the following diseases: 1. Gastric ulcer 2. Food poisoning 3. Pemphigus vulgaris		
48a	Describe the electron microscopic structure of the following apical cell surface specializations: 1. Microvilli 2. Sterocilia 3. Cilia	Integrate with biochemistry	
48b	Explain the correlation between the structure of microvilli and celiac disease Classify and exemplify the epithelia with their histological structure, locations and functions	Integrate with pathology	
48c	Describe the structure of exocrine glands Explain the mechanism of transport across the epithelia Describe the classification of exocrine glands on the basis of: 1. Shape of secretory portions and ducts 2. Mode of secretion 3. Type of secretion	Histology	
	Explain the histological basis of acne vulgaris	Integrate with pathology	
49	Describe the composition and list the constituents of connective tissue Classify the connective tissue with examples Describe the composition of ground substance of connective tissue Describe the composition, distribution, and function of glycosaminoglycans in connective tissue Explain the role of GAGs in formation of barrier against bacteria and the role of hyaluronidase in the breakdown of this barrier	Histology	Connective tissue

	Describe the structure, distribution, and functions of the cells of macrophage-mononuclear phagocytic system	Integrate with Biochemistry/ physiology	
	Describe the role of macrophages in innate immunity		
	Describe the types of adipose tissue (white & brown), their histogenesis, locations and function	Histology	
	Explain the etiology of Marfan's syndrome	Integrate with pathology	
	Describe lipid storage and mobilization in and from adipocytes and compare the brown and white adipose tissue		
	Explain the histological basis and clinical presentation of the following diseases in relation to adipocytes: 1. Lipoma 2. Obesity (with special emphasis of the role of leptin)		

Practical			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
	General Anatomy	**Total Hours = 05**	
50	Demonstrate the anatomical terms of position and movement, in particular on limbs. Demonstrate various anatomical movements of body Identify various elevations and anatomical landmarks on bones. Identify and interpret normal radiographs of various body regions Identify and interpret joint dislocations and displaced fracture bone segments radiographically.	Anatomy	Osteology Imaging and cross-sectional anatomy Arthrology
	Embryology	**Total Hours = 05**	
	Calculate fertilization age, gestational age, embryonic/fetal age and expected date of delivery.	Anatomy	Embryology
51	On models, charts, aborted embryos and fetal specimens, identify the: • events of embryonic period, i.e., cleavage, morula and blastula formation, yolk sac, amniotic cavity, connecting stalk,		

	gastrulation (notochord & primitive streak, three germ layers and their parts/derivatives), angiogenesis, neurulation, somites and embryonic age determination based on it, chorionic villi (primary, secondary & tertiary), developmental defects (sacrococcygeal teratoma, neural tube defects) • placenta and it's positional & implantational variations, umbilical cord and it's contents • fetal features during fetal period. Determine age of fetus based on these features.		
52	Describe the USG report for the: • fetal features, fetal age estimation, placental attachment with it's variations and fetal membranes. multiple pregnancies	Integrated with Radiology	
53	On gross examination of human placenta and umbilical cord, identify: • normal complete placenta and cord placental structural • variations • umbilical cord and anomalies of its attachment to placenta • contents of umbilical cord (umbilical vessels anomalies)	Integrated with Gynaecology	
54	Identify the features of haemolytic disease of newborn, dizygotic and monozygotic twins and correlate them embryologically	Integrated with Paediatrics	
55	Identify the protocols and procedural steps for amniocentesis and chorionic villus sampling (CVS) and correlate their significance in developmental defects. Correlate the role of alpha feto-protein assays in neural tube defects.	Integrated with Gynaecology	
	Histology	**Total Hours = 22**	
56	Describe different types of staining techniques and their significance with special emphasis on H&E staining	Microscopic Anatomy	Staining techniques
57	Identify and draw different parts of light microscope		Microscope
58	Identify and demonstrate different cell shapes under the microscope		Cell shape
59	Identify and demonstrate under light microscope the following types of epithelia: 1. Simple squamous 2. Simple cuboidal		Epithelium

	3. Simple columnar (ciliated & non-ciliated) 4. Pseudostratified columnar (ciliated & non- ciliated) 5. Stratified squamous (keratinized & non keratinized) 6. Stratified cuboidal 7. Stratified columnar 8. Transitional		
60	Identify and demonstrate serous & mucous secreting glands under light microscope		Epithelium
61	Identify and demonstrate the various types of connective tissue		Connective tissue

MEDICAL PHYSIOLOGY

Theory

CODE	SPECIFIC LEARNING OBJECTIVES	DISCIPLINE	TOPIC
	PHYSIOLOGY	**Total Hours = 40**	
1	Define Homeostasis Explain control system of body by giving examples Differentiate between Extracellular and Intracellular Fluids Explain the positive and negative feedback mechanisms with examples Explain the significance of feed forward/ adaptive control/delayed negative feedback mechanisms Explain the structure of cell membrane Enlist the types of cell membrane proteins Enumerate the functions of membrane proteins Define and enumerate the functions of cell Glycocalyx	Medical Physiology	Cell Biology

	Enlist membranous and non-membranous organelles Enlist the self-replicative organelles Differentiate between the functions of smoothand rough endoplasmic reticulum Explain the functions of Golgi apparatusEnlist the enzymes of lysosomes Explain the functions of lysosomes Enlist the enzymes of peroxisomes Explain the functions of peroxisomes Enumerate the components and functions of cytoskeleton Define and enlist types of endocytosis Explain the mechanism of pinocytosis Classify different transport mechanisms Compare the composition of Na, K and Cl in extracellular and intracellular fluid Define and enlist different types of diffusion Explain the process of facilitated diffusion withthe aid of diagram Define and classify different types of active transport Describe primary and secondary active transport with examples Explain voltage and ligand gated channels with examples Name Na, K channel Blockers. Discuss functions and significance of Na/KATPase pump.		
2	Enumerate the functions of blood Explain the composition of blood Enumerate the plasma proteins	Medical Physiology	Blood

	Discuss functions of plasma proteins & describe the pathophysiology of edema		
3	Discuss the characteristics of red blood cells Explain different types of Bone marrows Enumerate the different sites of erythropoiesisat different ages Explain the stages of erythropoiesis Enumerate factors that regulate erythropoiesisDiscuss the site and role of erythropoietin in redblood cell production Explain the significance of vitamin B12 and folic acid in maturation of red blood cell		Red Blood Cells
4	Enumerate the types of normal hemoglobin in different ages of life Explain the role of Iron in Hemoglobin formation. Define blood indices, give their normal values & enumerate the conditions in which thesevalues are disturbed Enlist the abnormal types of hemoglobin	Medical Physiology	Hemoglobin
5	Enumerate the types of white blood cells Describe the characteristics and functions ofNeutrophils Explain the process of defense against invading agent by neutrophils Define leukocytosis and leukemia Explain the effects of leukemia on bodyDefine leukopenia Explain the process of defense against invading agent by macrophages Discuss different lines of defense during inflammation	Medical Physiology	White Blood Cells

	Explain the functions of neutrophils and macrophages in spread of inflammation (walling off effect) Define the Reticuloendothelial system Enlist the different components ofReticuloendothelial system Explain the characteristics and functions ofbasophils Explain the characteristics and functions of eosinophils and enlist conditions in which thesecells are raised.		
6	Enumerate different blood group types. Explain the basis of ABO and Rh blood system Explain the Landsteiner law	Medical Physiology	Blood Types
7	Discuss Components of Autonomic nervoussystem Explain the physiological anatomy of sympathetic and parasympathetic nervoussystem Describe the types of adrenergic and cholinergic receptors and their functions Explain the effects of sympathetic and parasympathetic on various organs/ system of body	Medical Physiology	Autonomic nervous system

Practical

CODE	PHYSIOLOGY PRACTICAL	Total Hours = 10	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
8	Explain laboratory/clinical procedure to the subject. Obtain verbal consent from subject before starting a procedure. Reassure the subject after the procedure.	Medical Physiology	Consent

9	Determine Erythrocyte Sedimentation Rate and packed cell volume		RBCs
10	Determination of blood group		Blood Group
11	interpret Total Leucocyte Count, Differential Leucocyte Count (normal & abnormal) in aCBC report generated by Automated Cell Counter.		WBCs

MEDICAL BIOCHEMISTRY

Theory

		Total Hours = 40	
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
1	Differentiate between different types of cells. Explain the concept of organization of cells to tissue, tissues to organ, organs to system. Differentiate between the eukaryotic and prokaryotic cells.	Cell Biology	Structure of cell
2	Describe the composition and structure of cell on biochemical basis and justify it as fluid mosaic model. Describe the structure and function of cell membrane with particular reference to the role of (i) Lipids (ii) Carbohydrates (iii) Proteins Explain why the cell membrane is called fluid mosaic model		Cell Membrane
3	Discuss the various ways of cell-to-cell communication and to the environment. Describe cell to cell communications. Cell signaling pathways (only G protein signaling) Describe cell to cell adhesion.		Signal transduction
4	Explain the biochemical markers and importance of subcellular organelles and their inherited disorders especially:		Subcellular organelles

	a. I- cell disease b. Refsum disease c. Parkinsonism d. Progeria		
5	Describe the chemistry of purines and pyrimidines and their linkage in nucleic acid synthesis and their metabolism		Chemistry of purine and pyrimidines
6	Discuss the organization of DNA with special reference to Watson and crick model, composition, structure, role of proteins, Chargaff's rule of base pairing and genetic coding Describe the structural forms of DNA		DNA
7	Discuss the structure of different types of RNAs with special reference to composition, linkage, functions hn RNA, micro RNA Illustrate the structure and functions of various types of RNAs Describe the functions of various small RNAs present in cell		RNA
8	Explain the structure and nomenclature of nucleotides, biomedical importance of natural and synthetic analogues Interpret the role of synthetic analogues of nucleotides in medicine based on sign/symptoms and data e.g Methotrexate, 5 Flurouracil and Allupurinol.		Nucleotides
9	Explain the higher organization of DNA. Difference between DNA, chromatid and chromosome		Chromosome
10	Illustrate de Novo and salvage pathways of purines and pyrimidines Describe the degradation of purine and pyramidine nucleotides		Nucleotide Metabolism

	Interpret Lesch-Nyhan syndrome, gout and adenosine deaminase deficiency on given data		
11	Describe in detail all the steps in prokaryotic DNA replication with emphasis on: Different proteinsrequired, Primers, DNA polymerase; their differentcomponents and functions, Initiation, elongationand termination of replication, Topoisomerases Describe in detail all the steps in Eukaryotic DNAreplication with emphasis on differences between Pro- and Eukaryotes	Cell Biology	Replication
12	Describe DNA repair especially Xeroderma pigmentosa		DNA repair
13	Explain the transcription in prokaryotes focusing on the following key points; RNA polymerase, its components and functions, Initiation, elongation, and termination of transcription Illustrate the transcription in eukaryotes focusing on the differences between pro- and eukaryotic transcription and post transcriptional modifications Wobble hypothesis		Transcription
14	Interpret the translation focusing on the following key points: Initiation, elongation and termination and inhibition by drugs Describe Post-translational modification of proteins		Translation

Practical			
CODE	**BIOCHEMISTRY PRACTICAL**	**Total Hours = 10**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
15	Demonstrate the step taken to prevent or rectify the Laboratory Hazards	Biochemistry	Lab hazards
16	Identify the structure of cells under microscope		cell

17	identify the methods of isolation of cell organelles'		Cell organelles
18	Identify the different parts of equipment i.e., centrifuge, Microlab, Electrophoresis		Equipment
19	Demonstrate the basic principles, uses and working of centrifuge, chromatography, electrophoresis & spectrophotometer		Demonstration of techniques

PATHOLOGY			
CODE	**Pathology theory**	**Total Hours = 12**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
1	Discuss the significance of pathology. Discuss the causes of cell injury. Identify the types of cell injury. Describe the mechanism of cell injuryIdentify the types of cell death. Define necrosis and apoptosis. Describe different types of necrosis.Compare apoptosis with necrosis. Identify different types and mechanism of cellularadaptations to stress Discuss the mechanism and types of intracellular accumulations and pathological calcifications	General Pathology	Cell Injury
2	Enumerate the microbes causing infectious diseases. Describe the structure of bacterial cell Differentiate cell walls of gram positive and gram-negative bacteria. Compare the structure of bacterial cell and virusDiscuss the growth curve of bacteria. Enlist steps of viral replication Identify types of bacterial infections Enlist stages of bacterial pathogenesis	General Microbiology	Introduction to Microorganisms

	Discuss the determinants of bacterial pathogenesis		
3	Define sterilization and disinfection. Describe the principles of sterilization and disinfection. Describe clinical uses of common disinfectants and their mode of sterilization Discuss physical and chemical agents of sterilization		Sterilization & Disinfection

PHARMACOLOGY AND THERAPEUTICS			
CODE	**Theory**	**Total Hours = 04**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
1	Definitions of Pharmacology, drug, pro-drug, placebo, active principles, sources of drugs; Brief outline of Absorption, Distribution, Metabolism and Excretion	General Pharmacology	Absorption, Distribution, Metabolism and Excretion of drugs
2	Definitions of receptor, agonist, partial agonist, inverse agonist, antagonist and types of receptors and second messengers; Diagrammatic concept of signaling mechanisms		Basic terminologies of Pharmacology
3	Pharmacological aspects of Autonomic Receptors (types of autonomic receptors, important sites and actions)		Autonomic System

COMMUNITY MEDICINE & PUBLIC HEALTH

CODE	Theory SPECIFIC LEARNING OBJECTIVES	Total Hours = 08 DISCIPLINE	 TOPIC
1	Describe the changing concepts and new philosophy of health Explain responsibility for health	Community medicine and public Health	Concept of health
2	Explain dimensions and determinants of health andtheir role in achieving positive health Discuss concept of health and wellbeing Describe the Physical quality of Life Index & HumanDevelopment Index		Positive health Dimensions, health Determinants
3	Describe the importance of health indicators Classify health indicators Calculate Morbidity and MortalityDescribe Disability indicators Compare indicators among countries		Health indicators
4	Conceptualize disease causation and natural history of disease Explain Germ theory & multifactorial causation Describe Epidemiological Triad Discuss Web of disease causation Describe Gradient of infection	Community medicine and public Health	Disease causation
5	Describe principles of prevention and control on prevalent diseases Explain difference between elimination and eradication Describe disease surveillance, types and cycle Explain Primary, secondary, & tertiary prevention Describe five levels of interventions		Disease Prevention

AGING			
CODE	**Theory**	**Total Hours = 01**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
1	Discuss telomeres and telomerase and their clinical significance in aging.	Geriatrics Integrate with Biochemistry	Processof Aging

IMPACT (EPIDEMIOLOGY, SOCIOLOGY/SOCIETY,COMMUNITY MEDICINE & PUBLIC HEALTH)			
CODE	**Theory**	**Total Hours = 08**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
1	Identify the Biological Basis of human behaviorand discuss social behavior Describe processes such as neurobiology of memory, emotions, sleep, learning, motivation,sex, arousal, reward and punishment	Behavioral Sciences integrated with healthcare	Biological Basisof behavior
2	Identify the burden of mental illness on theperson, family and society Describe Intellectual disability, Mental Disorders and Personality Disorders		Psychological Disorders
3	Identify the role of psychosocial factors invarious illnesses Describe psychosocial aspects of varioussystem diseases such as CVS, CNS, GIT, Respiration, renal, endocrine and Cancer		Psychology and Disease
4	Identify the behavioral factors associated with pharmacological treatment of diseases Discuss Health belief model, treatment compliance and its psychosocial factors, socialfactors in drugs prescription and drug resistance		Behavioral factors and pharmacological treatment
5	Identify the rehabilitation work for patients ondialysis and any kind of physical disability Discuss the care requirements in chronic debilitating conditions like Diabetes, Multi-		Palliative care

	infarcts Dementia, chronic renal disease, limb amputation		
6	Identify the various physiological effects of stress Explain ANS response to stress, Describe behavioural manifestations of stress Stress related multiple sclerosis and autoimmune diseases		Stress

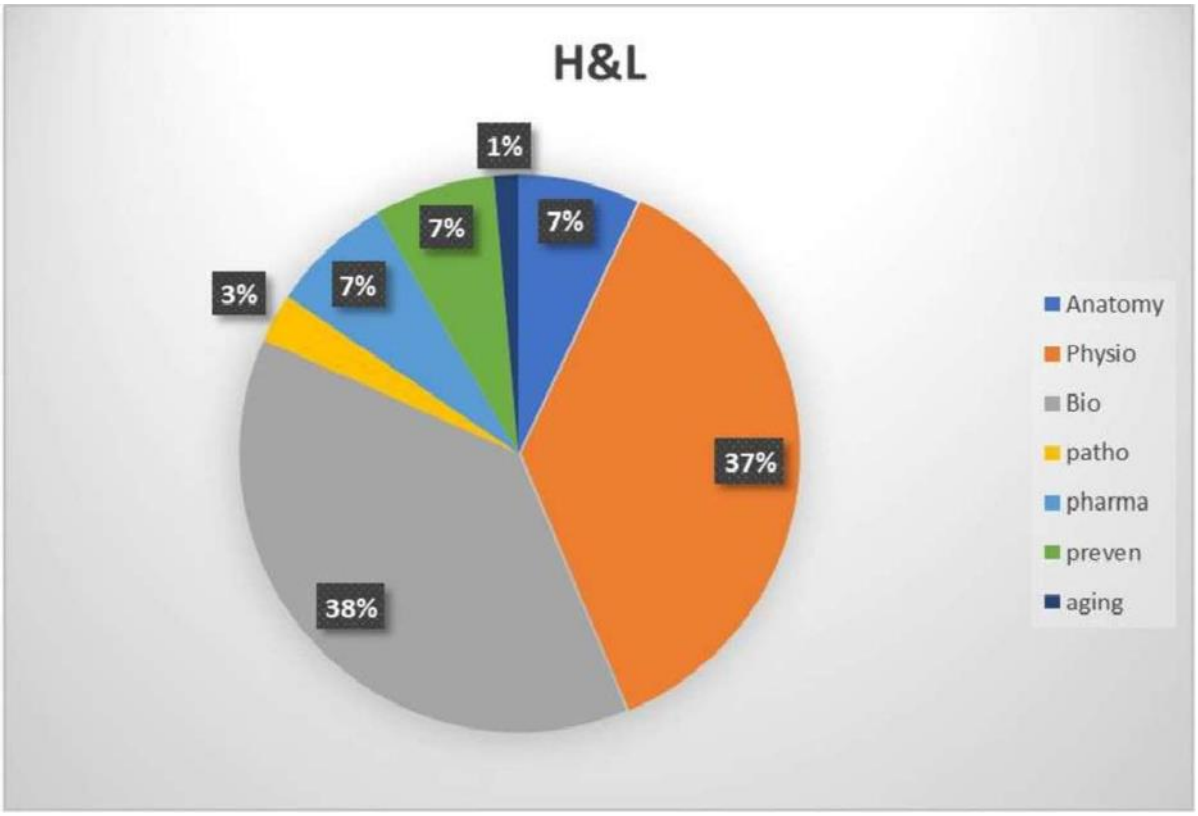
MBBS YEAR I

BLOCK I

MODULE II

Hematopoitic & Lymphatic Module

Duration: 03 weeks
Recommende minimum hours : 71



MODULE PLANNING COMMITTEE

Module Coordinator	Prof. Dr Sabahat Gull
Members	Prof. Dr Suhail Ata Rasool & Dr Naveed Najeeb

Preamble

This module has been designed to enable students to have a basic understanding about the normal structure function and biochemistry of blood ,immune and lymphatic systems. Not only that, but students would also learn when the normal physiology and composition of blood and immune system is disturbed ,what disorders result in our community. Emphssis has been given to incorporate deranged lab findings into the clinical problem solving.The research methodology, Behavioral Sciences and Islamiat will be taught as a part of the longitudina theme. Apart from attending daily scheduled sessions, students should engage in self- directed learning to achieve the desired objectives

Aim:

This module enables the student to relate the anatomy of different lymphoid organs with their function and to comprehend the outcomes that result from altered structure.

Learning outcomes

• **At the end of this module, student will be able to:**

1. Explain the function of all the organs / structures involved in this system andthe mechanisms controlling them. (Spleen, lymph nodes, thymus, bone marrow, RBC's, WBCs, and platelets
2. Explain the etiology and pathogenesis of common blood & lymphaticdiseases, particularly those of importance in Pakistan.
3. Explain the rationale for the use of common therapeutic agents for thediseases related to Blood and immunity
4. Describe the role of immunity in the body
5. Discuss the working & uses of laboratory instruments in diagnostic lab visit
6. Relate red cell indices with health and disease
7. Recognize ABO/RH blood grouping system
8. Describe the role of Reticuloendothelial system in the body
9. Describe the events of hemostasis
10. Extrapolate the biochemical aspects of plasma proteins
11. Discuss the pharmacological treatment of iron deficiency anemia
12. Discuss Blood composition and function
13. Discuss the role of liver in hemolytic anemia
14. Practice history taking of a patient presented with blood disorders

Theme
1. Red blood cells 2. Platelets 3. White blood cells
Clinical Relevance
1. Aplastic anemia 2. Hemolytic anemia 3. Blood loss anemia 4. Nutritional anemia 5. Polycythemia 6. Hemoglobinopathies 7. Jaundice 8. Acute and chronic lymphocytic and myelogenous Leukemia 9. Allergy (Type I, Type II & Type III)

NORMAL STRUCTURE

Theory

CODE	SPECIFIC LEARNING OUTCOMES	DISCIPLINE	TOPIC
	GROSS ANATOMY	**TOTAL HOURS = 2**	
HL-A-001	Identify and describe the components of the Hematopoietic & Lymphoid Tissue and their function	Human Anatomy	Hematopoietic & Lymphoid Tissue
	Location, coverings, relations of Spleen		
	Origin, course branches and distribution of Splenic artery		
	Venous drainage of Spleen, Portal vein formation, tributaries, and area of drainage.		
	Location and relations of Thymus. Age related changes in Thymus		
	EMBRYOLOGY & POST-NATAL DEVELOPMENT	**TOTAL HOURS = 1**	
HL-A-002	Intrauterine Development of spleen	Embryology	Developmental Anatomy of Spleen

Practical			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
	Histology	**Total Hours = 2**	
HL-A-003	Light microscopic structure of Spleen, Thymus, Lymph nodes, tonsils and MALT including Appendix.	Histology	Histological features of lymph node, spleen & thymus

NORMAL FUNCTION			
Theory			
	MEDICAL PHYSIOLOGY	**Total Hours = 20**	
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
HL-P-001	Define anemia	Medical Physiology	Anemia
	Classify anemia on the basis of morphology and cause		
	Discuss the effects of anemia on the body		
HL-P-002	Define polycythemia		Poly-cythemia
	Explain types of polycythemias		
	Discuss the effects of polycythemia on the body		
HL-P-003	Define hemostasis		Hemostasis
	Describe the mechanisms by which hemostasis is secured		
HL-P-004	Discuss the characteristics and functions of platelets		Platelets
	Explain the mechanism of formation of platelet plug		
HL-P-005	Enlist the clotting factors in blood		Coagulation factors
	Explain the conversion of Prothrombin to Thrombin & formation of Fibrin Fibers		
	Explain the Intrinsic & extrinsic clotting pathway.		
	Name & explain the mechanism of anticoagulants used in laboratory.		
	Explain the factors that prevent intravascular coagulation		
	Explain the role of Calcium ions in Intrinsic and Extrinsic pathways		
	Enlist the vitamin K dependent clotting factors		
	Explain the prothrombin time, INR, and its clinical significance.		
HL-P-006	Enlist and explain the conditions that cause excessive bleeding	Medical Physiology	Coagulation disorders

	Define thrombocytopenia	integrate with medicine	
	Enlist the causes and consequences of Thrombocytopenia		
HL-P-007	Define immunity	Medical Physiology	Immunity
	Classify immunity		
	Explain humoral immunity		
	Explain Innate immunity.		
	Elaborate cell mediated immunity.		
	Describe the structure of antigen and immunoglobulin		
	Describe the role of Helper T-cells in cell mediated immunity		
	Enlist the types of Immunoglobulins along with their functions		
	Explain the role of memory cells in enhancing antibody response (secondary response)		
	Describe the mechanism of action of antibodies		
	Elaborate the complement system.		
HL-P-008	Elaborate Immune tolerance	Medical Physiology	Tolerance
	Explain the process of clone selection during T cell processing		
	Discuss the failure of tolerance mechanism		
HL-P-009	Discuss immunization.	Medical Physiology Integrate with Pediatrics	Immunization
	Define passive Immunity		
	Explain features and physiological basis of delayed reaction allergy.		
	Explain features and physiological basis of Atopic Allergy		
	Explain features and physiological basis of Anaphylaxis, urticaria and Hay fever.		
HL-P-010	Discuss the pathophysiology, features and treatment of ABO and RH incompatibility	Medical Physiology	Blood group In-

		Integrate with Pathology	Scompatibility
HL-P-011	Discuss the features and complications of mismatched blood transfusion reaction Elaborate the Transplantation of Tissues and Organs		Blood mismatch Transfusion reactions
HL-P-012	Explain the process of tissue typing Explain prevention of Graft Rejection by suppressing immune system	Medical Physiology Integrate with Nephrology	Transplantation of tissues
MEDICAL BIOCHEMISTRY		**Total Hours = 21**	
HL-B-001	Discuss the biochemical role and types of hemoglobin a) Differentiate Hemoglobin and myoglobin b) Explain oxygen dissociation curve of hemoglobin and myoglobin and factors regulating them c) Interpret CO toxicity on basis of sign and symptoms d) Explain the role of 2,3 BPG in fetal circulation	Medical Biochemistry	Hemoglobin and its types/ RBCs
HL-B-002	Discuss haemoglobinopathies and their biochemical and genetic basis with special emphasis on sickle cell anemia, Thalassemia and methemoglobinemia a) Discuss the following types of anemia on the basis of signs and symptoms and laboratory data: a) Hypochromic microcytic b) Normochromic microcytic c) Normochromic normocytic d) Macrocytic (megaloblastic)	Medical Biochemistry integrate with Pathology	Hemoglobinopathies/ RBCs/ Homeostasis
HL-B-003	Explain the iron metabolism with mechanism of absorption and factors affecting it.	Medical Biochemistry integrate	Iron Metabolism/ RBCs

	a) Interpret Iron deficiency anemia on basis of given data and microscopic findings b) Interpret folic acid and cobalamin in relation to anemias on given data and microscopic findings c) Discuss biochemical role of pyridoxine and vitamin C in microcytic anemia	with Medicine	
HL-B-004	Discuss the degradation of heme in macrophages of reticuloendothelial system a) Describe the formation of bile pigments, their types and transport b) Discuss the fate of bilirubin	Medical Biochemistry	Heme Degradation/ RBCs
HL-B-005	Discuss hyperbilirubinemias and their biochemical basis a) Differentiate types of jaundice on basis of sign/symptoms and data b) Evaluate the genetic basis of jaundice on thebasis of lab investigations		Hyperbilirubinemias / RBCs/ Blood Groups
HL-B-006	Classify and Explain the biomedical importance of each class of plasma proteins		Plasma Proteins/ Homeostasis
HL-B-007	Explain the structure and biochemical role of immunoglobulins b) Describe the production, structure and functions of B cells, plasma cells, and antibodies (IgA, IgD, IgE, IgG, and IgM). c) Discuss the functions of the cytokines (ILs, TNFs, IFs, PDGF, and PAF). d) Interpret multiple myeloma on basis of given data		Immunoglobulins/ WBCs/ Immunity

HL-B-008	Explain and interpret pedigree of single gene defect i.e. sickle cell anemia (Autosomal recessive) andBeta Thalassemia (x linked recessive)		Genetics

Practical			
CODE	**PRACTICAL**	**Total Hours = 6+6=12**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
HL-P-013	Interpret the Red Blood Cell Count, Hemoglobin concentration, Hematocrit and RBC Indices by Automated Cell Counter	Medical Physiology	Blood Cells
	Interpret the Total Leucocyte Count, Differential Leucocyte Count Platelet Count by Automated Cell Counter.		
HL-P-014	Determine Bleeding Time. Determine Clotting Time.		Bleeding/Clotting time
HL-B-009	Interpret jaundice on the basis of estimation of bilirubin	Medical Biochemistry	Jaundice & Anemias/ RBCs/ Homeostasis
	Perform estimation of ALT and interpret the findings		
	Perform estimation of AST and interpret the findings		
	Perform estimation of ALP and interpret the findings		
	Interpret graph based on oxy HB curve and 23 BPG Interpret different types of anemias & porphyrias on basis of s/s and data		

PATHOPHYSIOLOGY AND PHARMACOTHERAPEUTICS			
		Total Hours = 2+5=7	
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
HL-Ph-001	Describe the oral and parenteral iron preparations including their pharmacokinetics, uses, adverse effects	Pharmacology & Therapeutics	Anemia
	Vitamin B12 preparations, Iron Antidotes		

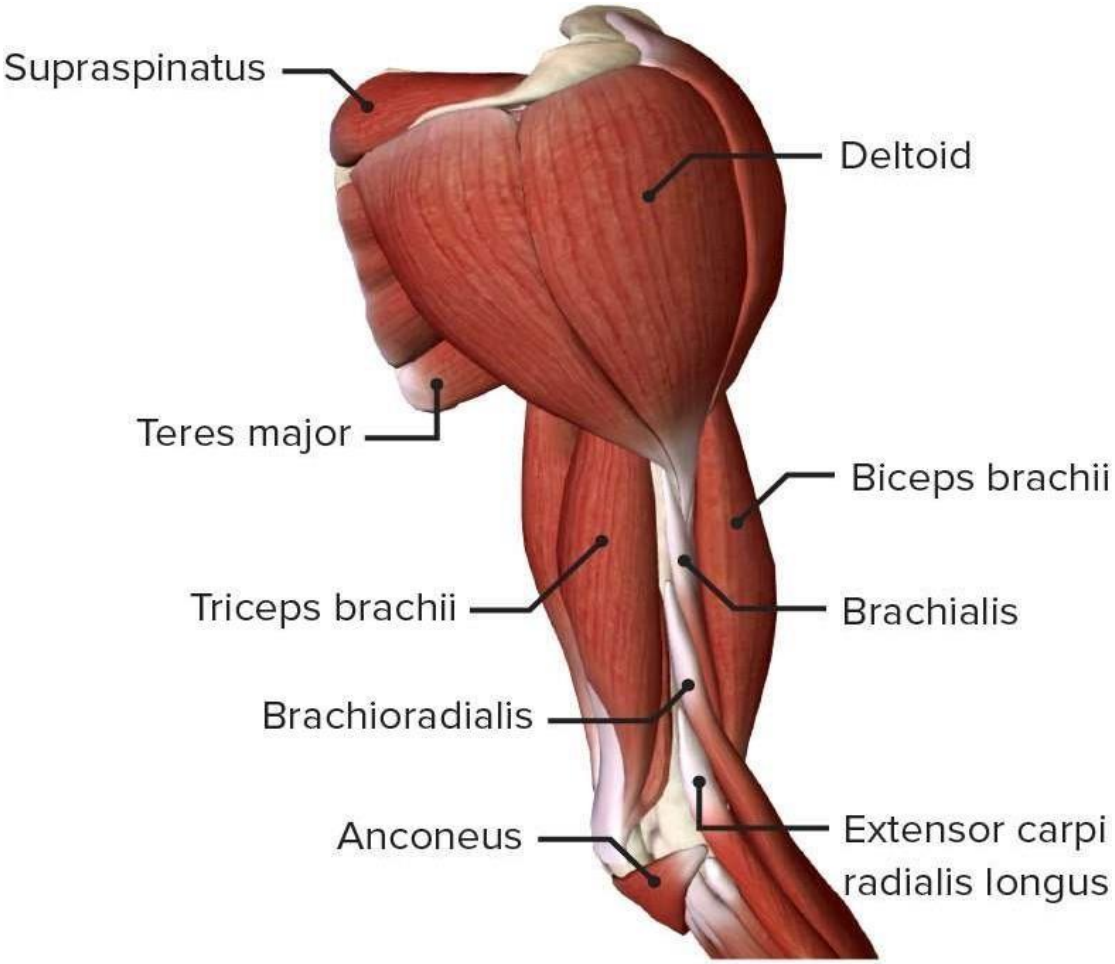
	Should know the terms: Hematopoietic growth factors, their name, mechanism of actions , uses and adverse effects		
HL-Pa-001	Define and classify anemias according to underlying mechanism and MCV/MCH	Pathology	Blood Cells, Platelets and Blood Group
	Discuss the causes and investigations of iron deficiency anemia and megaloblastic anemia		
	Classify the benign and malignant disorders of WBCs		
	Discuss the causes leading to reactive leukocytosis		
	Interpretation of anemias on the basis of peripheral blood smear and bone marrow findings		
	Classify bleeding disorders		
	Discuss first line laboratory investigations for bleeding disorders		
	Describe the basic concept of blood grouping and acute hemolytic transfusion reaction		

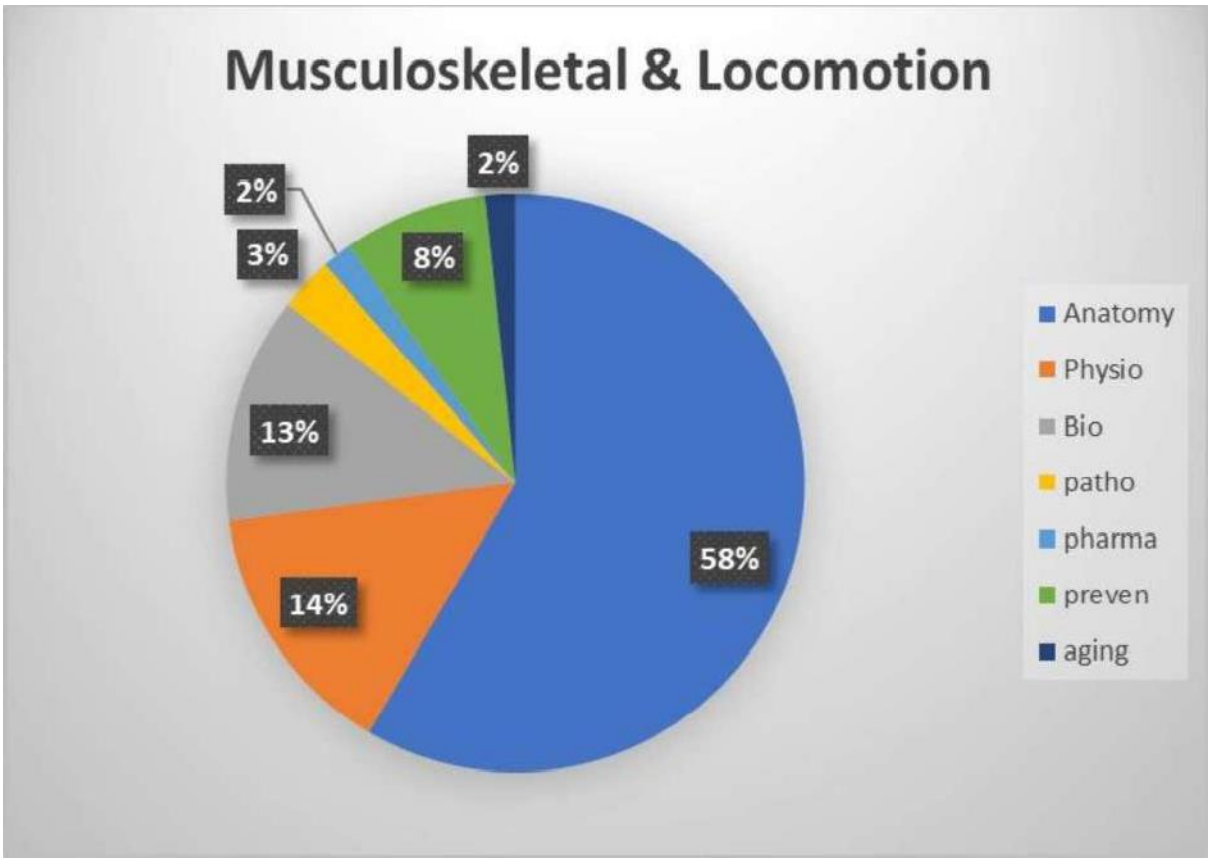
DISEASE PREVENTION AND IMPACT			
CODE		**Total Hours = 5**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
HL-CM-001	Describe the nutritional aspects of iron deficiency anemia and psychological aspects of diseases	Community Medicine and Public Health	Anemia
HL-CM-002	Enlist most common blood borne diseases in Pakistan Describe the routes of spread of blood borne diseases		communicable diseases
HL-CM-003	Genetic counseling of parents		Genetic diseases

HL-BhS-001	Psychological Counselling of patients and their families	Behavioral Sciences	Counselling, informational care
HL-BhS-002	Identify and deal with the various psychosocial aspects of Hematopoietic System disorders (such as Sickle Cell Disease, Hemophilia, and Conditions of the Blood) on Individual, Family and Society.		Personal, Psychosocial and vocational issues

AGING			
CODE	**Theory**	**Total Hours = 1**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
HL-Ag-001	Discuss the role of platelets in PRP treatment in old age (for skin, hairs and joints)	Biochemistry /Dermatology	Platelet Rich Plasma Therapy
HL-Ag-002	Explain the role of glutathione in skin whitening		Glutathione

MBBS YEAR I **BLOCK II** **MODULE I**
Musculoskeletal system & Locomotor module
Duration: 08 weeks Recommended minimum hours: 236




Musculoskeletal & Locomotion
2%
2%
3%
8%
13%
58%
14%
Anatomy
Physio
Bio
patho
pharma
preven
aging

MODULE PLANNING COMMITTEE

Module Coordinator	Prof. Dr Sabahat Gull
Members	Prof. Dr Suhail Ata Rasool & Dr Naveed Najeeb

Preamble

The Musculoskeletal system is responsible for locomotion, support and protection to the human body. T system consists of osteology (the study of bones), arthrology (the study of joints), and myology (the st of muscles) of upper limb. It also includes basic structure and functioning of the nerve and muscles and h their dysfunctions can lead to disease. Along with this, biochemical aspect of mineral and trace element also a part of this module. The research methodology, Behavioral Sciences and Islamiat will be taught a part of the longitudinal theme

Apart from attending daily scheduled sessions, students should engage in self-directed learning to ach the desired objectives

Aim

This module will enable the student to integrate the basic and clinical knowledge for better understandi of the upper limb which will help them in the subsequent years of clinical practice

OUTCOMES

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

1. Develop an understanding of the fundamental components of the musculoskeletal system.
2. Explain the development of the structure & function of the musculoskeletal (MSK) compone of limbs, back & correlate it with organization and gross congenital anomalies of the limbs.
3. Identify the anatomical features of bones, muscles & neurovascular components of the lim with clinical correlation.
4. Describe how injury and disease alter the MSK structure & function.
5. Integrate concepts relating to various metabolic processes, their disorders and relevant investigations in the study of human MSK system.
6. Describe the role of the limbs (upper/lower) in musculoskeletal support, stability, a movements.
7. Describe the types, formation, stability, function & clinical significance ofjoints of the up and lower limb.
8. Describe the basic histology of muscle fibers including their molecular structure (Sarcomere).
9. Explain the mechanism of excitation and contraction of skeletal and smoothmuscles.
10. Discuss the psychosocial impact of musculoskeletal diseases in society.

Theme
• Pectoral Region & Axilla • Upper limb • Pelvic Girdle • Lower Limb
Clinical Relevance
• Congenital anomalies of limb • Joint Dislocation • Fracture • Metabolic bone diseases (osteoporosis, osteomalacia, rickets) • Myasthenia Gravis • Multiple Sclerosis

NORMAL STRUCTURE			
Theory			
CODE	**SPECIFIC LEARNING OUTCOMES**	**DISCIPLINE**	**TOPIC**
	GROSS ANATOMY	**TOTAL HOURS = 116**	
UPPER LIMB			
MS-A-001	Describe the topographical anatomy of Pectoral Region	Human Anatomy	Pectoral Region
	Perform dissection of the Pectoral Region or use models to identify the key structures		
	Describe muscles of the Pectoral Region with their origin, insertion, nerve supply and actions.		
MS-A-002	Describe the fasciae, cutaneous nerves. and blood vessels of the Upper Limb.	Human Anatomy	Fascia & Myotomes of upper limb

	Describe the extent, attachments, and structures passing through Clavipectoral Fascia		
MS-A-003	Describe the extent, structure, neurovascular supply, lymphatic drainage of Breast (Mammary Glands)	Human Anatomy	Pectoral region & Back + Mammary Glands
	Define the boundaries of Triangle of Auscultation and state its clinical significance	Integrate with Medicine	
	Demonstrate palpation of breast and define its relation to the Fibrous septa in Carcinoma of Breast	Integrate with Surgery	
	Explain the anatomical basis of position adopted for breast examination and mammography.	Integrate with Radiology	
	Describe the osteology of the bones in pectoral region. Enumerate the muscles of pectoral girdle. Describe the attachments of muscle of pectoral girdle, nerve supply and actions (Pectoralis Major and minor, Subclavius, Trapezius, Latissimus Dorsi, Rhomboid major and minor, Levator Scapulae and Serratus anterior) Explain the role of muscles of pectoral region in stabilizing the pectoral girdle. Describe the triangle of auscultation. Mention the neurovascular supply of pectoral region and Correlate with important clinical conditions. Describe muscles of the back with their origin, insertion, nerve supply and actions.	Human Anatomy	

MS-A-004	Describe the Osteology of Clavicle (morphological features, side determination, attachments, ossification)	Human Anatomy	Bones of Upper Limb: Clavicle & Scapula
	Describe the functions of Clavicle in terms of weight transmission of upper limb		
	Describe the Osteology of Scapula (morphological features, attachments, ossification)		
	Determine the side and identify the landmarks of scapula		
	Describe the movements of Scapula associated with movements of Shoulder Girdle		
	Tabulate the movements of scapula with muscles acting on it		
	Tabulate the attachments, origin, insertion, innervation, and actions of Anterior Axio-appendicular Muscles		
MS-A-005	Describe the Sternoclavicular Joint in terms of articulating surfaces, ligaments, articular disc, nerve supply, blood supply, axes and planes of movements and stability factors.	Human Anatomy	Bones of thorax, Joints of Upper Limb: Sternoclavicular Joint
MS-A-006	Develop clear concepts of the topographical anatomy of Axilla and its contents	Human Anatomy	Axilla
	Describe the boundaries of Axilla. (Identification of muscles forming the boundaries of axilla)		
	List the contents of Axilla		
	Perform dissection/ Identify the Axilla and its contents		
	Describe Axillary Artery with reference to its 3 parts – their relations, branches, and anastomoses	Human Anatomy	

	Describe the formation, tributaries, and drainage of Axillary Vein		
	Identify and demonstrate the course/ relation and branches/tributaries of axillary vessels		
	Describe the Axillary Lymph Nodes in terms of location, grouping, areas of drainage and clinical significance		
	Describe the course, relations, root value and distribution of cutaneous nerves		
MS-A-007	Describe the Osteology of Humerus (Side Determination, morphological features, attachments, ossification)	Human Anatomy	Bones of upper limb: Humerus
MS-A-008	Describe the Shoulder Joint under the following headings: Articulation, Type/ Variety, Capsule, Ligaments, Innervation, Blood supply, Movements.	Human Anatomy	Joints of Upper Limb: Shoulder Joint
	Describe the 3 parts of Deltoid Muscle and correlate them with its unique functions. Explain its role in abduction of shoulder joint. Explain mechanism of Abduction of arm		
	Identify and demonstrate the movements of Axio-appendicular Muscles on Skeleton/Model		
	Draw and label the arterial anastomosis around shoulder joint		
	Describe, in detail, the Scapula-Humeral Mechanism in relation to movement of abduction. Discuss important clinical conditions		
MS-A-009	Describe Rotator Cuff Muscles, state their Anatomical significance and explain Rotator Cuff Tendinitis	Human Anatomy	Rotator Cuff
	Describe Frozen Shoulder in relation to anatomical features.	Integrate with Surgery	

MS-A-010	Describe the formation of Brachial Plexus; Infra and Supraclavicular parts. Discuss Brachial plexus injuries	Human Anatomy	Nerves of Upper Limb
	Demonstrate and identify the formation of brachial plexus and its branches		
	List the branches of brachial plexus and give their areas of distribution and muscles they innervate		
	Develop clear concepts of the topographical anatomy of Scapular Region		
	Tabulate the attachments, innervation, and actions of muscles of Scapular Region		
	Identify & Describe Musculocutaneous Nerve in terms of its Origin, Course, Termination, Relations, Branches, and distribution. Describe and illustrate the cutaneous innervation of the arm.		
MS-A-011	Describe the Brachial Artery in terms of its course, relations, branches, and distribution	Human Anatomy	Blood supply of arm
	Tabulate the attachments, innervation, and actions of Triceps brachii as a muscle of Posterior Fascial Compartment of Arm		
	Identify & Describe the Profunda Brachii Artery giving its course, relations, branches, and distribution		
MS-A-012	Describe Cubital Fossa with emphasis on its boundaries, contents, and clinical significance	Human Anatomy	Muscles of Arm
	Demonstrate surface marking of superficial veins of arm and forearm for IV injections		
	Determine the side and identify the landmarks of radius and ulna		

MS-A-013	Describe the Osteology of Radius (Side Determination, morphological features, attachments, ossification)	Human Anatomy	Bones of Forearm
	Describe the Osteology of Ulna (Side Determination, morphological features, attachments, ossification)		
MS-A-014	Describe in detail, the features of each flexor muscle of forearm, proximal & distal attachments, relations, and actions. Describe the action of paradox with examples	Human Anatomy	Muscle of Anterior/Flexor Compartment of Forearm
MS-A-015	Tabulate the attachments, innervation, and actions of Extensor Muscles of the Forearm	Human Anatomy	Muscle of Posterior/Extensor Compartment of Forearm
	Describe in detail, the features of each muscle of extensor compartment of forearm, proximal & distal attachments, relations, and actions with nerve supply.		
MS-A-016	Identify the muscles and neurovasculature of flexor and extensor compartments of forearm	Human Anatomy	Forearm: Neurovascular supply & topographical anatomy
	Develop clear concepts of the topographical anatomy of Forearm		
	Describe and illustrate the cutaneous innervation of the Forearm		
	Compartmentalize the forearm and give its anatomical basis.		
	Tabulate the attachments, innervation, and actions of Flexor & Pronator Muscles of the Forearm		
MS-A-017	Identify the Extensor & Flexor Retinacula and describe their attachments and relations	Human Anatomy	Retinacula of Forearm
MS-A-018	Demonstrate the formation of carpal tunnel and identify the contents	Human Anatomy	Carpel Tunnel
	Describe Carpel Tunnel Syndrome	Integrate with Surgery	

	Describe the features, attachments, relations and structures passing under Flexor Retinaculum	Human Anatomy	
MS-A-019	Describe the Origin, Course, Relations, and branches of Ulnar Artery in Forearm	Human Anatomy	Forearm: Blood supply and Venous drainage
	Describe the Origin, Course, Relations and list the tributaries of veins of Forearm		
	Surface marking of Brachial artery, Cephalic, Median cubital, Basilic Vein, Radial & Ulnar arteries, anterior &posterior interosseous artery		
MS-A-020	Describe the Elbow Joint in terms of articular surfaces, type, variety, ligaments, muscles producing movements, blood supply {Anastomosis around elbow joint}, nerve supply and radiological imaging.	Human Anatomy	Joints of Upper Limbs: Elbow Joint
	Describe Carrying Angle and justify its importance in limb movement	Integrate with Surgery	
MS-A-021	Describe the Radioulnar Joints in terms of articular surfaces, type, variety, ligaments, muscles producing movements, blood supply, nerve supply and radiological imaging.	Human Anatomy	Joints of Upper Limbs: Radioulnar Joint
	Demonstrate mechanisms of movements of Pronation & Supination		
MS-A-022	Describe the features of Interosseous Membrane with structures that pierce through it	Human Anatomy	Interosseous membrane
MS-A-023	Describe the features and explain the importance of Fibrous Flexor Sheaths,synovial flexor sheaths and extensor expansion	Human Anatomy	Fascia & Muscles of Hand
MS-A-024	Demonstrate the attachments and actions of the muscles of hand		Hand

	Identify the muscles and neurovasculature of the palm	Human Anatomy	
	Explain the morphology and tabulate the attachments, innervation, and actions of Intrinsic Muscles of the Hand		
MS-A-025	Demonstrate the various grips. Explain the mechanism of writing		Actions of Muscles of Upper Limb as a functional Unit
MS-A-026	Describe the Radial Artery's course, relations and termination in hand with its clinical significance in the region	Human Anatomy	Blood Vessels of Forearm& Hand
	Describe the Ulnar Artery's course, relations, and termination in hand with its clinical significance in the region		
	Describe the formation, branches, and areas of distribution of Superficial and Deep Palmar Arch		
MS-A-027	Describe the course, relations, and branches of Ulnar, Median and Radial Nerves in the Hand	Human Anatomy	Nerves of Forearm& Hand
MS-A-028	Describe the First Carpometacarpal Joint in terms of; Type, Variety, Articular Surfaces, Ligaments, Relations, Blood Supply, Innervation, movements.	Human Anatomy	Joints of Hands
	Demonstrate the movements of the 1st carpometacarpal joint		
	Describe the Metacarpophalangeal & interpharyngeal Joints in terms of; Type, Variety, Articular Surfaces, Ligaments, Relations, Blood Supply, Innervation & Movements		

MS-A-029	Palpate the arteries of the upper limb on a subject	Integrate with Medicine	Skills
	Identify the topographical features of upper limb in a cross-sectional model/ specimen.	Integrate with Radiology	
	Demonstrate and identify the anatomical landmarks of upper limb on radiographs/ CT/ MRI		
	Mark the anatomical landmarks on a subject/ simulated model	Human Anatomy	
LOWER LIMB			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
MS-A-030	Draw and label the Parts of the hip bone, with its attachments,	Human Anatomy	Hip Bone
	Describe the parts, attachments, and ossification of hip bone		
	Identify the parts and bony features of the hip bone, with its attachments, important relations		
	Demonstrate the side determination of hip bone, its bony features, attachments, sex differences, and important relations		
MS-A-031	Describe the parts, attachments, ossification, side determination, and Sex differences of femur	Human Anatomy	Femur
	Identify the parts and bony features of the femur, with its attachments, important relations.		
	Demonstrate the side determination of femur, its bony features, attachments, and important relations (correlate these with fractures)		
	Describe coxa Vara and coxa valga and their clinical significance		
MS-A-032	Describe the extent, attachments, and modifications of Fascia Lata	Human Anatomy	Fascia Lata

	Demonstrate the attachment of fascia Lata, iliotibial tract		
MS-A-033	Describe the cutaneous nerves and vessels of thigh	Human Anatomy	Neurovascular Supply of thigh
	Draw and label the cutaneous nerve supply of thigh		
	Describe the formation, course, relations, tributaries, and termination of the superficial veins		
	Explain the anatomical justification of venesection, varicose veins, and saphenous venous grafts		
	Describe the lymphatic drainage of the region with special emphasis on afferent and efferent of inguinal lymph nodes		
	Identify the superficial and deep lymph nodes		
	Explain the anatomical justification for enlargement of inguinal lymph nodes		
MS-A-034	Describe and identify the Boundaries and contents of femoral triangle	Human Anatomy	Femoral Triangle & Canal
	Draw and label the Boundaries and contents of femoral triangle		
	Identify the femoral sheath with its compartments		
	Describe the formation of femoral sheath and its significance		
	Describe the formation of femoral canal and its contents and significance		
	Describe the formation and significance of femoral ring		
	Compare and contrast the anatomical features of femoral and inguinal hernias	Integrate with Surgery	

MS-A-035	Describe the Muscles of anterior compartment of thigh with their proximal and distal attachments, actions, and innervation	Human Anatomy	Muscles of Anterior Compartment of Thigh
	Demonstrate and identify the muscles of anterior compartment of thigh with their proximal and distal attachments		
	Demonstrate the actions of muscles of anterior compartment of thigh		
	Explain the anatomical basis of psoas abscess	Integrate with Surgery	
MS-A-036	Identify and demonstrate the nerves and vessels of anterior compartment of thigh along with their branches	Human Anatomy	Neurovascular supply of Anterior Compartment of Thigh
	Describe the origin, course, relations, branches, distribution, and termination of femoral artery		
	Describe the origin, course, relations, tributaries, area of drainage and termination of femoral vein		
	Describe the origin, course, relations, branches, distribution, and termination of femoral nerve		
	Tabulate the muscles of anterior compartment of thigh with their attachments, nerve supply and actions		
MS-A-037	Describe the formation, boundaries, contents, and significance of adductor canal	Human Anatomy	Adductor Canal
	Identify and demonstrate the boundaries and contents of adductor canal		
MS-A-038	Describe Muscles of medial compartment of thigh with their proximal and distal attachments, innervation and actions		Muscles of Medial Compartment of Thigh

	Identify the muscles of medial compartment of thigh with their proximal and distal attachments	Human Anatomy	
	Demonstrate the actions of the muscles of the compartment on self/ subject		
MS-A-039	Describe the origin, course, relations, branches/ tributaries, distribution, and termination of neurovascular structures of medial compartment of thigh	Human Anatomy	Neurovascular supply of Medial Compartment of Thigh
	Identify the nerves and vessels of medial compartment of thigh along with their branches		
	Describe and identify the lumbar and sacral plexus and its branches supplying the lower limb		
	Describe the cutaneous nerve supply and lymphatics of the region		
MS-A-040	Describe the subcutaneous tissue of gluteal region	Human Anatomy	Gluteal Region
	List the structures passing through the greater and lesser sciatic foramen.		
	Describe the muscles of gluteal region with their proximal and distal attachments, innervation, and actions		
	Identify the muscles of gluteal region with their proximal and distal attachments		
	Describe the origin, course, relations, branches/ tributaries, distribution, and termination of neurovascular structures of gluteal region	Human Anatomy	
	Demonstrate the actions of the muscles of gluteal region		

	Draw and label the cruciate and trochanteric anastomosis		
	Explain the anatomical basis of the consequences of wrongly placed gluteal intramuscular injections and injury to superior and inferior gluteal nerves	Integrate with Medicine	
	Demonstrate and identify the origin, course, relations, branches/tributaries and termination of nerves and vessels of gluteal region	Human Anatomy	
MS-A-041	Describe the Attachments of muscles of posterior compartment of thigh with the innervation and action	Human Anatomy	Muscles of Posterior Compartment of Thigh
	Identify the muscles of posterior compartment of thigh with their proximal and distal attachments		
	Demonstrate the actions of muscles of posterior compartment of thigh		
	Describe the anatomical basis of signs and symptoms of Piriformis syndrome	Integrate with Surgery	
MS-A-042	Describe the origin, course, relations, branches, distribution, and termination of Profunda femoris artery	Human Anatomy	Blood supply of thigh
	Describe the formation and distribution of chain anastomoses of thigh (and its clinical significance)		
MS-A-043	Describe the origin, course, relations, branches, distribution, and termination of sciatic nerve	Human Anatomy	Sciatic Nerve
	Describe the anatomical basis of signs and symptoms of compression of or injury to sciatic nerve	Integrate with Surgery	
MS-A-044	Describe the hip joint with its type, articulations, ligaments, stabilizing factors,		Hip Joint

	movements, and neuro-vascular supply with clinical significance.	Human Anatomy	
	Perform the movements of hip joint at various angles and be able to describe the muscles producing the movement. Discuss important associated clinical conditions.		
MS-A-045	Describe the Boundaries, relations, and contents of popliteal fossa	Human Anatomy	Popliteal Fossa
	Draw and label boundaries, relations, and contents of popliteal fossa		
	Identify the boundaries and contents of popliteal fossa		
	Describe the origin, course, relations, branches/tributaries, distribution and termination of popliteal artery and vein		
MS-A-046	Enlist the bones in the knee joint	Human Anatomy	Knee Joint
	Describe parts of tibia and fibula, with their attachments, important relations, ossifications, and side determination		
	Identify the parts and bony features of the tibia & fibula, their bony features, attachments, important relations.		
	Describe the anatomical basis for using fibula as graft	Integrate with Surgery	
	Describe the attachments and role of popliteus in locking and unlocking of the knee joint	Human Anatomy	
	Draw and label Parts of patella with its attachments		
	Describe features and ossification of patella,		
	Enlist the factors responsible for stabilizing the patella		

	Describe the knee joint with its type, articulations, ligaments, movements, and neuro-vascular supply		
	Explain the mechanism of locking and unlocking of knee joint with the foot on ground and off the ground		
	Describe the factors responsible for stability of knee joint. Discuss important associated clinical conditions.		
MS-A-047	Describe the Muscles of anterior, lateral, and posterior compartments of leg with their proximal & distal attachments, innervation, and actions	Human Anatomy	Muscles of leg
	Identify the muscles of anterior, lateral, and posterior compartments of leg with their proximal and distal attachments		
MS-A-048	Describe the origin, course, relations, branches/tributaries and termination of nerves and vessels of anterior, lateral, and posterior compartments of leg	Human Anatomy	Neurovascular supply of Leg
	Describe the cutaneous nerves and vessels of leg.		
	Draw and label the cutaneous nerve supply and dermatomes of leg		
MS-A-049	Identify the extensor, flexor, and peroneal retinacula and demonstrate the structures related to them	Human Anatomy	Flexor, Extensor, and peroneal Reticula
	Describe the attachments, relations, and structures passing under cover of, extensor, peroneal, and flexor retinacula		
	Identify and demonstrate the nerves and vessels of anterior, lateral, and posterior compartments of leg along with their branches		

	Describe the formation of noncalcareous (Achilles tendon)		
MS-A-050	Describe the articulations, muscles and neurovasculature and movements at Tibio-fibular joints	Human Anatomy	Tibio-fibular Joint
MS-A-051	Describe the ankle joint with its type, articulations, ligaments, movements, and neuro-vascular supply	Human Anatomy	Ankle Joint
	Describe the factors stabilizing the ankle joint. Discuss important associated clinical conditions.		
	Identify and demonstrate the articulating surfaces and ligaments of ankle joint		
MS-A-052	Describe the formation, attachments, and clinical significance of plantar aponeurosis	Human Anatomy	Plantar Fascia
	Explain the anatomical basis of the signs and symptoms of plantar fasciitis.	Integrate with Orthopedics	
MS-A-053	Identify the parts and bony features, attachments, and important relations of the articulated foot	Human Anatomy	Muscles of foot
	Describe the muscles of the dorsum and sole of foot with their proximal & distal attachments, innervation and actions emphasizing the role of interossei and lumbricals.		
	Draw and label the muscles of the layers of sole of foot		
	Demonstrate and identify the muscles and tendons with their proximal and distal attachments in the sole of foot		
MS-A-054	Describe the interphalangeal, subtalar and midtarsal joints with their types, articulation, ligaments, stabilizing factors, movements, and neurovascular supply	Human Anatomy	Small joints of foot

MS-A-055	Describe the formation, components, stabilizing and maintaining factors of the arches of foot		Arches of foot
	Describe the clinical significance of arches of foot with respect to flat foot, claw foot.	Integrate with Orthopedics	
MS-A-056	Describe the fibrous flexor sheaths, extensor expansions and synovial flexor sheaths	Human Anatomy	Retinacula of foot
MS-A-057	Describe the origin, course, relations, branches/tributaries, distribution, and termination of plantar vessels	Human Anatomy	Neurovascular supply of foot
	Identify the nerves and vessels on the foot along with their branches		
	Describe the cutaneous nerves and vessels of foot		
	Draw and label the cutaneous nerve supply and dermatomes of foot		
	Identify the nerves and vessels in the sole of foot along with their branches		
	Describe the palpation of dorsalis pedis artery &explain the clinical significance of dorsalis pedis artery		
MS-A-058	Describe the surface anatomy, course, relations, tributaries, and communications of the superficial and deep veins of the lower limb	Human Anatomy	Venous drainage of lower limb
	Draw a concept map of the superficial and deep veins of lower limb		
	List the factors favoring venous return of the lower limb		
	Explain the anatomical basis of the formation, and signs and symptoms of deep venous thrombosis	Integrate with Surgery	
	Describe the anatomical basis of knee jerk, ankle jerk, and plantar reflex	Integrate with Medicine	

MS-A-059	Describe the mechanism of walking	Human Anatomy	Human Gait
	Describe the phases of gait cycle with muscles involved in each phase	Integrate with Orthopedics	
	Describe the propulsive and shock-absorbing mechanisms of foot		
	Describe the weight bearing/ line of weight transmission in lower limb	Human Anatomy	
MS-A-060	Draw a concept map of the lymphatic drainage of lower limb	Human Anatomy	Lymphatic drainage of lower limb
MS-A-061	Draw and label the cutaneous nerves & dermatomes of the lower limb	Human Anatomy	Cutaneous dermatomes of lower limb
MS-A-062	Demonstrate the surface marking of nerves and vessels of lower limb		Topographical and radiological anatomy of lower limb
	Demonstrate the surface marking of bony landmarks of lower limb		
	Identify the topographical features of lower limb in a cross-sectional model		
	Demonstrate and identify the features of bones and joints of lower limb on radiograph/ CT scan/ MRI	Integrate with Radiology	
MS-A-063	Describe the common fractures of the following bone with the risk factors, clinical presentations, and management: Clavicle Humerus Radius Ulna Small bones of hand Hip bone. Femur Tibia Fibula	Orthopedics and trauma	Bone Fracture

	Small bones of foot		
MS-A-064	Describe the dislocations of the following joints with the risk factors and clinical presentations, and brief management: Shoulder joint Elbow joint Interphalangeal joint of hand Hip joint Knee joint Ankle joint	Orthopedics and trauma	Joint Dislocation
	EMBRYOLOGY & POST-NATAL DEVELOPMENT	**TOTAL HOURS = 06**	
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
MS-A-065	Name the molecular and genetic factors involved in the development of musculoskeletal system	Human Embryology	Development of Muscles
	Describe the development of skeletal muscle		
	List the derivatives of epaxial and hypaxial musculature of limb		
	Briefly discuss the development of cardiac and smooth muscle (Detail to be covered in respective modules later).		
	Describe the developmental basis of myotome		
	Draw a concept map highlighting the sequence of events pertaining to smooth/ cardiac/ skeletal muscles		
MS-A-066	List the factors contributing to the development of limb	Human Embryology	Development of Limb
	Describe the role of AER and Zone of polarizing activity in development of limb		
	Describe the process of limb development and limb growth		
	Draw a concept map pertaining to development of limb		

	Compare and contrast the development of upper limb with the development of lower limb		
MS-A-067	Describe the embryological basis of cutaneous innervation of limb Describe the embryological basis of blood supply of limbs and concept of axial artery	Human Embryology	Development of Neurovascular supply of limbs
MS-A-068	Describe the embryological basis of congenital anomalies related to muscular system.	Human Embryology	Congenital anomalies of limbs
	Describe the clinical presentations and embryological basis of 1. Amelia 2. Meromelia 3. Phocomelia 4. Split-Hand/Foot Malformations 5. Polydactyly, Brachydactyly, Syndactyly 6. Congenital club foot	Integrate with Paedriatics	
MS-A-069	Describe the developmental process of cartilage and bone Describe the process of histogenesis of cartilage and bone	Human Embryology	Development of Cartilage
MS-A-070	Describe the developmental process of intramembranous and endochondral ossification	Human Embryology	Process of Ossification
MS-A-071	List the factors contributing to the development of Axial skeletal system Describe the clinical picture and explain the embryological basis of Axial skeletal anomalies Describe the developmental process of Vertebral Column	Human Embryology	Development of Axial skeleton
	MICROSCOPIC ANATOMY	**Total Hours = 06**	
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
MS-A-072	Describe the microscopic structure and ultra-microscopic structure of skeletal muscle	Histology	

	Explain the basis of myasthenia gravis and Duchenne muscular dystrophy	Integrate with Medicine	Histology of Muscles
	Describe the microscopic and ultramicroscopic structure of cardiac muscle	Histology	
	Describe the microscopic and ultramicroscopic of smooth muscle		
	Compare and contrast the histological features of three types of muscle tissue		
MS-A-073	Describe the regeneration of muscle, hyperplasia, and hypertrophy of muscle fiber	Integrate with Pathology	Functional Histology
	Explain the histopathological basis of leiomyoma	Histopathology	
	Describe the histological basis of Duchenne Muscular Dystrophy	Integrate with Pathology	
MS-A-074	Describe the light and electron microscopic structure of bone cells	Histology	Histology of Osseous tissue
	Describe the histological justification for osteoporosis, osteopenia.	Integrate with Pathology	
	Describe the histological basis for bone repair after fractures.		
MS-A-075	Describe the light and electron microscopic structure of compact and spongy bone	Histology	Histology of Bone
	Compare and contrast the microscopic features of compact and spongy bone		
	Draw a concept map to explain the characteristic features of ossification		
	Draw and label the zones seen in an epiphyseal growth plate		
MS-A-076	Describe the metabolic role of bone	Integrate with Medicine	Functional Histology of Bone
	Describe the clinical presentation of osteoporosis, osteopenia	Integrate with Orthopedics	

MS-A-077	Describe the microscopic and ultramicroscopic structure of all types of cartilage	Histology	Histology of Cartilage
	Compare and contrast the structure of cartilage and bone matrix		
	Tabulate the differences between three types of cartilage		
MS-A-078	Describe the histological basis for bone & Cartilage growth and repair	Histology	Mechanism of Bone growth

PRACTICAL			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
	Histology	**Total Hours = 10**	
MS-A-079	Draw and label the histology of skeletal muscle	Histology	Histology of Muscles
	Draw and label the histology of smooth muscle		
	Draw and label the histology of cardiac muscle		
MS-A-080	Draw and label the histological picture of compact bone	Histology	Histology of Bones
	Draw and label the histological picture of spongy bone		
MS-A-081	Draw and label the microscopic structure of hyaline cartilage	Histology	Histology of Cartilage
	Draw and label the microscopic structure of elastic cartilage		
	Draw and label the microscopic structure of fibro cartilage		

NORMAL ORGAN FUNCTION

Theory

	MEDICAL PHYSIOLOGY	**Total Hours = 34**	
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
MS-P-001	Explain the Physiological basis of membrane potential	Medical Physiology	Diffusion / Equilibrium Potentials &
	Explain diffusion potentials of Na & K		

	Define Nernst potential		Nernst potential
	Explain Physiological Basis of Nernst potential		
	Write the Nernst equation.		
	Calculate Nernst potential for Na & K		
	Explain the effects of altering the concentration of Na+, K+, Ca on the equilibrium potential for that ion		
MS-P-002	Describe the normal distribution of Na+, K+, Ca and Cl- across the cell membrane		Goldman Equation
	Explain physiological basis of Goldman equation		
	Clarify the role of Goldman equation in generation of RMP.		
MS-P-003	Describe the Physiological basis of generation of RMP.		Resting Membrane Potential in Neurons
	Explain the effects of hyperkalemia and Hypokalemia on the RMP		
	Name the membrane stabilizers		
	Explain the physiological basis of action of Local Anesthetics.	Medical Physiology integrate with Anesthesiology	
MS-P-004	Describe the Physiological anatomy of Neurons	Medical Physiology	Neurons
	Discuss the axonal transport		
	Enlist & give functions of Neuroglial cells		
	Explain process of myelination in CNS & PNS		
MS-P-005	Classify neurons functionally.		Classification of Neurons & Fibers
	Classify nerve fibers according to Erlanger & Gasser Classification		
MS-P-006	Define Action Potential		Action Potential of Neurons
	Enlist the Properties of action potential		
	Describe the ionic basis of an action potential.		
	Explain the phases of action potential.		
	Explain the effects of hyperkalemia and Hypokalemia on the action potential.		

	Draw monophasic action potential.		
	Explain absolute and relative refractory period		
MS-P-007	Explain the role of other ions in action potential.		Role of other ions in action potential
	Elaborate the effect of hypocalcemia on neuron excitability.		
MS-P-008	Explain Physiological basis& properties of Graded potential		Local / Graded potentials
	Draw & explain Physiological basis & properties of compound action potential.		
	Contrast between action potential and graded potential		
	Describe the ionic basis of excitatory post synaptic potential (EPSP), inhibitory post synaptic potential (IPSP), end plate potential (EPP).	Medical Physiology	
MS-P-009	Classify and explain Physiological basis of different types of synapses		Synapse
	Elaborate how signal transmission takes place across chemical synapse		
MS-P-010	Explain the mechanism of conduction of Nerve impulse in myelinated and unmyelinated nerve fibers.		Conduction of Nerve impulse
	Elaborate significance of saltatory conduction		
MS-P-011	Enlist the types of nerve injury		Nerve Degeneration
	Explain Wallerian degeneration.		
	Describe the process of regeneration of nerve fiber.		
	Describe the causes, features & pathophysiology of Multiple sclerosis, GB syndrome.	Medical Physiology integrate with Medicine	
MS-P-012	Discuss the physiological anatomy of skeletal muscles.	Medical Physiology	Skeletal muscle
	Differentiate b/w skeletal, smooth, and cardiac muscle		

	Describe the structure of Sarcomere		
MS-P-013	Differentiate between isometric and isotonic contraction by giving examples.		Characteristics of whole muscle contraction
	Compare the fast and slow muscle fibers.		
MS-P-014	Explain the mechanism of summation and Tetanization.		Mechanics of muscle contraction
	Describe staircase effect/Treppe phenomena		
	Discuss the mechanism of skeletal muscle fatigue.		
	Explain the physiological basis of rigor mortis	Medical Physiology integrate with Forensic medicine	
MS-P-015	Describe the physiological anatomy of NMJ	Medical Physiology	Neuromuscular junction
	Mechanism of Neuromuscular transmission & generation of End Plate Potential		
	Explain features, pathophysiology & treatment of myasthenia Gravis	Medical Physiology integrate with Medicine	
	Discuss the steps/ events of excitation contraction coupling in skeletal muscle.	Medical Physiology	
MS-P-016	Differentiate between types of smooth muscles.	Medical Physiology	Smooth Muscle
	Describe mechanism of smooth muscle contraction in comparison to skeletal muscle.		
	Explain the physiological anatomy of neuromuscular junction of smooth muscle		
	Explain the types of action potential in smooth muscles.		
	Explain the LATCH mechanism		
	Describe the significance of LATCH mechanism.		
	Explain the nervous and hormonal control of Smooth Muscle Contraction.		

MS-P-017	Enlist various types of muscle disorders Describe the pathophysiology & features of muscular dystrophy.	Medicine	Muscular Disorders
MS-P-018	Define Myopathy Enlist various causes of myopathy Outline management of myopathy	Medicine	Myopathy
MS-P-019	Define osteoporosis Identify risk factors for osteoporosis Outline management strategies	Geriatrics/ Medicine	Metabolic bone diseases: Osteoporosis
MS-P-020	Define osteomalacia Identify risk factors for osteomalacia Outline management strategies	Medicine/ Rheumatology	Metabolic bone diseases: Osteomalacia
MS-P-021	Define rickets Identify risk factors for rickets Outline management strategies	Pediatrics	Metabolic bone diseases: Rickets
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
	MEDICAL BIOCHEMISTRY	**Total Hours = 24**	
MS-B-001	Classify amino acids based on polarity, nutritional importance, and glucogenic/Ketogenic properties	Biochemistry	Classification of Amino acids
MS-B-002	Explain the structure, physical, chemical properties of amino acids and their biomedical importance		Amino Acids
MS-B-003	Classify proteins based on functions and physicochemical properties. Explain its biomedical importance. Distinguish between class A and B proteins. Discuss structure and functions of Fibrous proteins (collagen and Elastin)		Classification of Proteins
	Interpret diseases associated with them on basis of sign/symptoms and data	Integrate with Medicine	
MS-B-004	Explain the structural levels of proteins		

	Differentiate between alpha helix and beta pleated protein structures	Biochemistry	Structure of proteins
	Identify bondings at different levels of proteins		
MS-B-005	Describe the role of chaperons in protein folding.	Biochemistry	Protein misfolding
	Interpret disorders related to protein misfolding on basis of given data.	Integrate with pathology & Medicine	
	Describe the biochemical basis of Alzheimer's disease/ prion disease.		
MS-B-006	Describe biomedical importance of Mono-, Oligo and Polysaccharides.	Biochemistry	Carbohydrates Chemistry
	Discuss isomerization of carbohydrates		
	Explain physical and chemical properties of carbohydrates		
	Differentiate proteoglycan and glycoprotein and explain their functions		
MS-B-007	Describe the components of extracellular matrix.		ECM and collagen synthesis
	Describe the sources, metabolism, and biochemical functions of vitamin C		
	Describe structure, functions, and clinical significance of glycosaminoglycans.		
	Interpret the importance of vitamin C in collagen synthesis.		
MS-B-008	Identify the defects in collagen synthesis based on given data. (Osteogenesis Imperfecta)	Integrate with Medicine	Vitamin D metabolism
	Explain dietary sources, metabolism and biochemical functions of vitamin D	Biochemistry	
	Interpret Rickets and osteomalacia on basis of sign. Symptoms and clinical data	Integrate with Medicine/Orthopedics	

MS-B-009	Explain dietary sources, metabolism and biochemical functions of calcium and phosphate	Biochemistry	Calcium and Phosphate metabolism
	Discuss regulation of calcium metabolism in bone metabolism and role of parathyroid and calcitriol in it		
	Interpret hyper and hypocalcemic conditions on basis of sign/symptoms and clinical data	Integrate with Medicine	
MS-B-010	Interpret genetic basis of Duchene muscular dystrophy	Integrate with Pathology	Genetic basis of disease

PRACTICAL			
CODE		**Total Hours = 6**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
MS-B-011	Detection of amino acids by paper chromatography.	Bio-chemistry	Chromatography
MS-B-012	Estimation of total proteins by kit method/dipstick methods.		Total proteins
MS-B-013	Estimation of albumin and globulin		Albumin/ globulin
MS-B-014	Detection of calcium by micro lab.		Calcium
MS-B-015	Prepare different types of solution Molar, Molal, Normal and percentages.		Solutions

PATHOPHYSIOLOGY AND PHARMACOTHERAPEUTICS			
		Total Hours = 4+7=11	
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
MS-Ph-001	Explain the mechanism by which drugs can stimulate NMJ.	Pharmacology & Therapeutics	Drugs acting on Neuromuscular Junction (NMJ)
	Explain the mechanism by which drugs can block NMJ.		
MS-Ph-002	Outline the pharmacological concepts of drugs used in Myasthenia gravis		Drugs in Myasthenia Gravis
MS-Ph-003	Outline the pharmacological concepts of drugs used as local anesthetics.		Local Anesthetics

MS-Pa-001	Describe the hyperplasia, hypertrophy, and atrophy of muscle fiber	Pathology	Muscle remodeling
	Explain the histopathological basis of leiomyoma		
MS-Pa-002	Describe the histological basis of Duchenne Muscular Dystrophy		Diseases of Muscle
	Describe the histopathological basis and clinical presentation of Alzheimer`s Disease, Multiple Sclerosis and Astrocytoma		
MS-Pa-003	Describe the clinical presentation and histological justification for osteoporosis, osteopetrosis		Diseases of Bone
	Describe the histological basis for bone repair after fractures		
MS-Pa-004	Describe the histological basis for cartilage growth and repair		Disease of Cartilage

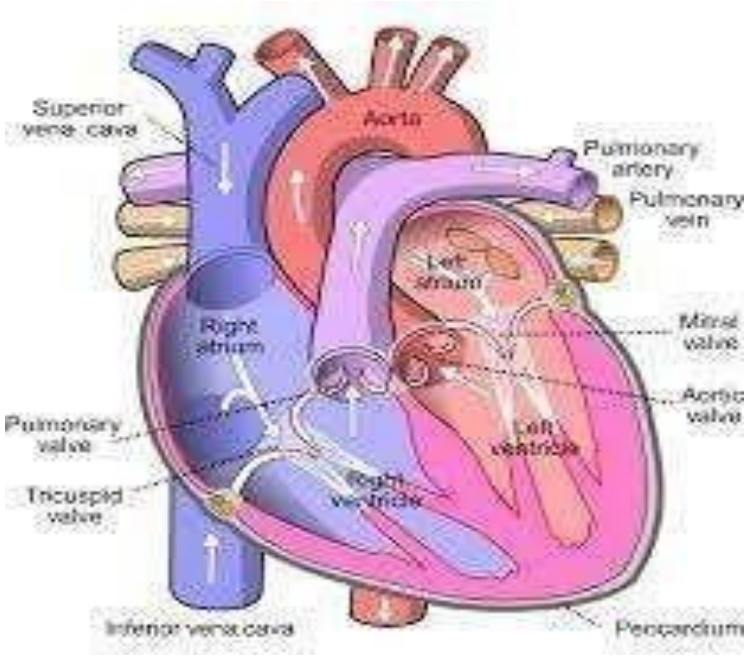
AGING			
CODE	**Theory**	**Total Hours = 4**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
MS-Ag-001	Discuss the effect of age on bone fragility and its implications with management.	Geriatrics/ Medicine/ Biochemistry	Bone
MS-Ag-002	Discuss the effect of age on loss of cartilage resilience and its implications and management		Cartilage
MS-Ag-003	Discuss the effect of age on Muscular strength and its implications and management		Muscle
MS-Ag-004	Explain the protective effect of estrogen (female sex hormone) on bone mineral density and relate it to increased prevalence of postmenopausal fractures in women.		Effect of estrogen on BMD

DISEASE PREVENTION AND IMPACT			
CODE		**Total Hours = 16+3=19**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**

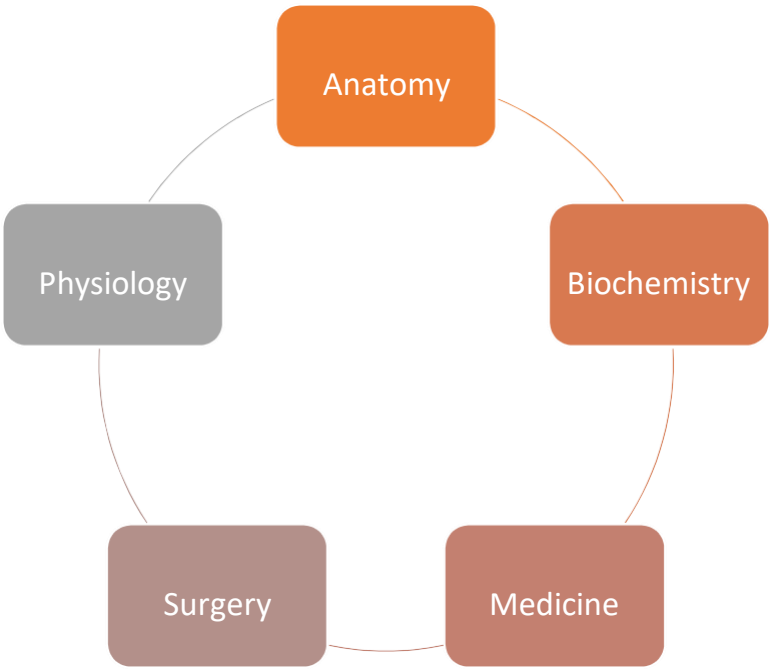
MS-CM-001	Explain causes of low back pain	Community Medicine and Public Health	Back Pain
	Describe prevention of low back pain		
MS-CM-002	Describe causes and prevention of musculoskeletal disorders (MSD)related to child labour		MSD related to child labour
MS-CM-003	Describe work related musculoskeletal disorders addition with its burden/epidemiology		Work related Musculoskeletal disorders
	Identify risk factors of MSD at workplace		
	Describe prevention of exposure to risk factors related to workplace		
MS-CM-004	Describe MSD related to mobile addition with its burden/epidemiology	Community Medicine and Public Health	MSD related to mobile usage
	Identify risk factors relates to MSD due to excessive mobile usage.		
	Describe the preventive strategies for mobile addiction related MSD.		
MS-CM-005	Describe application of ergonomics in MSD related to above disorders.	Community Medicine and Public Health	Ergonomics
MS-CM-006	Describe the concept of non-communicable diseases		Non-communicable disease
MS-CM-007	Identify the risk factors in the community for Osteoporosis		Risk factor assessment of Musculoskeletal diseases
	Learn and apply interventions to prevent the risk factors for various musculoskeletal diseases in community.		
MS-BhS-001	Identify and deal with the various psychosocial aspects of Musculoskeletal conditions (such as Osteoarthritis, Osteomyelitis, Rheumatoid arthritis, Gout, chronic back pain, psycho-somatic complaints) and Neuromuscular conditions (Muscular dystrophy, Myasthenia	Behavioral Sciences	Psychosocial factors influencing chronic illnesses

	Gravis, Sclerosis) on Individual, Family and Society.		
MS-BhS-002	Identify the psychosocial risk factors as mediating factors between illness and its effect.		Psychosocial Impact of Disease and its management
	Discuss the role of psychological variables like coping, social support, and other health cognitions in mediating between illness and its effect.		

MBBS YEAR I
BLOCK III
MODULE I Cardiovascular System
Duration: 07 weeks Recommended minimum hours:188

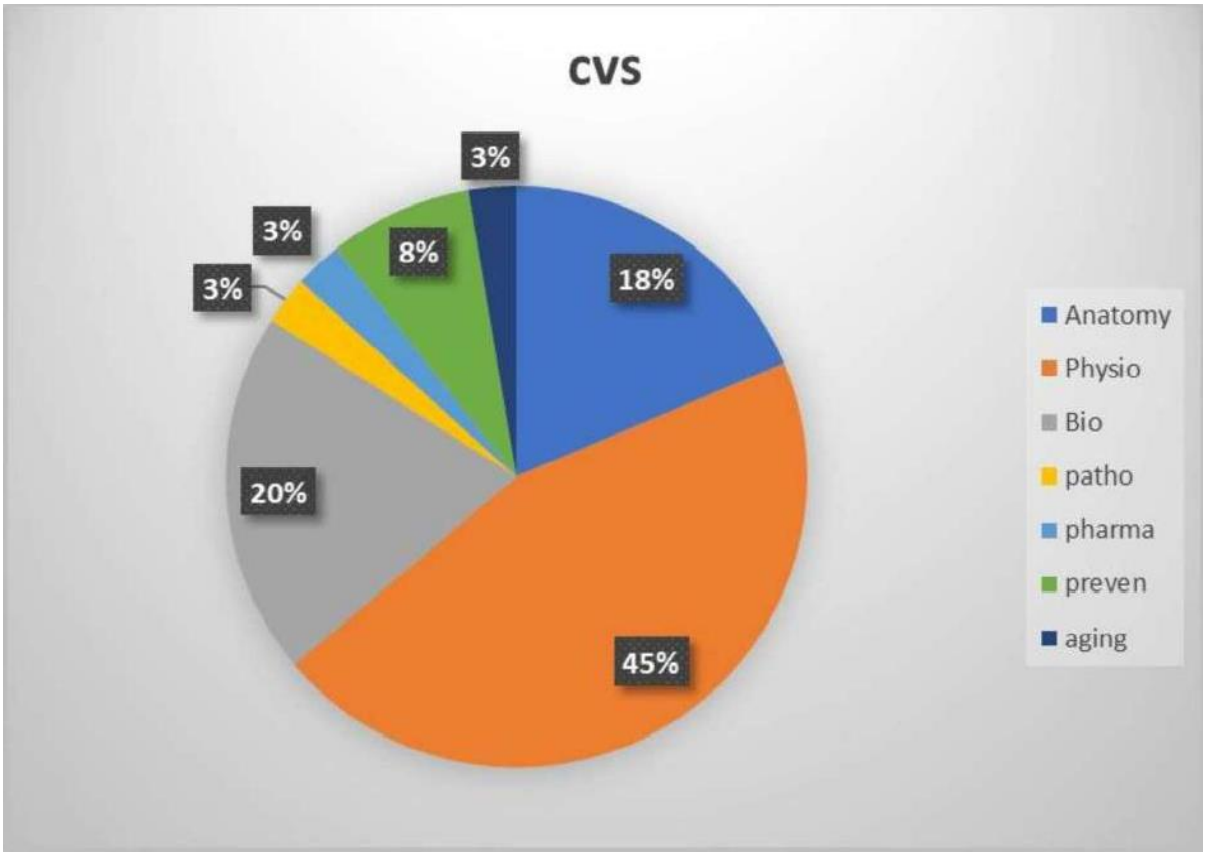


Integration of Disciplines in Module



Behavioral Sciences

Research Methodology



MODULE PLANNING COMMITTEE

Module Coordinator	Prof. Dr Suhail Ata Rasool
Members	Prof. Dr Sabahat Gull & Dr Naveed Najeeb

Preamble

This block focuses on cardiovascular system with basic understanding of structure of thorax. At the very out
medical student should understand that cardiovascular system has fundamental importance in all the field
Medicine. Coronary artery diseases alone are one of the leading causes of morbidity and mortality worldw
The course of this block is designed for first year MBBS students in an integrated manner.
Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve
desired objectives

Aim

This module will enable students to relate their theoretical learning about cardiovascular system throu
casebased learning, interactive Lectures, integrated sessions and apply this knowledge in relevant clin
scenarios encountered in subsequent years of training and practice.

Learning Outcomes:

At the end of this module, student will be able to:

- Describe the normal structure of heart including development,topographical anatomy, neurovascular supply, and histology.
- Review the arrangement of circulatory system (arteries, veins, lymphatics).
- Define the congenital anomalies of cardiovascular system with referenceto normal development and early circulation.
- Define functions of cardiac muscle along with its properties
- Interpret pressure changes during cardiac cycle along with regulation of cardiac pumping.
- Interpret normal & abnormal ECG, ST-T changes, and its abnormalities.Identify the risk factors and role of lipids in coronary blockage and atherosclerosis (hyperlipidemia/ dyslipidemia).
- Define cardiac output and its modulating/controlling factors.
- Differentiate left and right sided heart failure and correlate it with theimportance of pressure differences.
- Enumerate different types of arrhythmias and describe the electricalevents that produce them.
- Discuss the psychosocial impact of cardiovascular diseases in society.

Theme
• Heart • Circulation
Clinical relevance
• Cardiac facilure • Arrhythmias • Atherosclerosis • Ischemic heart diseases • Hypertension • Shock • Congenital Heart diseases • Peripheral arterial diseases

NORMAL STRUCTURE			
Theory			
CODE	**SPECIFIC LEARNING OUTCOMES**	**DISCIPLINE**	**TOPIC**
	GROSS ANATOMY	**TOTAL HOURS = 14**	
CV-A-001	Define mediastinum giving its boundaries and compartments. List the contents of its various compartments.	Human Anatomy	Mediastinum
	Justify the clinical picture of superior mediastinum syndrome anatomically	Integrate with Surgery	
	Describe the formation, tributaries, and termination of superior vena cava		
	Describe the formation, branches, and relations of ascending aorta, aortic arch and descending thoracic aorta.		
	Discuss the distribution of ascending aorta, aortic arch and descending thoracic aorta in reference to their branches		
	Describe formation, course and tributaries of azygous, hemizygous and accessory hemizygous veins.	Human Anatomy	

	Describe the course, relations, and distribution of vagus and thoracic splanchnic nerves in relation to nerve supply of heart.		
CV-A-002	Describe Pericardium and its parts with emphasis on their neurovascular supply and lymphatic drainage	Human Anatomy	Pericardium
	Describe the pericardial cavity mentioning transverse and oblique sinuses. Discuss their clinical significance		
	Describe the surgical significance of pericardial sinus	Integrate with Surgery	

	Describe the anatomical correlates of pericardial rub, pericardial pain, pericarditis, pericardial effusion, and cardiac tamponade.	Integrate with Medicine	
	Describe the anatomical basis for pericardiocentesis.		
CV-A-003	Describe the external features of heart.	Human Anatomy	Heart
	List various chambers of heart mentioning their salient features and openings.		
	Describe the arterial supply of heart: coronary arteries and their distribution with special emphasis on collaterals established during ischemia.		
	Describe the sites of anastomosis between right and left coronary arteries with the participating vessels.		
	Discuss the anatomical correlates of cardiac arterial supply	Integrate with cardiology/ Medicine	
	Describe the anatomical basis for cardiac catheterization		
	Describe the anatomical correlates of electrocardiography, heart block, atrial fibrillation, artificial cardiac pacemaker, cardiac referred pain	Integrate with Medicine	
	Describe the anatomical basis for echocardiography, coronary angiography, angioplasty, and coronary grafts	Integrate with Cardiology/ Medicine	Heart
	Describe the features of angina pectoris and myocardial infarction and correlate them anatomically		
	Describe the venous drainage of heart.	Human Anatomy	
	Describe the alternative venous routes to the heart		
	Identify the vessels supplying the heart with their origins/terminations		
	Describe the Lymphatics of heart		

	Describe the formation, relations, and distribution of cardiac plexus.		
	Describe components and significance of fibrous skeleton of heart		
	Describe the cardiac valves		
	Explain the anatomical basis for valvular heart diseases	Integrate with Cardiology/ Medicine	
	Perform surface marking of various anatomical landmarks of heart and great vessels	Human Anatomy	
	Perform percussion and auscultation of heart	Integrate with Medicine	
	Identify the salient features of heart and great vessels on CT/ MRI	Integrate with Radiology	
CV-A-004	Describe the surgical importance of pericardial sinus	Surgery	Pericardial sinus
CV-A-005	Discuss the anatomical principles of Varicose Veins	Surgery	Varicose Veins
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
	EMBRYOLOGY & POST-NATAL DEVELOPMENT	**TOTAL HOURS = 14**	
CV-A-006	Describe the early development of heart and blood vessels	Human Embryology	Introduction
CV-A-007	Define parts of primitive heart tube and give its folding	Human Embryology	Development of Heart
	Describe the development of various chambers of heart with emphasis on their partitioning		
	Identify various parts of developing heart tube and structures derived from them during embryonic and fetal life (Models and specimens)		
CV-A-7a	Describe the embryological basis of dextrocardia and ectopia cordis		Development of Heart and Development of Lymphatic System
	Describe the partitioning of primordial heart: atrioventricular canal and atrium		
	Describe the development of sinus venosus		

	List clinically significant types of atrial septal defects along with their embryological basis and features. Describe probe patent foramen ovale	Integrate with Pediatrics	
	Describe the partitioning of truncus arteriosus and bulbus cordis	Human Embryology	
	Describe the formation of ventricles and interventricular septum		
CV-A-008	Describe the clinical features and embryological basis of ventricular septal defects	Integrate with Pediatrics	
	Describe the development of cardiac valves and conducting system.	Human Embryology	
	Describe the development of lymphatic system	Human Embryology	
CV-A-009	Describe the embryological correlates and clinical presentation of developmental defects of heart: Tetralogy of Fallot, Patent ductus arteriosus, Unequal division of arterial trunks, Transposition of great vessels and Valvular stenosis, Coarctation of aorta	Integrate with Pediatrics	Development of Arteries
	Describe the formation and fate of pharyngeal arch arteries	Human Embryology	
	Describe the anomalies of great arteries emerging from heart: Coarctation of aorta, anomalous arteries	Integrate with Cardiology/ Medicine	
CV-A-010	Describe the development of embryonic veins associated with developing heart: Vitelline veins, Umbilical Veins and Common cardinal vein and their fate	Human Embryology	Development of Veins
	Describe the formation of superior & inferior vena cava and portal vein with their congenital anomalies		

	With the help of diagrams illustrate the development of superior vena cava, inferior vena cava and portal vein		
CV-A-011	List the derivatives of fetal vessels and structures: Umbilical vein, ductus venosus, umbilical artery, foramen ovale, ductus arteriosus	Human Embryology	Fetal Vessels & Circulation
	Describe Fetal and neonatal circulationmentioning transitional neonatal circulation with its clinical implication	Integrate with Pediatrics/ Obgyn	
CV-A-012	List clinically significant types of atrial septal defects along with their embryological basis and features. Describe patent foramen ovale.	Pediatrics	Congenital Heart defects
	Describe the embryological correlates and clinical presentation of developmental defects of heart: Tetralogy of Fallot, Persistent ductus arteriosus, Unequal division of arterial trunks, Transposition of great vessels and Valvular stenosis		
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	TOPIC
	MICROSCOPIC ANATOMY (HISTOLOGY & PATHOLOGY)	Total Hours = 4	
CV-A-013	Describe the microscopic and ultramicroscopic structure of cardiac muscle emphasizing on T-tubules, sarcoplasmic reticulum and intercalated discs.	Histology	Cardiac Muscle
	Identify, draw and label histological structure of cardiac muscle		
CV-A-014	Describe general histological organization of blood vessels: Tunica intima, media and adventitia.	Histology	Blood Vessels Organization
	Identify, draw and label histological sections of elastic artery, muscular artery, arterioles, vein, capillaries and sinusoids		
CV-A-015	Describe histological features of arteries: Muscular arteries, elastic arteries, Arterioles	Histology	Arteries

CV-A-016	Describe histological features of veins and exchange vessels: large veins, medium sized veins, venules, Capillaries, and sinusoids	Histology	Veins
	Compare and contrast the light microscopic structure of arteries and veins		
CV-A-017	Describe the histopathological basis of thrombus and embolus formation.	Integrate with Pathology	Thrombus/ Embolus formation
CV-A-018	Explain the histological basis of arteriosclerosis and atherosclerosis	Histology	Arteriosclerosis atherosclerosis
CV-A-019	Describe role of arterioles in hypertension		Hypertension

PRACTICAL			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
	Histology	**Total Hours = 3**	
CV-A-020	Identify, draw and label histological structure of cardiac muscle	Histology	Histological features of Cardiac Muscle
CV-A-021	Identify, draw and label histological sections of elastic artery, muscular artery, arterioles, vein, capillaries and sinusoids	Histology	Histological features of Blood Vessels

NORMAL FUNCTION

Theory

CODE	**MEDICAL PHYSIOLOGY**	**Total Hours = 75**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
CV-P-001	Explain the physiological anatomy of cardiac muscle.		
	Explain the functional importance of intercalated discs.		
	Discuss the properties of cardiac muscles.		
	Describe and draw the phases of action potential of ventricle.		

	Describe and draw the phases of action potential of SA node along with explanation of the mechanism of self–excitation/ Auto rhythmicity of SA node.	Physiology	Cardiac Muscle
	Define and give the duration of the Absolute and relative refractory period in cardiac muscle.		
	Draw & explain pressure & volume changes of left ventricle during cardiac cycle.		
	Explain & draw relationship of ECG with cardiac cycle.		
	Explain & draw the relationship of heart sounds with cardiac cycle.		
	Enlist, draw, and explain the physiological basis of atrial pressure waves in relation to cardiac cycle.		
	Define & give the normal values of the cardiac output, stroke volume, end diastolic volume & end systolic volume	Integrate with Medicine	
CV-P-002	Describe the Frank starling mechanism.	Physiology	Regulation of heart pumping
	Describe the autonomic regulation of heart pumping.		
	Describe the effect of potassium, calcium ions & temperature on heart function.		
	Define chronotropic effect- positive and negative.		
	Define the inotropic effect: positive and negative.		
	Define dromotropic effect: positive and negative		
	Describe the location of adrenergic & cholinergic receptors in heart.		
	Name the receptors present in coronary arterioles.		
	Explain sympathetic & parasympathetic effects on heart rate & conduction velocity		
CV-P-003	Draw and explain the conducting system of heart	Physiology	Conducting system of heart
	Describe the physiological basis and significance of AV nodal delay.		

	Explain the ectopic pacemaker.	Integrate with Cardiology/ Medicine	
CV-P-004	Enlist, draw, and explain the physiological basis & give durations of waves, intervals, and segments of normal ECG.	Physiology	Fundamentals of ECG
	Describe the standard limb leads, Augmented limb leads & precordial leads.		
	Define Einthoven's Triangle & Einthoven's law.		
	Explain the physiological basis of upright T wave in normal ECG.		
	Describe the location and significance of J point in ECG.		
	Explain the physiological basis of current of injury.		
	Enlist the ECG changes in angina pectoris.	Integrate with Medicine	
	Enlist the ECG changes in myocardial infarction.		
	Plot the mean cardiac axis.	Physiology	
	Enlist the physiological & pathological causes of right axis deviation of heart.		
	Enlist the physiological & pathological causes of left axis deviation of heart		
	Describe the abnormalities of T wave and their causes.	Integrate with Medicine	
CV-P-005	Describe the effect of hypokalemia and hyperkalemia on ECG	Integrate with Biochemistry	Effect of electrolyte on ECG
	Describe the effect of hypocalcemia and hypercalcemia on ECG.		
CV-P-006	Define tachycardia and enlist its causes.	Integrate with Medicine	
	Define bradycardia and enlist its causes.		

	Classify arrhythmias	Physiology	Cardiac arrhythmia
	Explain the physiological basis of sinus arrythmia.		
	Explain the physiological basis of reflex bradycardia in Athletes.		
	Explain the carotid sinus syndrome.		
	Enlist the causes of atrioventricular block.	Integrate with Cardiology/ Medicine	
	Explain the types of atrioventricular blocks.		
	Explain the ECG changes in 1st, 2nd & 3rd degree heart block.		
	Explain the cause, physiological basis & ECG changes in Stokes Adam syndrome/ventricular escape.	Physiology	
	Enlist the causes of premature contractions.	Integrate with Cardiology/ Medicine	
	Explain the causes and ECG changes of premature atrial contractions.		
	Explain the physiological basis of pulses deficit.	Physiology	
	Explain the causes and ECG changes in PVC.	Integrate with Cardiology/ Medicine	
	Enlist the causes and ECG findings in Long QT syndrome.		
	Explain the causes, physiological basis, features, ECG changes & management of ventricular fibrillation.		
	Explain the causes, physiological basis, features & ECG changes of atrial fibrillation.		
	Explain the physiological basis, features & ECG changes of atrial flutter.	Physiology	
	Compare Flutter and Fibrillations	Physiology	
CV-P-007	Explain the functional parts of circulation (arteries, arterioles, capillaries, veins, venules).	Physiology	Organization of Circulation
CV-P-008	Explain the pressures in systemic & pulmonary circulation.	Physiology	Blood flow

	Explain the types of Blood flow and significance of Reynolds number.		
CV-P-009	Discuss acute local control of local blood flow. Discuss acute humoral control of local blood flow. Explain long term control of local blood flow. Name the organs in which auto regulation of blood flow occurs during changes in arterial pressure (metabolic & myogenic mechanisms).	Physiology	Local & Humoral Control of Blood flow
CV-P-010	Explain the role of autonomic nervous system for regulating the circulation. Explain the vasomotor center. Explain the control of vasomotor center by higher nervous centers. Explain emotional fainting/vasovagal syncope. Identify vessels constituting micro-capillaries. Enumerate hydrostatic and osmotic factors that underlie Starling's Hypothesis for capillary function	Physiology	Nervous Regulation of circulation
CV-P-011	Explain the role of nervous system in rapid control of arterial blood pressure. Explain the regulation of arterial blood pressure during exercise. Enlist different mechanisms for short term regulation of arterial blood pressure. Explain the role of baroreceptors in regulation of arterial blood pressure. Explain the role of chemoreceptors in regulation of arterial blood pressure. Make a flow chart to discuss the role of Atrial volume reflexes/ Bainbridge reflex in control of blood pressure. Make a flow chart to show the reflex responses to increased blood volume which increase blood pressure and atrial stretch.	Physiology	Rapid control of arterial blood pressure

	Describe the role of CNS ischemic response in regulation of the blood pressure.		
	Explain the Cushing reflex		
	Explain the role of abdominal compression reflex to increase the arterial blood pressure.		
CV-P-012	Make a flow chart to discuss the role of renin angiotensin system for long term control of blood pressure.	Physiology	Role of kidneys in long term Regulation of Arterial Blood Pressure
	Make a flow chart to show the regulation of blood pressure in response to increase in ECF volume.		
	Make a flow chart to show the regulation of blood pressure in response to increase in salt intake.		
CV-P-013	Define cardiac output, cardiac index & venous return with their normal values.	Integrate with Cardiology/ Medicine	Cardiac output
	Explain the pathological causes of high & low cardiac output.		
	Discuss the factors regulating cardiac output		
	Discuss factors regulating venous return	Physiology	
CV-P-014	Explain the regulation of skeletal muscle blood flow at rest & during exercise.	Physiology	Skeletal muscle circulation
CV-P-015	Explain the physiological anatomy of coronary circulation.	Physiology	Coronary circulation
	Explain the regulation of coronary blood flow.		
	Explain the physiological basis of angina, myocardial & subendocardial infarction		
CV-P-016	Define & enlist different types of shock.	Physiology	
	Explain the causes, features, and pathophysiology of hypovolemic/hemorrhagic shock.		
	Explain the causes, features, and pathophysiology of septic shock.		

	Explain the causes, features, and pathophysiology of neurogenic shock.	Integrate with Pathology	Circulatory shock
	Explain the causes, features, and pathophysiology of anaphylactic shock.		
	Discuss the treatment of different types of shock.	Integrate with Medicine	
	Explain the different stages of shock.	Physiology	
	Explain the mechanisms that maintain the cardiac output & arterial blood pressure in non-progressive shock.		
	Enlist different types of positive feedback mechanisms that can lead to the progression of shock.		
CV-P-017	Enlist the different types of heart sounds and explain the physiological basis of each.	Physiology	Heart Sounds
	Enlist the causes of 3rd and 4th heart sounds.		
	Explain the causes & physiological basis of murmurs caused by valvular lesions.		
	Enumerate abnormal heart sounds and describe the physiological basis of each.	Integrate with Medicine	
CV-P-018	Classify different types of heart failure	General Medicine/ Cardiology	Heart Failure
	Discuss the signs and symptoms of Heart failure.		
	Discuss the management of Heart failure.		
CV-P-019	Discuss the signs and symptoms of: Arrhythmias.		Arrhythmias
	Discuss the management of Arrhythmias.		
CV-P-020	Enlist various categories of ischemic heart diseases		Ischemic Heart Disease (IHD)
	Discuss the signs and symptoms of ischemic heart diseases		
	Discuss the management of ischemic heart diseases.		
	Discuss the signs and symptoms of: Hypertension.		

CV-P-021	Discuss the management of Hypertension.		Hypertension
CV-P-022	Enlist various valvular heart diseases		Valvular Heart Diseases
	Identify presentations and signs and symptoms of valvular heart diseases		
	Outline management strategies		
CV-P-023	Identify various pericardial diseases	General Medicine/ Cardiology	Pericardial Diseases
	Identify presentations and signs and symptoms		
	Outline management strategies		
CV-P-024	Identify various endocardial and myocardial diseases	General Medicine/ Cardiology	Endocardial and myocardial diseases
	Identify presentations and signs and symptoms		
	Outline management strategies		
CV-P-025	Define Peripheral arterial diseases	General Medicine	Peripheral Arterial Diseases (PAD)
	Identify symptoms and signs of PAD		
	Outline management strategies		
CV-P-026	Enlist various sites of venous thromboembolism	General Medicine, Surgery	Venous thrombo-embolism
	Identify various symptoms and signs of DVT		
	Identify various symptoms and signs of pulmonary embolism		
	Outline management strategies		
CV-P-027	Identify the salient features of heart and great vessels on CT/ MRI	Radiology	Imaging in CVS disorders
	Discuss the principles of cardiac catheterization		
CV-P-028	Justify the clinical picture of superior mediastinum syndrome anatomically	Surgery	Superior mediastinum Syndrome
CV-P-029	Describe Fetal and neonatal circulation mentioning transitional neonatal circulation with it clinical implication	Pediatrics, Obgyn	Fetal circulation at Birth

CV-P-030	Psychological basis of emotional fainting and its impact	Behavioral Sciences	Emotional fainting
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
	MEDICAL BIOCHEMISTRY	**Total Hours = 30**	
CV-B-001	Classify lipids.	Biochemistry	Classification of lipids
CV-B-002	Discuss the biomedical functions & properties of lipids.	Biochemistry	Functions of lipids & Properties of lipids
CV-B-003	Classify fatty acids. Discuss the role of trans saturated, saturated, poly- and mono-unsaturated fatty acids in diet on lipid profile. Discuss lipid peroxidation and its significance	Biochemistry	Classification of fatty acids
CV-B-004	Explain the biochemical and therapeutic roles of eicosanoids (prostaglandins, leukotrienes, thromboxane, and prostacyclin)	Biochemistry	Eicosanoids
CV-B-005	Describe the types, structure, biomedical importance of Lipoproteins Discuss the synthesis, transport and fate of Lipoproteins	Biochemistry	Circulation Lipoproteins
CV-B-006	Interpret the disorders associated with impairment of lipoprotein metabolism especially atherosclerosis and LDL oxidized	Biochemistry	Hyperlipidemias
CV-B-007	Explain the sources, properties, and biomedical role of cholesterol Describe the reactions of cholesterol biosynthesis and its regulation & fate. Discuss Genetic basis of the Hypercholesterolemia	Biochemistry	Cholesterol

CV-B-008	Describe enzymes with reference to: • Active sites • Specificity • Catalytic efficiency • Cofactor • Coenzyme • Holoenzyme • Apoenzyme • Prosthetic group • Zymogens • Location	Biochemistry	Hypercholesterolemia
CV-B-009	Classify enzymes according to the reaction they catalyze.	Biochemistry	Enzymes
	Explain the mechanism of enzyme action from reactants to products (catalysis). a) Illustrate enzyme kinetics in relation to MM Equation & Lineweaver- Burke plot		
	Discuss the effect of various factors (with special reference to Km/V max) on enzymatic activity. • Substrate concentration • Temperature • PH • Enzyme concentration		
	Explain the regulation of enzymatic activity. a) Compare allosteric regulation with regulation by covalent modification. b) Discuss the effect of inhibitors on enzymatic activity which includes: • Competitive inhibition • Uncompetitive inhibition c) Interpret the effect of organophosphorus poisoning on enzyme activity on basis of given data		

	Explain the application of enzyme in clinical diagnosis and therapeutic use	Integrate with Medicine/ Cardiology	
CV-B-010	Discuss the signs and symptoms of hyperlipidemia	Biochemistry / Medicine	Type I to V hyperlipidemias
	Interpret data related to hyperlipidemia		

PRACTICAL			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**Total Hours = 10+08=18**	
		DISCIPLINE	**TOPIC**
CV-P-031	Record an electrocardiogram by correct lead placement and connections.	Physiology	ECG
CV-P-032	Perform auscultation of chest to recognize normal heart sounds.		Heart Sounds
CV-P-033	Examine neck veins to determine Jugular Venous Pulse.		JVP
CV-P-034	Examine arterial pulse to recognize normal characteristics of pulse.		Arterial Pulse
CV-B-011	Perform estimation of Cholesterol by kit method	Biochemistry	Cholesterol Estimation
CV-B-012	Perform estimation of HDL, LDL		HDL, LDL Estimation
CV-B-013	Estimation of cardiac markers		Cardiac Marker Estimation
CV-B-014	Interpret lab reports based on enzymes for diseases like cardiac disorders and hyperlipidemias		Interpretation of Lab report

AGING			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**Total Hours = 5**	
		DISCIPLINE	**TOPIC**
CV-Ag-001	Discuss the effect of age on blood vessels with reference to hypertension	Physiology/ Geriatrics/ Medicine	Hypertension
CV-Ag-002	Discuss the risk of cardiac attack in old age and weather conditions		Cardiac Attack
CV-Ag-003	Discuss the effect of age on valvular system of the heart.		Valvular diseases
CV-Ag-004	Discuss the effect of age on neural conduction of the heart in relation to arrythmia.		Arrythmia
CV-Ag-005	Discuss the protective role of female hormone against CVS diseases in women of reproductive age group	Physiology/ Obstetrics and Gynecology	Role of female hormone on CVS disease

PATHOPHYSIOLOGY AND PHARMACOTHERAPEUTICS			
		Total Hours = 5+5= 10	
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
CV-Pa-001	Classify types of thrombosis, embolism, and infarction	Pathology	Hemodynamics and CVS
CV-Pa-002	Discuss the pathophysiology of thrombosis, embolism, and infarction		Atherosclerosis
CV-Pa-003	Identify the types and causes of hypertension		Hypertension
CV-Pa-004	Discuss the pathophysiology of atherosclerosis, hypertension, and shock		Shock
CV-Pa-005	Discuss the clinical consequences of hypertension and atherosclerosis		Cardiac Failure
	Classify the types of heart failure		
	Identify the causes leading to heart failure		

CV-Pa-006	Identify the types of ischemic heart disease Discuss the pathophysiology of different types of ischemic heart disease		Ischemic Heart Disease
CV-Ph-001	Outline the pharmacological concepts of drugs used in hypertension.	Pharmacology	Antihypertensive drugs
CV-Ph-002	Outline the pharmacological concepts of drugs used in angina.		Antianginal drugs
CV-Ph-003	Outline the pharmacological concepts of drugs used in arrythmias.		Antiarrhythmics drugs
CV-Ph-004	Outline the pharmacological concepts of drugs used in cardiac failure.		Drugs for cardiac failure
CV-Ph-005	Outline the pharmacological concepts of drugs used in peripheral vascular diseases.		Drugs for peripheral vascular diseases

DISEASE PREVENTION & IMPACT			
CODE		**Total Hours = 15**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
CV-CM-001	Describe the various strategies and models to prevent diseases.	Community Medicine and Public Health	Disease Prevention Models
CV-CM-002	Describe primordial prevention and its application to preventing CVS diseases. Depict the concept of primary prevention in context to CVS and able to apply on CVS diseases.		Primordial Prevention
CV-CM-003	Discuss the basic concept of health promotion and its application to CVS.		Health Promotion
CV-CM-004	Discuss various methods of behavioral change interventions at community level.		Behavioral Change Intervention
CV-CM-005	To apply secondary and tertiary preventions on CVS diseases (coronary heart disease, ischemic heart disease, hypertension)		Secondary & Tertiary Prevention

CV-CM-006	Describe the concept of cardiovascular diseases as non-communicable diseases		Non-communicable disease
CV-CM-007	Identify the risk factors in the community for CVS diseases.		Risk factor assessment of CVS diseases
	Learn and apply interventions to prevent the risk factors in community.		
CV-BhS-001	Identify and deal with the various psychosocial aspects of Cardiovascular conditions (such as Hypertension, Coronary artery disease, Heart failure, Arrythmias, and other cardiovascular conditions) on Individual, Family and Society.	Behavioral Sciences	Personal, Psychosocial and vocational issues

CARDIOVASCULAR SYSTEM				
HISTOLOGY				
Topic/ Theme	**Learning outcomes**	**Learning Objectives/Contents**	**Instructional strategies**	**Assessmen tool**
Histology of Circulatory System	Correlate the light microscopic structure of different components of cardiovascular System (elastic and muscular arteries, small and large veins, capillaries, heart) with their function and dysfunction.	• Define capillaries & classify them based on their structure and describe each class by giving examples • Classify arteries and veins depending on their size and describe structure and relative thickness of each component by giving examples. • Describe histological changes in intima in atherosclerosis or arteriosclerosis.	LGIS	MCQs/ SEQs/ SAQs VIVA VOCE
		• Identify various vessels under light microscope and enlist at least two identification points for each. • Illustrate elastic and muscular arteries, small and large veins, capillaries, emphasizing the differences amongst them with the help of eosin and hematoxylin pencils.	Practical	OSPE/ Viva voce
EMBRYOLOGY				
The Embryonic Period (Third to Eight Weeks)	Correlate the developmental events during the embryonic period with relevant congenital anomalies	• Define neurulation and describe process of formation of neural plate, neural tube and neural crest cells.	LGIS	MCQs/ SEQ SAQs/ OSPE/ VIV VOCE
		• Enlist derivatives of: • Surface ectoderm • Neuroectoderm • Neural crest • Intraembryonic mesoderm (paraxial, intermediate, lateral		

		plate) • Endoderm • Explain somitogenesis and differentiation of somites		
		• Explain the development of Intraembryonic coelom.		

		• Correlate the folding of the embryo in the horizontal and longitudinal planes with its consequences. • Explain the processes of formation of blood vessels • Define hemangioma and explain its embryological basis.		
Fetal Period	• Correlate the developmental events of fetal period including placenta, fetal membranes, multiple pregnancies with relevant congenital anomalies	• Define fetal period • List the external body landmarks from third month till birth. • Enumerate various methods to estimate fetal age List • factors affecting fetal growth. Define intrauterine • growth retardation.	LGIS	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE

Placenta and Fetal Membranes	• Distinguish various types of multiple pregnancies based on fertilization, fetal membranes, and placental circulation	• Enlist fetal membranes. Describe their important functions & fate in humans • Enlist types of chorion and & give fate of each. • Define decidua. Enlist its types and give fate of each. • Differentiate between stem, anchoring and terminal villi • Describe the structure of placenta and enumerate its functions • Correlate the following anomalies with development of placenta Placenta Previa • Placenta Accreta • Placenta Percreta • Placenta Succenturiata • Placenta Battledore • Placenta Velamentosa Differentiate between features of maternal and fetal • surfaces of placenta. Enumerate the layers forming placental barrier	LGIS	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE
		• Describe placental circulation (maternal and fetal) • Describe development of umbilical cord • Describe production, circulation, and significance of amniotic fluid • Identify causes, complications and diagnostic features of poly & oligohydramnios. • Describe embryological basis of amniotic bands and umbilical cord defects		

Multiple pregnancies	Correlate the development of body cavities with common congenital anomalies	• Elucidate the mechanism behind the occurrence of various types of multiple pregnancies. • Explain the arrangement of fetal membranes in various types of multiple pregnancies • Explain the embryological basis of fetus papyraceus, twin transfusion syndrome and conjoined twins.	LGIS	MCQs/ SEQs/ SAQ VIVA VOCE
Screening for fetal well being	Appraise Invasive and noninvasive approaches for antenatal screening for fetal well being	• Appraise Invasive and noninvasive approaches for antenatal screening for fetal well being	LGIS	MCQs/SAQ /SEQs/Viva voce/ OSPE

Development of body cavities	Correlate the development of body cavities with their congenital anomalies	• Describe the formation of intraembryonic coelom and its divisions • Correlate the effects of folding with relocation of different parts of intraembryonic coelom • Elucidate the processes involved in partitioning of intraembryonic coelom into definitive body cavities • Explain the contribution of different developmental sources of Diaphragm	LGIS	MCQs/SAQ /SEQs/Viva voce/ OSPE

		• Correlate the nerve supply of diaphragm with its developmental sources • Correlate the anomalies of ventral body wall and diaphragm with normal development		
Development of Heart	Correlate the development of heart with its congenital anomalies	• Explain the formation, division of heart tube with special reference to primary & secondary heart • fields Elucidate the mechanism of cardiac looping, and justify dextrocardia on basis of • that knowledge Explain methods of septal formation in atria and • ventricles Describe division of atrioventricular canal. Describe the formation of • left atrium and pulmonary veins Explain the division of conotruncus • Appraise the embryological basis of the • following heart defects. Atrial septal defects Ventricular septal defects • • Fallot's tetralogy • • Transposition of great vessels • Persistent truncus arteriosus • Ectopia cordis	LGIS	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE
Development of vascular system	Correlate the development of vascular system with its congenital anomalies	• Explain the development and fate of aortic arches • Enumerate the developmental sources of aorta • Explain the congenital anomalies of arterial system which include: • • Patent Ductus Arteriosus • Coarctation of aorta Double aortic arch	LGIS	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE

		• Right aortic arch		

		• Abnormal origin of the Right Subclavian Artery • An interrupted aortic arch • Explain the fate of vitelline, umbilical and cardinal veins. • Describe the development of superior & inferior vena cava. • Apply the knowledge of developmental anatomy to explain following anomalies: • Double Inferior Vena Cava • Absence of Inferior Vena Cava • Left Superior Vena Cava • Double Superior Vena Cava		
Fetal circulation	Use the knowledge of fetal circulation for interpreting cardiovascular congenital anomalies	• Identify the sites of mixing of oxygenated and deoxygenated blood in a fetus • Justify the needs of these sites in a fetus • List the changes occurring in human circulation after birth • Explicate the embryological basis of various congenital anomalies of CVS based on the knowledge of fetal circulation and changes after birth.	LGIS	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE
Skills	Recognize the developmental events of fetal period and cardiovascular system on the given models	• Identify the developmental events of embryonic and fetal period on the given models and diagrams • Identify the developmental events of cardiovascular system on the given models and diagrams	SGD	OSPE Viva

GROSS ANATOMY

Osteology of ribs, sternum and thoracic vertebrae	Appraise bony features of thoracic vertebrae, ribs, sternum	• Identify basic features of thoracic vertebrae, ribs, sternum • Recognize the site and importance of sternal angle in relation to great vessels and rib counting.	LGIS/SGD	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE
General organizatio n of circulatory system	Appraise the general concept of anatomical organization of cardiovascular system	• Describe general plan of systemic, pulmonary, and portal circulatory system. • Classify blood vessels on anatomical and functional basis with the help of examples. • Differentiate between anatomical end arteries and functional end arteries by giving examples. • Explain the anatomical basis and clinical significance of collateral/potential circulation • Describe general plan of the lymphatic system of the body.	LGIS/SGD	Formative- MCQs/ SEQs/ SAQ
Thoracic wall	Appraise thoracic inlet and outlet, sternum, sternal angle, thoracic vertebrae,	• Identify structures forming the thoracic inlet and outlet/costal margin • Mark sternal angle and discuss its importance in clinical practice • Identify basic features of thoracic vertebrae, ribs, sternum	LGIS/SGD	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE
	Correlate the gross anatomy of thoracic wall, lungs, pleura and diaphragm with relevant clinical conditions	• Revisit basic features of thoracic vertebrae, ribs, sternum • Correlate the cartilaginous, bony, and muscular framework of the thoracic cage with its function	LGIS/SGD	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE

		• Identify structures forming the thoracic inlet and outlet/costal margin • Mark sternal angle and discuss its importance in clinical practice • Describe the joints of thorax with reference to their types and movements • Discuss and differentiate between the pump handle and bucket handle movements and their effect on diameters of chest cavity • Discuss the role of the respiratory muscles during inspiration and expiration • Justify the selection of a site for invasive chest procedures (intercostal nerve block, chest intubation on right and left side) giving anatomical reasons. • Discuss the arterial supply, lymphatic and venous drainage of the thoracic wall. **Skill:** • Calculate ribs, cardiothoracic ratio on chest x ray PA view • Identify cardiophrenic angle, cardiothoracic angle, hilar shadow and aortic knuckle on chest x ray PA view. • Identify Lung consolidation on X ray chest PA view.		
Anterior Mediastinum	Recognize the boundaries and contents of erior mediastinum	• Outline the boundaries of anterior mediastinum • Enumerate the contents of anterior mediastinum	LGIS/SGD	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE

	wit h			

	special emphasis on thymus	• Describe the shape, relations, and blood supply of thymus		
Superior Mediastinum	Discuss superior mediastinum in detail	• Outline the boundaries of superior mediastinum and describe its general topography • Enumerate the contents of superior mediastinum • Identify carina at the site of bifurcation of trachea into main principal bronchi • Describe immediate relations, blood, and nerve supply of thoracic part of trachea • Justify the right bronchus being the most probable site of foreign body impaction in respiratory tract • Describe the origin, course, relations, and distribution of both phrenic nerves Analyze the clinical scenarios related to compression of trachea and damage/irritation to phrenic nerve based upon your knowledge of Anatomy	LGIS/SGD	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE
Middle mediastinum and Heart	Correlate the anatomical knowledge of the middle mediastinum with relevant clinical conditions	• Recognize anatomical position, borders, surfaces, apex and base, chambers of heart as seen from exterior Describe internal features of various chambers of heart Describe the arterial supply, venous drainage and nerve supply of heart • Correlate the anatomical basis of opening and closing of AV, aortic and pulmonary valves, with the heart sounds produced by them.	LGIS/SGD	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE

		• Locate the sites for auscultation of various heart sounds on the chest wall • Describe the anatomical basis of valvular heart diseases • Differentiate between anatomical end arteries and functional end arteries • Define angina pectoris and myocardial infarction. and explain their anatomical basis in case of coronary artery disease • Explain the anatomical basis of cardiac referred pain in case of ischemic heart disease • List various diagnostic procedures for coronary artery disease • Differentiate between coronary angiography and angioplasty • Name the blood vessels preferably used for coronary catheterization		
Posterior mediastinum	Discuss posterior mediastinum in detail	• Outline the boundaries of posterior mediastinum and describe its general topography • Enumerate the contents of posterior mediastinum • Describe the relations and branches of descending aorta • Describe the thoracic duct with reference to its formation, course, tributaries, termination, and area of drainage • Analyze the clinical scenarios related to chylothorax with the help of your knowledge of Anatomy	LGIS/SGD	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE

		• Describe the course, relations, and distribution of both vagii in thorax • Discuss the azygos system of veins with reference to formation, course, relations, tributaries, and area of drainage of both azygos and hemiazygos veins • Discuss the role of azygos vein in case of caval obstruction • Identify the lymph nodes in the posterior mediastinum • Define splanchnic nerves and identify the location of thoracic sympathetic chain		
Pericardium	Correlate the anatomical features of pericardium with its clinical abnormalities	• Describe the layers, innervation, blood supply and functions of pericardium • Correlate the reflections of parietal and visceral pericardium resulting in formation of oblique sinus, and transverse sinus with its surgical significance • Define pericarditis and identify the layers of pericardium involved • Explain the anatomical basis of cardiac tamponade and pericardial rub • Name the layers between which the serous accumulation may occur, resulting in pericardial effusion. • Identify the ideal site for pericardiocentesis, and list the structures pierced during the	LGIS/SGD	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE

		procedure in an order.		

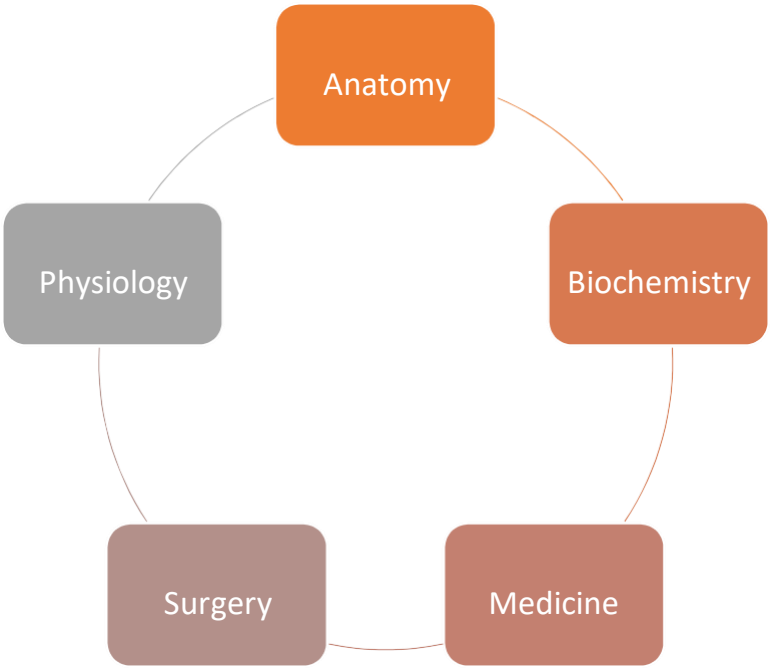
Lungs	Correlate the development of lungs with its structure and function	• Identify the side of lung correctly by recognizing its borders, surfaces, and hilar apertures • Discuss the blood supply, nerve supply, and relations of various surfaces of both lungs • Correlate bronchopulmonary segments with their position and significance. • Discuss with anatomical reasoning, the clinical presentation of bronchogenic carcinoma and lung trauma	LGIS/SGD	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE

Pleura	Correlate the development of pleura with its anatomy, functions, and diseases	• Identify various parts of pleura • Recognize the pleural reflections and recesses Relate • the innervation of the visceral and parietal layers of the pleura in different clinical presentations of pleurisy • Discuss the clinical significance of reflections and recesses of pleura and pleural cavity • Recognize signs, symptoms and radiological findings of pleural effusion, pneumothorax, empyema and hemothorax.	LGIS/SGD	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE
Diaphragm	Correlate the development of diaphragm with its structure and function	• Identify parts of diaphragm and their embryological origin • List the apertures in diaphragm with their levels and structures passing through each • Discuss the role of diaphragm and scalene muscles in increasing the vertical diameter	LGIS/SGD	MCQs/ SEQs/ SAQ OSPE/ VIVA VOCE

		of thoracic cavity		

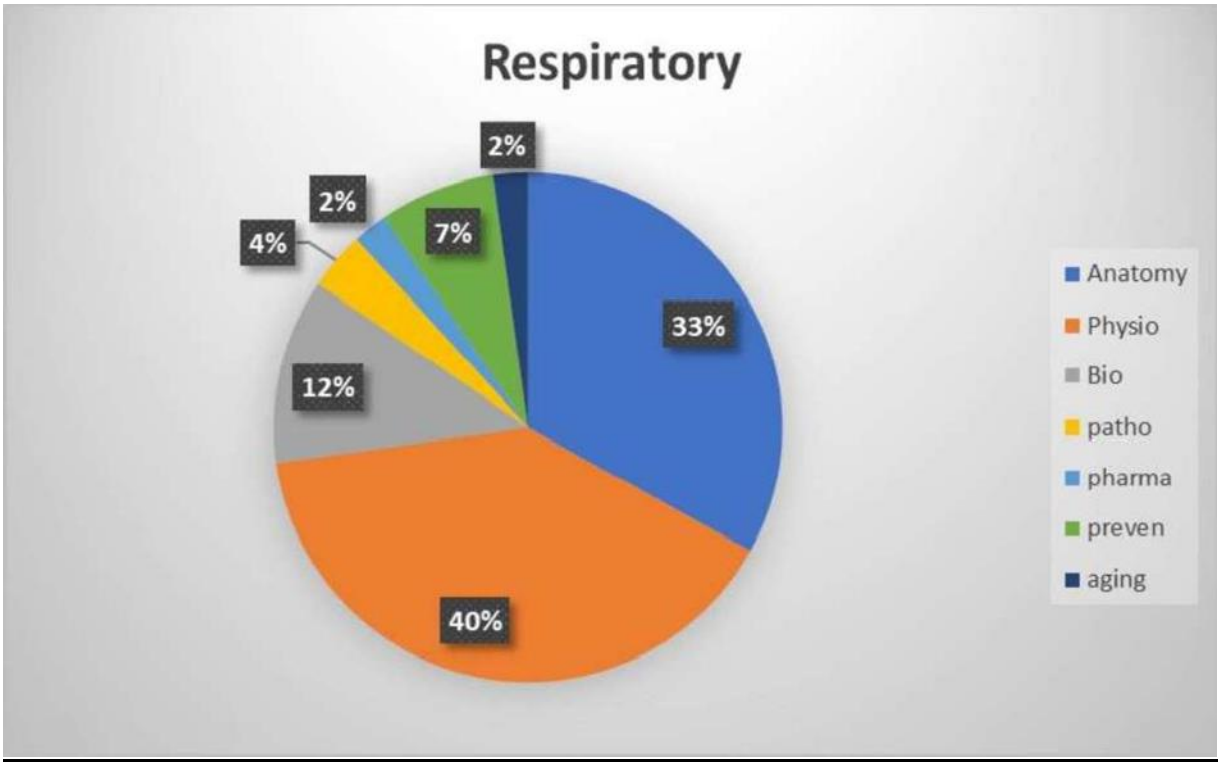
		• Analyze the clinical scenario related to diaphragmatic hernia and phrenic nerve lesions with anatomical reasoning • Justify anatomical basis of referred shoulder tip pain		
	Correlate the gross anatomy of thoracic wall with its movements, relevant clinical conditions, and requisite surgical interventions Surface Marking	• Correlate the cartilaginous, bony, and muscular framework of the thoracic cage with its functions • Explain the mechanics of respiration • Recognize signs, symptoms and radiological findings of pleural effusion, pneumothorax, empyema and hemothorax. • Justify the selection of a site for invasive chest procedures (intercostal nerve block, chest intubation on right and left side) giving anatomical reasons. • Discuss with anatomical reasoning, the clinical presentation of bronchogenic carcinoma and lung trauma Correlate • bronchopulmonary segments with their position and clinical significance	SGD	MCQs/SAQ / SEQs/Viv voce/ OSPE

MBBS YEAR I
BLOCK III
MODULE II
Respiratory system
Duration: 04 weeks Recommended minimum hours: 136



Behavioral Sciences

Research Methodology



MODULE PLANNING COMMITTEE

Module Coordinator	Prof. Dr Suhail Ata Rasool
Members	Prof. Dr Sabahat Gull & Dr Naveed Najeeb

Preamble

One of the unfortunate gifts of industrialization is varied respiratory illnesses. However, high prevalence chronic respiratory diseases, mortality and morbidity associated with it is a burden that is not limited affluent countries. According to a lancet report, nearly 545 million of world population (7.4% of wor population) suffers from chronic respiratory condition. However, disability remains highest in our part of world (South Asia), where premature mortality from chronic respiratory diseases is highest! Risk factors men include air pollution, cigarette and sheesha smoking causing rise in COPD cases. Amongst wom exceptions exist, as household air pollution from solid fuels and ambient particulate matter are the were leading cause. Genetics also play a part in diseases like asthma, sarcoidosis, interstitial lung diseases. Howe certain lifestyle and behavioral modifications can overcome genetic and environmental factors improving morbidity. With the world suffering from COVID-19 not only physically but also mentally, a firm understand of the respiratory system is very important for undergraduate students so that they can manage these disea in clinical settings reducing disease burden in society.

Aim

This module will enable the students to integrate the basic knowledge of respiratory system and relate it with its clinical aspects which helps them to practice clinically in the subsequent years

Learning Outcomes:

At the end of this module, student will be able to:

- Apply basic sciences' knowledge to understand the causes of common respiratory problems.
- Explain the pathogenesis of respiratory diseases.
- Enlist the main investigations relevant to respiratory disorders.
- Recognize risk factors and preventive measures of main respiratorydiseases

Theme
• Rib cage • Thoracic vertebrae • Upper respiratory system • Lower respiratory system
Clinical relevance
• Acute respiratory distress syndrome • Bronchial asthma • Tuberculosis • pneumonia

NORMAL STRUCTURE			
Theory			
CODE	**SPECIFIC LEARNING OUTCOMES**	**DISCIPLINE**	**TOPIC**
	GROSS ANATOMY	**TOTAL HOURS =30**	
Re-A-	Describe the anatomical features and neurovascular supply of nasal cavity	Human Anatomy	upper respiratory
	Describe the anatomical features and neurovascular supply of pharynx	Human Anatomy	

001	Describe the anatomical features and neurovascular supply of larynx	Human Anatomy	tract

Re-A-002	Describe the anatomical features of the Trachea with its extent, relations, neurovascular supply and lymphatics.	Human Anatomy	Trachea
Re-A-003	Give the boundaries of thoracic cavity, superior and inferior thoracic apertures and list the structures contained/ traversing them.	Human Anatomy	Thoracic Cavity
	Describe the anatomical correlates of Thoracic inlet syndrome & Thoracic outlet syndrome	Integrate with Surgery	
Re-A-004	Identify and differentiate the typical from atypical ribs.	Human Anatomy	Rib Cage
	Describe the anatomical features of ribs and give their attachments.		
	Describe the anatomical correlates of supernumerary cervical rib.	Integrate with Surgery	
	Classify the articulations of the ribs.	Human Anatomy	
	Describe the anatomical features of these articulations.		
	Describe the movements with the muscles producing articulations.	Human Anatomy	
	Describe the effects of fracture to the neck of rib and give its anatomical justification	Integrate with Orthopedics	
	Describe the anatomical correlates of Flail Chest.		
Re-A-005	Describe the anatomical correlates of Thoracotomy	Integrate with Surgery	Intercostal space
	Define the attachments, relations, nerve supply and actions of intercostal muscles	Human Anatomy	
	Define an intercostal space and give details of its contents		
	Describe the anatomical correlates of intercostal incisions	Integrate with Surgery	

Re-A-006	Describe the anatomical features and attachments on typical & atypical thoracic vertebrae.	Human Anatomy	Thoracic Vertebrae
	Differentiate between typical and atypical vertebrae		
	Explain the thoracic part of vertebral column (normal curvature, intervertebral joints, muscles & fascia of the back, blood supply, lymphatic drainage, nerve supply of back) Associated Clinical conditions -Kyphosis, Scoliosis		
Re-A-007	Describe the bony features and attachments on the sternum	Human Anatomy	Sternum
	Describe the anatomical correlates of median sternotomy.	Integrate with Surgery	
	Describe the anatomical correlates of sternal biopsy.		
	Describe the presentation of sternal fractures and correlate it anatomically	Integrate with Orthopedics	
Re-A-008	Describe the endo thoracic fascia with its attachments.	Human Anatomy	Connective tissue of thorax
	Describe the supra-pleural membrane with its attachments.		
Re-A-009	Classify the joints of the thorax mentioning their articulations, movements with the muscle producing them.	Human Anatomy	Joints of thorax
	Describe the mechanism of thorax: pump handle and bucket handle movements.		
Re-A-010	Describe the origin, course, relations and distribution of intercostal nerves and vessels	Human Anatomy	Neurovascular supply of thorax
	Describe the course and relations of Internal thoracic vessels.		

	Describe the alternate routes of venous drainage in blockage of superior/ inferior vena cava	Integrate with medicine	
Re-A-011	Describe the cutaneous nerve supply and dermatomes of thorax.	Human Anatomy	Cutaneous nerve supplyof thorax
	Give anatomical justification of the manifestations of herpes zoster infection on thoracic wall.	Integrate with medicine	
	Discuss anatomical correlates of intercostal nerve block	Integrate with Anesthesia	
Re-A-012	Name the parts of diaphragm mentioning their attachments and neurovascular supply	Human Anatomy	Diaphragm
	Explain the role of diaphragm in respiration		
	Enumerate the diaphragmatic apertures with their vertebral levels, mentioning the structures traversing them.		
Re-A-013	Describe the pleura giving its parts, layers, neurovascular supply, and lymphatic drainage	Human Anatomy	Pleural cavity
	Describe the pleural cavity giving its recesses and the lines of pleural reflection		
	Describe the anatomical correlates of pleural pain pleurisy, pneumothorax, pleural effusion	Integrate with Medicine	
	Describe the anatomical features, relations of lungs	Human Anatomy	Lungs
Re-A-014	Describe the neurovascular supply and lymphatic drainage of lungs.		
	Compare and contrast the anatomical features and relations of right and left lung		
	Describe the root of the lung and pulmonary ligament with arrangement of structures at the hilum		

	Define Bronchopulmonary segments. Give their vascular supply, lymphatic drainage and clinical significance		
	Describe the anatomical correlates of chest tube intubation	Integrate with surgery	
	Describe the anatomical correlates of thoracentesis		
	Explain the pathophysiology of Atelectasis.	Integrate with pulmonology	
	Describe the anatomical correlates of bronchoscopy	Integrate with pulmonology	
	Describe the anatomical basis for medico-legal significance of lungs in determining the viability of newborn	Integrate with Forensic Medicine	
	Identify various anatomical landmarks on chest X-Rays, CT and MRI	Integrate with Radiology	
	EMBRYOLOGY & POST-NATAL DEVELOPMENT	**TOTAL HOURS = 6**	
Re-A-015	Describe the development of ribs, sternum, and thoracic vertebrae. Give the associated congenital malformations	Human Embryology	Bony componentsof thoracic cavity
Re-A-016	List the embryological sources of the diaphragm. Describe the events taking place in the development and descent of the diaphragm	Human Embryology	Diaphragm
	Describe the embryological basis of congenital anomalies of the diaphragm: diaphragmatic hernias, eventuation of diaphragm, epigastric hernia, hiatal hernia, retrosternal hernia	Integrate with Pediatrics	
Re-A-017	Describe the development of upper respiratory tract: larynx and trachea	Human Embryology	

	Describe congenital anomalies of larynx and trachea: laryngeal web, laryngeal atresia, tracheal stenosis and atresia.	Integrate with Pediatrics	Upper respiratory tract
	List the types of tracheo-esophageal fistulas. Describe their embryological basis and clinical presentation	Integrated with Surgery	
Re-A-018	List the phases of lung development with their time periods. Describe the events taking place in each phase	Human Embryology	Lungs
	Describe the embryological basis and clinical presentation of respiratory distress syndrome/Hyaline membrane disease.	Integrate with Pediatrics	
	MICROSCOPIC STRUCTURE	**Total Hours = 4**	
Re-A-019	Give the general histological organization of respiratory system.	Histology	Organization of respiratory system
Re-A-020	Describe the microscopic and ultra-microscopic structure of respiratory epithelium	Histology	Respiratory epithelium
Re-A-021	Describe the histology of blood-air barrier	Histology	blood-air barrier
Re-A-022	Describe the histological features of epiglottis and larynx	Histology	Epiglottis & larynx
Re-A-023	Describe the histological features of trachea and lungs	histology	trachea and lungs
Re-A-024	Explain the histological basis of: Coughing Atelectasis Infant respiratory distress syndrome Diffuse alveolar damage Lung carcinoma	Integrate with pathology	Clinical correlates

Practical			
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
	Histology	**Total Hours = 5**	
Re-A-025	Identify, draw and label the histologic sections of epiglottis and larynx.	Histology	Epiglottis& larynx
Re-A-026	Describe the histological features of bronchialtree: trachea, bronchi, bronchioles, alveoli		Trachea & Organization of respiratory system
Re-A-027	Identify, draw and label the histological sections of bronchial tree: trachea, bronchi, bronchioles, alveoli, Lung		Bronchial tree & Lung
	Describe the mucosal changes encountered in the trachea-bronchial tree		
	Compare and contrast the histological features of various components of bronchial tree: trachea, bronchi, bronchioles, alveoli.		
Re-A-028	Describe, compare and contrast the light and electron microscopic features of type I and type II pneumocytes		Pneumocytes

NORMAL ORGAN FUNCTION

NORMAL ORGAN FUNCTION

Theory			
	MEDICAL PHYSIOLOGY	**Total Hours = 45**	
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
Re-P-001	Enlist the muscles of inspiration and expiration in quiet breathing	Integrate with Anatomy	Breathing
	Enlist the muscles of inspiration and expiration in labored breathing		
	Explain the components of the work of breathing	Medical Physiology	
	Discuss the mechanics of pulmonary ventilation		
	Explain periodic breathing		
	Explain the causes and pathophysiology of sleep apnea	Integrate with medicine	
Re-P-002	Define lung compliance		Lung Compliance
	Enlist the factors that affect lung compliance		

	Draw the compliance diagram of air filled and saline filled lungs	Medical Physiology	
	Enlist the components of surfactant		
	Describe the role of surfactant in lung compliance		
	Explain the role of surfactant in premature babies	Integrate with Pediatrics	
Re-P-003	Define the different lung volumes and capacities and their clinical significance	Medical Physiology	Lung volumes andCapacities
	Discuss fev1/ FVC ratio and its clinical significance		
	Enlist the lung volumes and capacities that cannot be measured by spirometer.		
	Define dead space & explain its types		
	Discuss FEV1/FVC ratio in relation to Bronchial Asthma.	Integrate with Pulmonology	
	Discuss FEV1/FVC ratio in relation to Chronic Obstructive Pulmonary disease/restrictive lung diseases		
	Discuss FEV1/FVC ratio in relation to pulmonary embolism	Integrate with medicine	
Re-P-004	Define alveolar ventilation.	Medical Physiology	Alveolar ventilation
	Define minute respiratory volume		
Re-P-005	Explain the ultrastructure of respiratory membrane	Medical Physiology	Principles of gaseous exchange
	Discuss the factors affecting diffusion of gases across the respiratory membrane		
	Explain the diffusion capacity of respiratory membrane for oxygen and carbon dioxide		
	Define alveolar, pleural and transpulmonary pressure.		
	Explain differences in the partial pressures of atmospheric, humidified, alveolar air and explain physiological basis of change in each pressure		
Re-P-006	Explain the different forms of transport of oxygen in the blood	Medical Physiology	Transport of oxygen in the blood

	Draw and explain oxyhemoglobin dissociation curve		
	Enlist the factors that cause rightward shift of oxyhemoglobin dissociation curve.		
	Enlist the factors that cause leftward shift of oxyhemoglobin dissociation curve		
	Explain the Bohr's effect		
	Define; enlist the types, and causes of cyanosis	Integrate with Medicine	
Re-P-007	Enlist different forms in which CO2 is transported in the blood.	Medical Physiology	Transport of CO2 in blood
	Explain the Carboxyhemoglobin dissociation curve.		
	Explain the Haldane effect.		
	Explain the chloride shift/Hamburger phenomenon.		
	Define the respiratory exchange ratio (RER)		
Re-P-008	Explain the alveolar oxygen and carbon dioxide pressure when VA/Q = infinity, zero and normal	Medical Physiology	VA/Q (Ventilation Perfusion Ratio)
	Explain the concept of physiological shunt when VA/Q ratio is less than normal		
	Explain the concept of physiological dead space when VA/Q ratio is above normal		
Re-P-009	Enlist the respiratory & non-respiratory functions of lungs.	Medical Physiology	Protective Reflexes
	Explain the nervous control of bronchiolar musculature		
	Trace the reflex arc of cough reflex and sneeze reflex		
Re-P-010	Explain the principal means by which acclimatization occurs	Medical Physiology	Aviation and Space
	Explain the events that occur during acute mountain sickness		
	Enlist the features of chronic mountain sickness		

Re-P-011	Explain the pathophysiology, features, prevention and treatment of decompression sickness.	Medical Physiology	Deep sea diving
Re-P-012	Draw and explain the effect of CO poisoning on oxyhemoglobin dissociation curve	Medical Physiology	CO poisoning
	Explain the pathophysiology, features, and treatment of CO poisoning.	Integrate with medicine	
Re-P-013	Enumerate the components of respiratory centers and explain their functions.	Medical Physiology	Nervous regulation of respiration
	Explain the inspiratory RAMP signal		
	Explain the Herring Breuer reflex/lung inflation reflex and its clinical significance		
Re-P-014	Explain the location of chemo sensitive area (central chemoreceptors) and peripheral chemoreceptors	Medical Physiology	Chemical control of respiration
	Explain the effect of hydrogen ions & carbon dioxide on the chemo- sensitive area		
	Explain the role of oxygen in the control of respiration/peripheral chemoreceptors		
Re-P-015	Explain the regulation of Respiration during Exercise	Medical Physiology	Exercise and respiration
Re-P-016	Enlist the effects of acute hypoxia	Medical Physiology	Hypoxia
	Explain the hypoxia inducible factor a master switch for body response to hypoxia		
	Define and explain different types of hypoxias	Integrate with Medicine	
Re-P-017	Explain the pathophysiology of Tuberculosis.	Integrate with pathology	Tuberculosis
Re-P-018	Describe the pathophysiology of Pneumonia	Integrate with pathology	Pneumonia
Re-P-019	Define Dyspnea	General Medicine	Dyspnea
	Enlist different causes of dyspnea		
	Differentiate between cardiac and respiratory dyspnea		

	Outline management strategies for dyspnea		
Re-P-020	Enlist the causes of Pneumothorax	Surgery	Pneumothorax
	Describe the signs and symptoms of Pneumothorax		
Re-P-021	Enlist the causes of Pleuritis		Pleuritis
	Describe the signs and symptoms of Pleuritis		
	Discuss the management of Pleuritis		
Re-P-022	Enlist the causes of Bronchitis	General Medicine	Bronchitis
	Discuss the signs and symptoms of Bronchitis		
	Discuss the management of Bronchitis		
Re-P-023	Classify different types of pneumonia		Pneumonia
	Discuss the sign symptoms of pneumonia		
	Discuss the management of pneumonia		
Re-P-024	Classify different types of asthma		Asthma
	Discuss the signs and symptoms of asthma		
	Discuss the management of asthma		
Re-P-025	Classify different types of Tuberculosis		Tuberculosis
	Discuss the signs and symptoms of tuberculosis		
	Discuss the management of Tuberculosis		
Re-P-026	Classify different types of acute respiratory distress syndrome	General Medicine	Acute respiratory distress syndrome
	Discuss the signs and symptoms of acute respiratory distress syndrome		
	Discuss the management of acute respiratory distress syndrome		
Re-P-027	Define respiratory failure	General Medicine	Respiratory Failure
	Describe various types of respiratory failure		
	Enlist various causes of respiratory failure		
	Outline management strategies of respiratory failure		
Re-P-028	Describe ABC in a trauma patient	Surgery	First Aid in Surgical Patients

MEDICAL BIOCHEMISTRY		Total Hours = 15	
Re-B-001	Explain and interpret the pedigree of single gene defect i.e., Emphysema and cystic fibrosis (autosomal recessive)	Medical Biochemistry	Genetic defects
Re-B-002	Explain the biochemical significance of phospholipids	Medical Biochemistry	Phospholipids
	Interpret Respiratory Distress syndrome on the basis of given data	Integrate with Physiology	
Re-B-003	Describe the structure, synthesis, degradation and functions of Elastin	Medical Biochemistry	Elastin
	Discuss the pathophysiology of Emphysema.	Integrate with Pathology	
Re-B-004	Discuss the concept of acid base balance	Medical Biochemistry	Acid base balance
	Interpret metabolic and respiratory disorders of acid base balance on the basis of sign, symptoms and ABG findings		
	Describe the Clinical interpretation of acid base balance	Integrate with Medicine	

Practical			
CODE	**PRACTICAL**	**Total Hours = 10**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
Re-P-029	Perform the clinical examination of chest for the respiratory system (inspection, palpation, percussion, Auscultation)	Medical Physiology	Clinical Examination of Chest
Re-P-030	Determine Peak Expiratory Flow rate with Peak Flow Meter		Peak Expiratory Flow rate measurement
Re-P-031	Determine Blood Oxygen Saturation with finger Pulse Oximeter		Oxygen Saturation

Re-P-032	Determine Respiratory Volumes & Capacities with Spirometer/ Spiro lab. (FEV1/FVC ratio)		Spirometry
Re-P-033	Student should be able to Record the movements of chest by stethograph		Chest movements
Re-B-005	Determine the pH of the solution by pH meter	Medical Biochemistry	Determination of pH

PATHOPHYSIOLOGY AND PHARMACOTHERAPEUTICS			
		Total Hours = 5+3	
CODE	**SPECIFIC LEARNING OBJECTIVES**	**DISCIPLINE**	**TOPIC**
Re-Ph-001	Identify the drugs for cough suppression & expectoration	Pharmacology & Therapeutics	Cough Suppressants
	Explain the mechanism of action and adverse effects of cough suppressants		
Re-Ph-002	Explain the mechanism of action and adverse effects of anti-histamines		Anti-histamines
Re-Ph-003	Explain the mechanism of action and adverse effects of anti-asthmatics		Anti-asthmatics
Re-Pa-001	Describe the pathophysiology of acute respiratory distress syndrome	Pathology	Acute Respiratory Distress Syndrome
Re-Pa-002	Describe the pathophysiology of obstructive lung disease		Obstructive lung Disease
Re-Pa-003	Describe the pathophysiology of Restrictive Lung Disease		Restrictive Lung Disease

AGING			
CODE	**Aging theory**	**Total Hours = 3**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
Re-Ag-001	Discuss the effect of age on decreased lung compliance	Pathology	Age-induced lung fibrosis
Re-Ag-002	Discuss the role of age on respiratory clearance leading to recurrent inflammatory processes at the ciliated respiratory epithelium		Increased vulnerability to infection & neoplasia

DISEASE PREVENTION & IMPACT			
CODE		**Total Hours = 10**	
	SPECIFIC LEARNING OBJECTIVES	**DISCIPLINE**	**TOPIC**
Re-CM-001	Identify the common risk factors of acute respiratory infections with emphasis on smoking	Community Medicine and Public Health	Prevention of acute respiratory infections (ARI)
	Discuss preventive strategies of different problems related to respiratory system		
	Enlist the common vaccines used for the prevention of ARI		
	Explain the role of vitamins in the respiratory tract infections	Integrate with Biochemistry	
Re-CM-002	Explain the effect of air pollutants on the respiratory system		Interaction of environment &

		Community Medicine and Public Health	Respiratory system
Re-CM-003	Describe the burden of respiratory diseases		Epidemiology of respiratory Diseases
Re-CM-004	Enlist the common respiratory diseases related to occupation		Occupational Lung Diseases
Re-BhS - 001	identify the psychosocial factors leading to dyspnea.	Behavioral sciences	Dyspnea
Re-BhS-002	Identify the psychosocial factors leading to psychogenic cough.		Psychogenic cough
Re-BhS-003	Identify and deal with the various psychosocial aspects of Respiratory conditions (such as Asthma, COPD, Tuberculosis, Cystic Fibrosis, Sleep Apnea) on Individual, Family and Society.		Personal, Psychosocial and vocational issues

MBBS 1st Professional

Paper 1

Theme	Subject	Written Exam			Oral/Practical/Clinical Exam			
					OSPE/OSCE/Viva Stations			
		MCQ (1 mark)	SEQ (5 mark each)	Marks	OSPE (08 marks each) Observed	OSCE (08 marks each) Observed	Structured Viva (16 marks each)	Marks
Normal Structure	Anatomy & applied/clinical	20	3	35	3	-	1	40
Normal Function	Physiology & applied/clinical	22	2	32	2	-	1	32
	Biochemistry & applied/clinical	22	2	32	2	-	1	32
Disease Burden & Prevention	Community Medicine & Public Health	05	-	05	-	-	-	-
	Behavioral Sciences	05	-	05	-	-	-	-
Pathophysiology and Pharmacotherapeutics	Pathology	06	-	06	-	-	-	-
	Pharmacology	05	-	05	-	-	-	-
CFRC	CF 1-1	-	-	-		1	-	8
PERLs	PERLs 1-1	-	-	-		1	-	8
		85	7x5=35	**120**	7 Stations x 08 = 56	2 Stations x 08 = 16	3 Vivas x 16 = 48	**120**

POLICY

MBBS 1st Professional

Paper 2

Theme	Subject	Written Exam			Oral/Practical/Clinical Exam			
					OSPE/OSCE/Viva Stations			
		MCQ (1 mark)	SEQ (5 mark each)	Marks	OSPE (08 marks each) Observed	OSCE (08 marks each) Observed	Structured Viva (16 marks each)	Marks
Normal Structure	Anatomy & applied/clinical	35	4	55	5	-	1	56
Normal Function	Physiology & applied/clinical	17	2	27	1	-	1	24
	Biochemistry & applied/clinical	11	1	16	1	-	1	24
Disease Burden & Prevention	Community Medicine & Public Health	06	-	06	-	-	-	-
	Behavioral Sciences	04	-	04	-	-	-	-
Pathophysiology and Pharmacotherapeutics	Pathology	07	-	07	-	-	-	-
	Pharmacology	05	-	05	-	-	-	-
CFRC	CFRC-1-2	-	-	-		1	-	08
PERLs	PERLs-1-2	-	-	-		1	-	08
		85	7x5=35	**120**	7 Stations x 08 = 56	2 Stations x 08 = 16	3 Vivas x 16 = 48	**120**

MBBS 1st Professional

Paper 3

Theme	Subject	Written Exam			Oral/Practical/Clinical Exam			
		MCQ (1 mark)	SEQ (5 mark each)	Marks	OSPE/OSCE/Viva Stations			Marks
					OSPE (08 marks each) Observed	OSCE (08 marks each) Observed	Structured Viva (16 marks each)	
Normal Structure	Anatomy & applied/clinical	16	2	26	1	-	1	24
Normal Function	Physiology & applied/clinical	31	4	51	4	-	1	48
	Biochemistry & applied/clinical	18	1	23	2	-	1	32
Disease Burden & Prevention	Community Medicine & Public Health	06		06	-	-	-	-
	Behavioral Sciences	02	-	02	-	-	-	-
Pathophysiology and Pharmacotherapeutics	Pathology	07	-	07	-	-	-	-
	Pharmacology	05	-	05	-	-	-	-
CFRC	CFRC-1-3	-	-	-	-	1	-	08
PERLs	PERLs-1-3	-	-	-	-	1	-	08
		85	7x5=35	**120**	7 Stations x 08 = 56	2 Stations x 08 = 16	3 Vivas x 16 = 48	**120**

Recourse book

Anatomy

- Langman's Medical Embryology
- Snell's Clinical Anatomy
- Snell's Clinical Neuroanatomy. Walter Kluwer
- Laiq H.S. Medical Histology. Paramount Books.
- Laiq H.S. General Anatomy. Paramount Books.

Physiology

- Guyton AC and Hall JE. Textbook of Medical Physiology. W. B. Sunders & Co., Philadelphia.
- Essentials of Medical Physiology by Mushtaq Ahmad

Biochemistry

- Harper's Biochemistry by Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell. McGraw-Hill latest ed.
- Lippincott's Illustrated Reviews Biochemistry Champe, P.C. & Harvey, E.A latest ed. Published by Lippincott Williams and Wilkins.
- ABC of clinical genetics by H.M.Kingston

Pathology

- Vinary Kumar, Abul K. Abbas and Nelson Fausto Robbins and Cotran, Pathologic basis of disease. WB Saunders.
- Richard Mitchall, Vinary Kumar, Abul K. Abbas and Nelson Fausto Robbins and Cotran, Pocket Companion to Pathologic basis of diseases. Saunder Harcourt.

Walter and Israel. General Pathology. Churchill Livingstone.

Pharmacology

- Basic and Clinical Pharmacology by Katzung, McGraw-Hill.
- Pharmacology by Champe and Harvey, Lippincott Williams & Wilkins

Behavioral Sciences

- Handbook of Behavioural Sciences by Prof. Mowadat H.Rana, 3rd Edition
- Medical and Psychosocial Aspects of Chronic Illness and Disability SIXTH EDITION Donna R. Falvo, PhD Beverley E. Holland, PhD, RN,

Community medicine

- Parks Textbook of Preventive and Social Medicine. K. Park (Editor)
- Public Health and Community Medicine Ilyas, Ansari (Editors)

Surgery

- Bailey & Love' Short practice of Surgery

Medicine

- Davidson's Principles and Practice of Medicine

Islamiyat

- Standard Islamiyat (compulsory) for B.A, BSc, MA,MSc, MBBS by Prof M Sharif Islahi.
- Ilmi Islamiyat (compulsory) for BA, BSc, & equivalent.