



॥वसुधैव कुटुम्बकम्॥

**SYMBIOSIS MEDICAL COLLEGE FOR WOMEN
(SMCW)**

A Constituent of Symbiosis International (Deemed University)

(Established under section 3 of the UGC Act, 1956)

Re-accredited by NAAC with 'A' grade

Founder: Prof. Dr. S. B. Mujumdar, M. Sc., Ph. D. (Awarded Padma Bhushan and Padma Shri by President of India)

Syllabus

Dean's Preamble:

"Vasudhaiva Kutumbakam"

This is the motto of Symbiosis International University, which is a Sanskrit phrase which means "The world is one family".

Heartfelt welcome is extended to students from all over the world, National and International who have come to study at Symbiosis Medical College for Women under the umbrella of the Symbiosis International University.

The abbreviation MBBS expands itself to mean Bachelor of Medicine and Bachelor of Surgery. Symbiosis International University has initiated to provide the women an excellent opportunity in pursuing a career in medicine by commencing with the MBBS course.

MBBS is an Undergraduate Academic Degree Course. The period of MBBS curriculum is covered over four and a half years which are divided into three phases followed by an internship of one year.

Recently the Medical Council of India updated the medical curriculum for undergraduates and postgraduates to be in consonance with the changing health needs of the country. The result is an outcome driven curriculum which conforms to global trends. The Indian Medical Graduate, at the end of the undergraduate training program, will be able to recognize "health for all" as a national goal and will be able to fulfill his/her societal obligations towards the realization of this goal. The clinician thus produced will be able to provide preventive, promotive, curative, palliative and holistic care to his patients. Under the new curriculum, the student will be trained to effectively communicate with patients and their relatives in a manner respectful of the patient's preferences, values, beliefs, confidentiality and privacy. The Symbiosis Medical College for Women is committed to effective implementation of this competency based curriculum wherein the thrust is towards making medical education more learner-centric, patient-centric, gender-sensitive, outcome-oriented and environment appropriate. The curriculum will lay emphasis on importance of ethical values, responsiveness to the needs of the patient and effective communication skills. The education will lay stress on collaborative and inter-disciplinary teamwork, professionalism, altruism and respect in professional relationships. An international standard syllabus has been designed at Symbiosis Medical

College for Women to create student centric and community oriented quality learning and research experience.

INDIAN MEDICAL GRADUATE:

Introduction to MBBS:

Phase wise training and time distribution for professional development

The Competency based Undergraduate Curriculum and Attitude, Ethics and Communication (AETCOM) course, as published by the Medical Council of India shall be the curriculum for the batches admitted in MBBS

Training period and time distribution (Table-1):

Every learner shall undergo a period of certified study extending over 4 ½ academic years, divided into nine semesters from the date of commencement of course to the date of completion of examination which shall be followed by one year of compulsory rotating internship.

The period of 4 ½ years is divided as follows (Table-2):

- **Pre-Clinical Phase [(Phase I) - First Professional phase of 13 months preceded by Foundation Course of one month]:** will consist of preclinical subjects – Human Anatomy, Physiology, Biochemistry, Introduction to Community Medicine, Humanities, Professional development including Attitude, Ethics & Communication (AETCOM) module and early clinical exposure, ensuring both horizontal and vertical integration. The teaching in the first Professional year commences with induction through the Foundation Course by the 1st of August of each year.
- **Para-clinical phase [(Phase II) - Second Professional (12 months)]:** will consist of Para-clinical subjects namely Pathology, Pharmacology, Microbiology, Community Medicine, Forensic Medicine and Toxicology, Professional development including Attitude, Ethics & Communication (AETCOM) module and introduction to clinical subjects ensuring both horizontal and vertical integration. The clinical exposure to learners will be in the form of learner-doctor method of clinical training in all phases. The emphasis will be on primary, preventive and comprehensive health care. The student will be provided learning experiences in secondary health care, wherever possible. This will involve: (a) Experience in recognizing and managing common problems seen in outpatient, inpatient and emergency settings, (b) Involvement in patient care as a team member, (c) Involvement in patient management and performance of basic procedures.

- **Clinical Phase – [(Phase III) Third Professional (28 months)]**

(a) **Part I (13 months)** - The clinical subjects include General Medicine, General Surgery, Obstetrics & Gynaecology, Pediatrics, Orthopaedics, Dermatology, Otorhinolaryngology, Ophthalmology, Community Medicine, Forensic Medicine and Toxicology, Psychiatry, Respiratory Medicine, Radiodiagnosis & Radiotherapy and Anaesthesiology & Professional development including AETCOM module.

(b) **Electives (2 months)** - To provide learners with opportunity for diverse learning experiences, to do research/community projects that will stimulate enquiry, self-directed experimental learning and lateral thinking

(c) **Part II (13 months)** - Clinical subjects include: i. Medicine and allied specialties (General Medicine, Psychiatry, Dermatology Venereology and Leprosy (DVL), Respiratory Medicine including Tuberculosis) ii. Surgery and allied specialties (General Surgery, Orthopedics [including trauma]), Dentistry, Physical Medicine and rehabilitation, Anaesthesiology and Radiodiagnosis) iii. Obstetrics and Gynecology (including Family Welfare) iv. Pediatrics v. AETCOM module

During para-clinical and clinical phases, including prescribed 2 months of electives, clinical postings of three hours' duration daily would apply for various departments.

Phase distribution and timing of examinations of the MBBS programme is as follows:

Time distribution of MBBS program & Examination Schedule											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
							Foundati on Course	I MBBS			
I MBBS								Exam I- MBBS	II MBBS		
II MBBS								Exam II- MBBS	III MBBS		
III MBBS Part I									Exam III- MBBS Part I	Elective & Skills	
III MBBS Part II											
Exam III- MBBS Part II	Internship										
Internship											

- i. One month is provided at the end of every professional year for completion of examination and declaration of results
- ii. Supplementary examinations shall be conducted within 90 days from the date of declaration of the results of the main examination, so that the learners who pass can join the main batch for progression and the remainder would appear for the examination in the subsequent year.
- iii. A learner shall not be entitled to graduate later than ten (10) years of her/his joining the first MBBS course.
- iv. A learner, who fails in the second Professional examination, shall not be allowed to appear in third Professional Part I examination unless she/he passes all subjects of second Professional examination.
- v. Passing in third Professional (Part I) examination is not compulsory before starting part II training; however, passing of third Professional (Part I) is compulsory for being eligible for third Professional (Part II) examination.

Professional Phase-wise distribution of subjects			
Phase & year of MBBS training	Subjects & New Teaching Elements	Duration	University examination
First Professional MBBS	<ul style="list-style-type: none"> • Foundation Course (1 Month) • Human Anatomy, Physiology & Biochemistry, introduction to Community Medicine, Humanities • Early Clinical Exposure • Attitude, Ethics and Communication Module (AETCOM) 	1 + 13 months	I Professional
Second Professional MBBS	<ul style="list-style-type: none"> • Pathology, Microbiology, Pharmacology, Forensic Medicine and Toxicology. • Introduction to clinical subjects including Community Medicine • Clinical postings • Attitude, Ethics & Communication Module (AETCOM) 	12 months	II Professional
Third Professional MBBS Part I	<ul style="list-style-type: none"> • General Medicine, General Surgery, Obstetrics & Gynecology, Pediatrics, Orthopedics, Dermatology, Psychiatry, Otorhinolaryngology, Ophthalmology, Community Medicine, Forensic Medicine and Toxicology, Respiratory Medicine, Radio diagnosis & Radiotherapy, Anesthesiology • Clinical subjects / postings • Attitude, Ethics & Communication Module (AETCOM) 	13 months	III Professional (Part I)
Electives	<ul style="list-style-type: none"> • Electives Skills and assessment* 	2 months	
Third Professional MBBS Part II	<ul style="list-style-type: none"> • General Medicine, Pediatrics, General Surgery, Orthopedics, Obstetrics and Gynecology including Family welfare and allied specialties • Clinical postings / subjects • Attitude, Ethics & Communication Module (AETCOM) 	13 months	III Professional (Part II)

Phase I

Phase I: First Professional MBBS

The teaching in the first Professional year commences with induction through the **Foundation Course** by the 1st of August of each year.

This will be followed by commencement of teaching of the following subjects in the **1st professional year**:

- Anatomy
- Physiology
- Biochemistry
- Community Medicine

The distribution of the teaching hours in Phase-I will be as follows:

Subjects	Lectures (hours)	Small Group Teaching / Tutorials / Integrated learning / Practical (hours)	Self-directed learning (hours)	Total (hours)
Human Anatomy	220	415	40	675
Physiology*	160	310	25	495
Biochemistry	80	150	20	250
Early Clinical Exposure**	90	-	0	90
Community Medicine	20	27	5	52
Attitude, Ethics & Communication Module (AETCOM)***	-	26	8	34
Sports and extracurricular activities	-	-	-	60
Formative assessment and Term examinations	-	-	-	80
Total	-	-	-	1736

* including Molecular Biology.

** Early clinical exposure hours to be divided equally in all three subjects.

***AETCOM module shall be a longitudinal programme.

Foundation course

Syllabus

This syllabus is based on Medical Council of India, Competency based Undergraduate curriculum for the Indian Medical Graduate, 2019.

GOAL: The goal of the Foundation Course is to prepare a learner to study Medicine effectively. Foundation course will sensitize the fresh medical student with the required knowledge and skills that will assist them in acclimatizing to the new professional environment which would be their milieu for a life-long career in the medical profession.

OBJECTIVES

1. Knowledge: At the end of the course the student will be oriented to:

- a. The medical profession and the physician's role in society
- b. The MBBS programme
- c. Alternate health systems in the country and history of medicine
- d. Medical ethics, attitudes and professionalism
- e. Health care system and its delivery
- f. National health priorities and policies
- g. Universal precautions and vaccinations
- h. Patient safety and biohazard safety
- i. Principles of primary care (general and community-based care)
- j. The academic ambience

2. Skills: At the end of the course the student should be able to acquire enhanced skills in:

- a. Language (Local & English)
- b. Interpersonal relationships
- c. Communication
- d. Learning including self-directed learning
- e. Time management
- f. Stress management
- g. Use of information technology

Student Should be able to provide:

- a. First-aid
- b. Basic life support

3. Attitude, Ethics & Communication: At the end of the course the student should be able to:

- a. Develop empathy towards the patient
- b. Ethical protocol in dealing with patients

c. Communicate effectively with patient and patient’s relatives in local language as well as in English.

The foundation course will be conducted under following six modules:

(The teaching hours in the foundation course is depicted in Table 3.)

Subjects / Contents	Teaching hours	Total hours
Orientation	30	30
Skills Module	35	35
Field visit to Community Health Center	8	8
Introduction to Professional Development & AETCOM module	-	40
Sports and extracurricular activities	22	22
Enhancement of language / computer skills	40	40
	-	175

1) Orientation Module

- Role of doctors in the society and their impact
- Roles of an Indian Medical Graduate and relate it to the societal impact
- Expectations of the students from the Nation, society, Institution, peers, colleagues and patients and vice versa
- Rules and regulations of the institution
- Orientation of students to the college campus, facilities, faculty, administrative structure, support systems and processes of the institution
- Various career pathways and opportunities for personal growth
- Overview of MBBS curriculum, its structure and outcomes and its relation to the career pathways
- Role of physician at various levels of Health care delivery
- Principles of family practice
- History of Medicine and alternate systems of Medicine

2) Skills Module

- Basic Life support in Skills lab
- First Aid in a simulated environment
- Bio-safety and universal precautions
- Handling and safe disposal of Biohazardous materials in a simulated environment

- Proper hand washing and use of personal protective equipment
- Appropriate response to needle stick injuries
- Biomedical Waste segregation (BMW), observe and explain the process of management of BMW in accordance with National Regulations
- Immunization requirements of Health care professionals
- Awareness of significance of documentation in patient care and the proper method of documentation

3) Community Orientation Module

- National Health Goals and Policies
- National health scenario, demographic, socio-cultural and epidemiological issues
- Health care systems in India with reference to primary, secondary and tertiary level care
- Basic principles of community health and its impact on health and disease
- Structure and functioning of the community health center
- Patient and family interactions and relate these to impact of environment and diseases.

4) Professional Development and Ethics Module

- Concept of professionalism and ethics among health care professionals and consequences of unprofessional and unethical behaviour
- Nature of physician's work considering core values like compassion, altruism, integrity, duty, responsibility and trust
- Value, honesty and respect during interaction with peers, seniors, faculty, other health care workers and patients
- Significance of working in a health care team
- Disability competencies
- Respect of cultural diversities and interact with those with different cultural values
- Significance and methods of stress management and risk taking behaviour
- Role of Yoga and meditation in personal health
- Significance and appropriate ways of Time management
- Importance of interpersonal relationship while working in a health care team
- Role of mentoring
- Group learning and group dynamics
- Pedagogy and its role in learning skills

- Methods of self-directed learning
- Collaborative learning

5) Enhancement of Language and Computer Skills Module

- Communication with patient and families, be aware of barriers to communication and appropriate ways to respond
- Local language training for patient and peer interactions
- English language training
- Basic computer skills training
- Training of accessing online resources

6) Sports and extracurricular activities

- Engagement of students in different sports activities
- Engagement of students in different extra-curricular activities

Formative and Internal Assessment:

- Foundation Course is compulsory and an attendance of 75% is mandatory
- Assessment: May be assessed by active discussion in the small group session or by Reflective writing in log book
- Feedback, comments and/or grades about the student's performance will be documented by the faculty mentor.
- The performance of the students in the Foundation Course will not contribute towards internal assessment marks.
- Student's feedback about the Foundation Course will be documented in a structured format for program evaluation and refinement.

References:

- 1) MCI document on Foundation course for undergraduate medical education program 2019.
- 2) Related subject books as per the topic.
- 3) Further guidance will be provided by designated person conducting teaching learning session and the librarian.

Department of Anatomy

Preamble:

The subject of Anatomy is about the macroscopic and microscopic study of structure of human body and correlating it with its functioning. The history of this subject can be traced back to almost 2000 years ago when it was studied by the Greeks. Even in those days there was awareness that unless the structure and function of the human body was understood it was not possible to treat the human being.

Anatomy is part of the Pre-clinical phase (Phase-I) of medical education. This phase of medical education begins with one month of Foundation course followed by 13 months of studying the Preclinical subjects i.e. Human Anatomy, Physiology, Biochemistry and Introduction to Community Medicine, Humanities, Professional development including Attitude, Ethics & Communication (AETCOM) module and early clinical exposure, ensuring both horizontal and vertical integration. Thus the learning of Anatomy subject will be started by students following completion of the Foundation course at the end of the month of August. The total duration for learning Human Anatomy is 13 months.

The subject of Anatomy is studied under several subheadings such as gross anatomy, histology, embryology and genetics. The gross anatomy itself is further subdivided into different regions of the body such as superior and inferior extremity, thorax, abdomen, head face and neck and neuroanatomy. Histology and embryology are also further subdivided into general and systemic.

In 2019 the medical curriculum in India underwent a revision. Henceforth the emphasis in medical education will be on learning as per the specified competencies with stress on integrated teaching and learner centred acquisition of skills, ethical and humanistic values.

Goal: The Broad goal of teaching Human Anatomy to undergraduate students aims to provide comprehensive knowledge of the structure of Human body along with the various organ systems of the body to facilitate the understanding of structure function correlation as well as structural relation of health and disease.

Objectives:

1. **Knowledge:** At the end of the Phase I, the undergraduate student must be able to:

- a) Understand the normal gross anatomy of the human body
- b) Describe the structure of the central nervous system and its connections within and with rest of the body.
- c) Comprehend the microscopic structure of human body.
- d) Comprehend the basic principles of development of human body and embryological anomalies
- e) Explain the clinical correlation of the organs and structures involved and interpret the anatomical basis of the disease presentations following the early clinical exposure sessions.
- f) Comprehend the basics of genetics in relation to structure of chromosomes, chromosomal abnormalities and patterns of inheritance and to apply it with genetic disorders.

2. **Skills:**

- a) Dissect the cadaver to identify the normal structure in Human body.
- b) Identify the micro-structure of various tissues and Organs under the microscope.
- c) Demonstrate the Human development and Genetic inheritance using models and Charts.

3. **Attitude, Communication and Ethics:**

- a) Develop respect for the human body.
- b) Exhibit honesty, fairness, respect and integrity in all interactions during the course.
- c) Recognize the importance of teamwork.

ANATOMY SYLLABUS

The topics will be covered as per GMER guidelines.

1. General Anatomy

- Normal anatomical position, various planes, relation, comparison, laterality & movement in our body
- Various types of cartilage with its structure & distribution in body
- Composition of bone and bone marrow. Classification of bones and their salient features. Parts, blood and nerve supply of a long bone.
- Various joints with subtypes and examples. Salient features of Synovial joint.
- Classification of muscle tissue according to structure & action. The parts of skeletal muscle and difference between tendons and aponeuroses with examples.
- Different types, structure & function of skin. Dermatomes in body.
- Types, Structure and function of fascia. Modifications of deep fascia with its functions.
- The architecture of Cardio-vascular system, its parts and function. Difference between systemic and pulmonary circulation. Other types of circulations.
- The components and functions of the lymphatic system
- General plan of nervous system with components of central, peripheral & autonomic nervous systems

2. General Histology

- Epithelium: microanatomy of epithelium, various types, function and the ultrastructure of epithelium.
- Connective tissue: Various types, function and the ultrastructure of connective tissue
- Muscle: microanatomy of Various types, function and the ultrastructure of muscular tissue
- Nervous tissue: Multipolar and unipolar neuron, ganglia, peripheral nerve with the structure-function correlation of neuron along with the ultrastructure of nervous tissue.
- Blood Vessels: microstructure of blood vessels, capillaries. Various types and structure-function correlation of blood vessel and the ultrastructure of blood vessels
- Glands & Lymphoid tissue: microstructure of Exocrine gland and distinguish between serous, mucous and mixed acini and the lymphoid tissue & microanatomy of lymph node, spleen, thymus, tonsil and their function.

- Bone & Cartilage: Microanatomy, classification, various types and function of Bone and cartilage.
- Integumentary System: microanatomy of skin and its appendages and their function.

3. General Embryology

- Stages of human life, the terms- phylogeny, ontogeny, trimester, viability
- Uterine changes occurring during the menstrual cycle, Synchrony between the ovarian and menstrual cycles
- Spermatogenesis and Oogenesis.
- Stages and Consequences of Fertilization and the anatomical principles underlying contraception
- Teratogenic influences; fertility and sterility, surrogate motherhood, social significance of “sex-ratio”.
- Cleavage and formation of blastocyst and the development of trophoblast.
- Process of implantation & common abnormal sites of implantation and abortion, decidual reaction.
- Formation of extra-embryonic mesoderm and coelom, bilaminar disc and prochordal plate
- Formation & fate of the primitive streak
- Development and fate of Notochord
- Process of Neurulation
- Development of somites and intra-embryonic coelom
- Embryological basis of congenital malformations, nucleus pulposus, sacrococcygealteratomas, neural tube defects
- Pregnancy test, pregnancy in first trimester and role of teratogens, alpha-fetoprotein
- Formation, functions & fate of-chorion: amnion; yolk sac; allantois & decidua
- Formation & structure of umbilical cord, various types of umbilical cord attachments
- Formation of placenta, its physiological functions, fetomaternal circulation & placental barrier, Role of placental hormones in uterine growth & parturition.
- Embryological basis of twinning in monozygotic & dizygotic twins
- Embryological basis of estimation of fetal age.
- Various methods of prenatal diagnosis
- Indications, process and disadvantages of amniocentesis, chorion villus biopsy

4. Upper Limb

- Bony landmarks of upper limb: Jugular notch, sternal angle, acromial angle, spine of the scapula, vertebral level of the medial end, Inferior angle of the scapula
- The bones of superior extremity, its side, important features, anatomical position and joints formed by them.
- Attachment, nerve supply & action of muscles of pectoral, Shoulder and Scapular region.
- Location, extent, deep relations, structure, age changes, blood supply, lymphatic drainage, microanatomy, development and applied anatomy of breast.
- Boundaries and contents of axilla
- Origin, extent, course, parts, relations and branches of axillary artery & tributaries of vein
- Formation, branches, relations, area of supply of branches, course and relations of terminal branches of brachial plexus
- The anatomical groups of axillary lymph nodes and their areas of drainage.
- Type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements, muscles involved, blood supply, nerve supply and applied anatomy of shoulder joint, Sternoclavicular joint, Acromioclavicular joint.
- Attachment, nerve supply & action of muscle groups of upper arm.
- Boundaries and contents of cubital fossa. Anatomical basis of Venepuncture of cubital vein.
- Type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements, muscles involved, blood supply, nerve supply and applied anatomy of Elbow joint.
- Muscle groups of forearm with attachments, nerve supply and actions.
- Type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements, muscles involved, blood supply, nerve supply and applied anatomy of Wrist joint, Carpometacarpal joints & Metacarpophalangeal joint.
- Intrinsic muscles groups of hand and movements of thumb and muscles involved
- The bones and joints of upper limb seen in anteroposterior and lateral view radiographs of shoulder region, arm, elbow, forearm and hand.
- Development of upper limb
- Palpation of Brachial artery, Radial artery, Testing of muscles of upper Limb.

5. Lower Limb

- Anatomical position, side identification and important features of all the bones of Lower limb, joints formed by the given bones and their ossification centers, their importance.
- Origin, course, relations, branches (or tributaries), termination & clinical application of important nerves and vessels of thigh,
- Attachment, nerve supply and actions of muscles of front and medial side of thigh.
- Boundaries, floor, roof and contents of femoral triangle, Adductor canal and the anatomical basis of psoas abscess, femoral Hernia
- Origin, course, relations, branches (or tributaries), termination of important nerves and vessels of gluteal region
- Anatomical basis of sciatic nerve injury during gluteal intramuscular injections and Trendelenburg sign.
- Hamstrings group of muscles with their attachment, nerve supply and actions
- Boundaries, roof, floor, contents and relations of popliteal fossa
- Type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements and muscles involved, blood and nerve supply, bursae around the hip joint.
- Anatomical basis of Complication of fracture of femur, dislocation of hip joint and surgical Hip replacement.
- Muscles of leg with their attachment, nerve supply and actions.
- Origin, course, relations, branches (or tributaries), termination & clinical application of important nerves and vessels of anterior compartment of leg.
- Type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements and muscles involved, blood, nerve supply, bursae and applied anatomy of knee joint.
- Arches of Foot, factors maintaining arches of the foot with its importance, anatomical basis of Flat foot, club foot, metatarsalgia, and plantar fasciitis.
- Type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements and muscles involved, blood and nerve supply of tibiofibular, ankle joint, subtalar and transverse tarsal joints.
- Fascia lata, Venous drainage, Lymphatic drainage, Retinacula & Dermatomes of lower limb. Anatomical basis of enlarged inguinal lymph nodes, varicose veins and deep vein thrombosis.

- Bones and joints of lower limb seen in anteroposterior and lateral view of radiographs.
- Important bony and soft tissue landmarks of lower limb.
- Describe basic concept of development of lower limb

6. Thorax

- Salient features of sternum, ribs and thoracic vertebra with type, articular surfaces & movements of manubriosternal, costovertebral, costotransverse, xiphisternal, Costochondral and interchondral joints.
- Boundaries of thoracic inlet, cavity and outlet and Mechanics and types of respiration.
- Typical and atypical intercostal space with its content.
- Boundaries and contents of the superior, anterior, middle and posterior mediastinum.
- Subdivisions, sinuses in pericardium, blood supply and nerve supply of pericardium.
- External and internal features of each chamber of heart. Fibrous skeleton of heart.
- Parts, position and arterial supply of the conducting system of heart.
 - Origin, course and branches of coronary arteries. Formation, course, tributaries and termination of coronary sinus. Anatomical basis of ischemic heart disease.
 - External appearance, microanatomy, relations, blood supply, nerve supply, lymphatic drainage and applied anatomy of Oesophagus and Trachea.
 - Origin, course, relations, tributaries and termination of superior venacava, azygos, hemiazygos and accessory hemiazygos veins and thoracic duct and its applied anatomy.
 - Extent, branches and relations of arch of aorta & descending thoracic aorta.
 - Location and extent of thoracic sympathetic chain, splanchnic nerves and lymphatic duct.
 - Blood supply, lymphatic drainage and nerve supply of pleura, extent of pleura and describe the pleural recesses and their applied anatomy.
 - Side, extent, external features, microanatomy and relations, blood supply, lymphatic drainage and nerve supply of lungs & bronchial tree, bronchopulmonary segment and their clinical correlate.
 - Development of pleura, lung, heart and Embryological basis of congenital anomalies.
 - General and special radiology of chest.
 - Surface marking of lines of pleural reflection, lung borders and fissures, trachea, heart borders, apex beat & surface projection of valves of heart.

7. Abdomen

- Planes regions & Quadrants of abdomen
- Fascia, nerves & blood vessels of anterior abdominal wall the formation of rectus sheath and its contents
- Boundaries, extent, contents of Inguinal canal including and anatomical basis of inguinal hernia.
- Attachments of muscles of anterior abdominal wall and common Abdominal Incisions
- Thoracolumbar fascia
- Lumbar plexus for its root value, formation & branches.
- Major subgroups of back muscles, nerve supply and action
- Coverings, internal structure, side determination, blood supply, nerve supply, lymphatic drainage and applied anatomy of testis, Epididymis, Penis.
- Anatomical basis of Varicocoele, Phimosi& Circumcision
- Boundaries and recesses of Lesser & Greater sac
- Various peritoneal folds & pouches with its explanation and anatomical basis of Ascites, Peritonitis and Subphrenic abscess.
- Major viscera of abdomen under following headings (anatomical position, external and internal features, important peritoneal and other relations, blood supply, nerve supply, lymphatic drainage and applied aspects).
- Formation, course relations and tributaries of Portal vein, Inferior vena cava & Renal vein
- Origin, course, important relations and branches of Abdominal aorta,
- The sites of portosystemic anastomosis and clinical application.
- Nerve plexuses of posterior abdominal wall
- Attachments, openings, nerve supply & action of the thoracoabdominal diaphragm, abnormal openings of thoracoabdominal diaphragm and diaphragmatic hernia
- Muscles of Pelvic diaphragm
- Position, features, important peritoneal and other relations, blood supply, nerve supply, lymphatic drainage and clinical aspects of important male & female pelvic viscera
- Origin, course, important relations and branches of internal iliac artery
- Branches of sacral plexus
- Superficial & deep perineal pouch (boundaries and contents), Perineal body, Perineal membrane in male & female

- Boundaries, content & applied anatomy of Ischiorectal fossa. Anatomical basis of Perineal tear, Episiotomy, Perianal abscess and Anal fissure
- Curvatures of the vertebral column. Type, articular ends, ligaments and movements of Intervertebral joints, Sacroiliac joints & Pubic symphysis
- Lumbar puncture (site, direction of the needle, structures pierced during the lumbar puncture)
- Anatomical basis of Scoliosis, Lordosis, Prolapsed disc, Spondylolisthesis & Spina bifida
- Micro anatomical features of Gastro-intestinal system and Suprarenal gland.
- Micro anatomical features of: Urinary system, Male Reproductive System and Female reproductive system.
- Development and congenital anomalies of Diaphragm.
- Development and congenital anomalies of: Foregut, Midgut & Hindgut.
- Development of Urinary system.
- Development of male & female reproductive system.
- Anatomical position of bony pelvis & show boundaries of pelvic inlet, pelvic cavity, pelvic outlet. True pelvis and false pelvis and demonstrate sex determination in male & female bony pelvis.
- Clinical importance of bones of abdominopelvic region
- Features seen in plain and special radiographs, CT, MRI, ERCP of abdomen and pelvis and its clinical correlation.
- Surface marking of Regions and planes of abdomen

8. Head and Neck

- Anatomical position of skull, location of individual skull bones and the features of Norma frontalis, verticalis, occipitalis, lateralis and basalis.
- Cranial cavity, its subdivisions, foramina and structures passing through them
- Morphological features of mandible, typical and atypical cervical vertebrae.
- Layers of scalp, its blood supply, its nerve supply and surgical importance.
- Muscles of facial expression and their nerve supply. Sensory innervation and blood supply of face.
- Parts, borders, surfaces, contents, relations and nerve supply of parotid gland with course of its duct and surgical importance

- Attachments, nerve supply, relations and actions of sternocleidomastoid muscle.
- Boundaries and contents of Posterior triangle.
- Dural folds and Dural venous sinuses with their clinical importance.
- Boundaries and contents of Orbit. Attachment, nerve supply and action of Extra-ocular muscles. Parts of Lacrimal apparatus.
- Boundaries, subdivisions and contents of anterior triangle.
- Boundaries and contents of temporal and infratemporal fossae.
- Articulating surface, type, movements and clinical conditions of temporomandibular joint. Attachments, direction of fibers, nerve supply and actions of muscles of mastication.
- Morphology, relations and nerve supply of submandibular salivary gland & submandibular ganglion.
- Parts, extent, attachments, modifications of deep cervical fascia
- Location, parts, borders, surfaces, relations & blood supply of thyroid gland
- Extent, drainage & applied anatomy of cervical lymph nodes.
- Morphology, Extent, Parts, Muscles and function of Pharynx.
- Morphology, relations, blood supply and applied anatomy of palatine tonsil and composition of soft palate.
- Features of nasal septum, lateral wall of nose, their blood supply and nerve supply.
Location and functional anatomy of paranasal sinuses
- Morphology, structure of the wall, nerve supply, blood supply and actions of intrinsic and extrinsic muscles of the larynx with the clinical correlations.
- Morphology, nerve supply, embryological basis of nerve supply, blood supply, lymphatic drainage and actions of extrinsic and intrinsic muscles of tongue
- Parts, blood supply and nerve supply of ear. Boundaries, contents, relations and functional anatomy of middle ear and auditory tube. Features of internal ear
- Parts and layers of eyeball with clinical correlation.
- Contents of the vertebral canal. Boundaries and contents of Suboccipital triangle
- Movements with muscles producing the movements of atlanto-occipital joint & atlantoaxial joint.
- Important bony and soft tissue landmarks on Head, Face and Neck region.
- The bones and joints of Head, neck, face seen in anteroposterior and lateral view radiographs.

- Microanatomy of pituitary gland, thyroid, parathyroid gland, tongue, salivary glands, tonsil, epiglottis, cornea, retina, olfactory epithelium, eyelid, lip, sclero-corneal junction, optic nerve, cochlea- organ of corti, pineal gland.
- Development and developmental basis of congenital anomalies of face, palate, tongue, branchial apparatus, pituitary gland, thyroid gland & eye

9. Neuroanatomy

- Layers of meninges with its extent & modifications. Circulation of CSF with its applied anatomy.
- Extent, external and internal features of spinal cord. Ascending & descending tracts of spinal cord with clinical correlation.
- External and Internal features of Medulla, Pons and Midbrain with clinical application.
- External, internal features, divisions, functions and clinical correlation of cerebellum.
- Nuclei with its functional component, course, distribution and clinical application of cranial nerve.
- Surfaces, sulci, gyri, poles, functional areas and white matter of cerebral hemisphere
- Parts & major connections of basal ganglia & limbic lobe.
- Boundaries, parts, gross relations, major nuclei and connections of dorsal thalamus, hypothalamus, epithalamus, metathalamus and subthalamus.
- Blood supply of Central nervous system.
- Parts, boundaries & features of IIIrd, IVth & lateral ventricle
- Micro anatomical features of Spinal cord, Cerebellum & Cerebrum.
- Development of neural tube, spinal cord, medulla oblongata, pons, midbrain, cerebral hemisphere & cerebellum.

10. Genetics

- The structure of chromosomes with classification
- Technique of karyotyping with its applications
- The Lyon's hypothesis
- The various modes of inheritance with examples
- Pedigree charts for the various types of inheritance & give examples of diseases of each mode of inheritance
- Multifactorial inheritance with examples

- The genetic basis & clinical features of Achondroplasia, Cystic Fibrosis, Vitamin D resistant rickets, Hemophilia, Duchene's muscular dystrophy & Sickle cell anemia
- The structural and numerical chromosomal aberrations. Mosaics and chimeras with example.
- the genetic basis & clinical features of Prader Willi syndrome, Edward syndrome & Patau syndrome
- Genetic basis of variation: polymorphism and mutation
- The principles of genetic counselling

11. Ethics

- Respect and follow the correct procedure when handling cadavers and other biologic tissue.

12. Integration

- The above topic will be integrated horizontally and vertically as per the new curriculum set by MCI.

PAPER WISE DISTRIBUTION OF TOPICS FOR ANATOMY

Paper	Topics
I (100 marks)	MCQs on all topics of the paper I
	General Anatomy
	General Embryology
	General Histology
	Inferior Extremity
	Abdomen and pelvis and related Histology and Embryology
	Thorax and related Histology and Embryology
	AETCOM module
	Question based on Problem Based learning (PBL)
II (100 marks)	MCQs on all topics of the paper II
	Superior Extremity
	Head Neck Face and related Histology and Embryology
	Neuroanatomy and related Histology and Embryology
	Genetics
	Question based on Problem Based learning (PBL)

Anatomy													
Practical									Oral/ Viva				Total
Seat No	Soft Parts	Micro anatomy (10 spots)	Micro Anatomy Slide for Discussion (2 slides)	Axial skeleton	Embryology Model	Clinical Anatomy Including Genetic Charts (2 spots)	Journal/ Log Book	Total	Appendicular Skeleton	X-rays	Surface Living Anatomy	Total	PR/ Oral Total
	A	B	C	D	E	F	G	H	I	J	K	L	M
Max. Marks	25	10	5	10	10	10	10	80	10	05	05	20	100

BOOKS RECOMMENDED:

1. Textbooks:
 - a. Human Anatomy - B D Chaurasia Vol 1 to 4
 - b. Textbook of Anatomy –Vishram Singh. Vol 1 to 4
 - c. Neuroanatomy - Vishram Singh
 - d. Textbook of Histology - I B Singh
 - e. General Anatomy – B D Chaurasia
 - f. Textbook of Osteology – Poddar
 - g. Human Embryology – I B Singh
 - h. Human Genetics – Gangane S D
 - i. Di fiore’s atlas of Histology
2. Reference Books:
 - a. Gray’s Anatomy
 - b. Snell’s Clinical Anatomy
 - c. Snell’s Neuroanatomy
 - d. Keith Moor’s Developing Human
 - e. Last’s Anatomy

Department of Physiology

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

Objectives

1. Knowledge: At the end of the course the student will be able to:

- a. Explain the normal functioning of all the organ systems and their interactions for well-coordinated total body function.
- b. Assess the relative contribution of each organ system to the maintenance of the milieu interior.
- c. Elucidate the physiological aspects of normal growth and development.
- d. Describe the physiological response and adaptations to environmental stresses.
- e. List the physiological principles underlying pathogenesis and treatment of disease.

2. Skills: At the end of the course the student should be able to:

- a. Conduct experiments designed for study of physiological phenomena.
- b. Interpret experimental/investigative data.
- c. Distinguish between normal and abnormal data derived as a result of tests which he/she has performed and observed in the laboratory.

3. Attitude, Communication, Ethics: At the end of the course the student should be able to:

- a. Develop empathy towards the patient
- b. Know the importance of obtaining consent from the patient
- c. Ethical protocol in dealing with female patients
- d. Explain the relevant details of the disease to the patient.
- e. Clear instructions to patients before and during examination

PHYSIOLOGY SYLLABUS

1. General Physiology

- Structure and functions of a mammalian cell + intercellular connections
- Principles of homeostasis
- Intercellular communication, apoptosis – programmed cell death
- Transport mechanisms across cell membranes

- Methods used to demonstrate the functions of the cells and its products, its communications and their applications in Clinical care and research.

2. Blood

- Fluid compartments of the body, its ionic composition & measurements
- Composition and functions of blood components
- Origin, forms, variations and functions of plasma proteins
- Synthesis and functions of Haemoglobin. Variants of haemoglobin
- RBC formation (erythropoiesis & its regulation) and its functions & fate of RBCs
- Types of anaemias & Jaundice
- WBC formation (granulopoiesis) and its regulation
- Types of immunity. Development of immunity and its regulation
- Formation of platelets, functions and variations.
- Physiological basis of hemostasis and, anticoagulants. Bleeding & clotting disorders (Hemophilia, purpura)
- Blood groups and clinical importance of blood grouping, blood banking and transfusion
- Introduction to microscopy
- Introduction to hemocytometry
- RBC count
- Hemoglobin estimation
- ESR PCV
- Blood indices
- Osmotic fragility
- Reticulocyte count
- Total leucocyte count
- Preparation of blood smear
- Differential leucocyte count
- Platelet count
- BT, CT
- Blood grouping

3. Nerve Muscle Physiology

- Structure and functions of a neuron; Nerve Growth Factor & other growth factors/cytokines
- Molecular basis of resting membrane potential and action potential in excitable tissue
- The types, functions & properties of nerve fibers
- Degeneration and regeneration in peripheral nerves
- Structure of neuro-muscular junction and transmission of impulses, Action of neuro-muscular blocking agents
- Pathophysiology of Myasthenia gravis
- Different types of muscle fibres and their structure
- Action potential and its properties in different muscle types (skeletal)
- Strength-duration curve
- Molecular basis of muscle contraction in skeletal muscles
- Mode of muscle contraction (isometric and isotonic)
- Energy source and muscle metabolism
- Gradation of muscular activity
- Muscular dystrophy: myopathies
- Observe with Computer assisted learning amphibian nerve - muscle experiments
- Ergography: Effect of load and frequency on work done.
- Ergography: Effect of arterial and venous occlusion on work done and fatigue

4. Gastro Intestinal Physiology

- Structure and functions of digestive system
- Gut-Brain Axis
- Composition, mechanism of secretion, functions, and regulation of saliva, gastric, pancreatic, intestinal juices and bile secretion
- Action potential and its properties in different muscle types (smooth)
- The molecular basis of muscle contraction in smooth muscles
- GIT movements, regulation and functions. Defecation reflex. Role of dietary fibre.
- Physiology of digestion and absorption of nutrients
- Source of GIT hormones, their regulation and functions
- Structure and functions of liver and gall bladder
- Gastric function tests, pancreatic exocrine function tests & liver function tests

- The physiology aspects of: peptic ulcer, gastro- oesophageal reflux disease, vomiting, diarrhoea, constipation, Adynamic ileus, Hirschsprung's disease.
- Examination of abdomen

5. Cardio vascular physiology

- Functional anatomy of heart including chambers, sounds; and pacemaker tissue and conducting system.
- Generation, conduction of cardiac impulse
- Properties of cardiac muscle including its morphology, electrical, mechanical and metabolic functions
- Physiology of electrocardiogram (E.C.G), its applications and the cardiac axis
- Abnormal ECG, arrhythmias, heart block and myocardial Infarction
- The events occurring during the cardiac cycle
- Haemodynamics of circulatory system
- Local and systemic cardiovascular regulatory mechanisms
- Factors affecting heart rate, regulation of cardiac output & blood pressure
- Regional circulation including microcirculation, lymphatic circulation, coronary, cerebral, capillary, skin, foetal, pulmonary and splanchnic circulation
- Patho-physiology of shock, syncope and heart failure
- Observe with Computer assisted learning amphibian cardiac experiments
- Examination of arterial pulse and demonstration of arterial pulse tracing using finger plethysmography
- Measurement of blood pressure
- Effect of posture on heart rate and blood pressure
- Effect of exercise on heart rate and blood pressure
- Demonstration of electrocardiography
- Examination of cardiovascular system

6. Respiratory physiology

- Functional anatomy of respiratory tract
- Mechanics of normal respiration, pressure changes during ventilation, lung volume and capacities, alveolar surface tension, compliance, airway resistance, ventilation, V/P ratio, dead space, diffusion capacity of lungs
- The transport of respiratory gases: Oxygen and Carbon dioxide
- Regulation of respiration - Neural & Chemical

- The pathophysiology of dyspnoea, hypoxia, cyanosis asphyxia; drowning, periodic breathing, oxygen therapy
- The physiology of high altitude and deep sea diving including acclimatization and decompression sickness.
- Lung function tests & their clinical significance,
- The principles of artificial respiration
- Spirometry- Demonstration of lung volume and capacities
- Spirometry (vitalography) – Recording of vital capacity and PEFR
- Spirometry (vitalography)- Effect of posture on vital capacity
- Examination of respiratory system

7. Endocrine Physiology

- List of endocrine glands, endocrine and exocrine secretion, neuronal signaling of endocrine secretion, Mechanism of action of steroid, protein and amine hormones.
- Synthesis, secretion, transport, physiological actions, regulations and effect of altered (hypo and hyper) secretion of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas and hypothalamus. Function tests: Thyroid gland; Adrenal cortex, Adrenal medulla and pancreas
- Physiology of bone and calcium, phosphorus metabolism
- Physiology of Thymus & Pineal Gland
- Metabolic and endocrine consequences of obesity & metabolic syndrome, Stress response. Psychiatric component pertaining to metabolic syndrome.

8. Renal physiology

- Structure and functions of kidney
- Structure and functions of juxta glomerular apparatus
- Mechanism of urine formation involving processes of filtration (along with role of renin-angiotensin system), tubular reabsorption & secretion; concentration and diluting mechanism
- Significance & implication of renal clearance
- Renal regulation of fluid and electrolytes.
- Concept of pH & buffer systems in the body and acid-base balance.
- Innervations of urinary bladder, physiology of micturition and its abnormalities, cystometry and normal cystometrogram, Artificial kidney, dialysis and renal transplantation.

- Renal Function Tests

9. Reproductive Physiology

- Sex determination; sex differentiation and their abnormalities, psychiatric and practical implication of sex determination.
- Puberty: onset, progression, stages, early and delayed puberty, clinical and psychological association of puberty.
- Male reproductive system: functions of testis and control of spermatogenesis. factors modifying, and its association with psychiatric illness (including male sex hormones)
- Interpretation of a normal semen analysis, including (a) sperm count, b) sperm morphology and (c) sperm motility, as per WHO guidelines and discuss the results
- Common causes of infertility
- Female reproductive system: (a) functions of ovary and its control; (b) menstrual cycle - hormonal, uterine and ovarian changes (Including female sex hormones)
- Physiological effects of sex hormones,
- Effects of removal of gonads on physiological functions
- Contraceptive methods for male and female, advantages & disadvantages
- Physiology of pregnancy, parturition & lactation, outline the psychology and associated psychiatric disorders.
- Physiological basis of various pregnancy tests.
- Hormonal changes and their effects during perimenopause and menopause
- Common causes of infertility and role of IVF

10. Integrative physiology

- Mechanism of temperature regulation, adaptation to altered temperature (heat and cold) mechanism of fever, cold injuries and heat stroke
- Cardio-respiratory changes in exercise (isometric and isotonic), under different environmental conditions (heat and cold),
- Cardio-respiratory and metabolic adjustments during exercise; physical training effects
- Physiological consequences of sedentary lifestyle
- Physiology of Infancy (growth & development),
- Interpret growth charts
- Interpret anthropometric assessment of infants

- Physiology of aging; free radicals and antioxidants
- Diagnosis of brain death and its implications
- Physiological effects of meditation
- General examination
- Harvard step test
- Autonomic function test
- Basic Life Support (BLS)
- Interpretation of graphs, values and figures from 12 systems

11. Central nervous system

- Organization of nervous system including neuroglia
- Functions and properties of synapse, reflex, receptors
- Somatic sensations & sensory tracts
- Motor tracts, mechanism of maintenance of tone, control of body movements, posture and equilibrium & vestibular apparatus
- Structure and functions of reticular activating system, autonomic nervous system (ANS)
- Spinal cord, its functions, lesion & sensory disturbances
- Cerebral cortex, basal ganglia, thalamus, hypothalamus, cerebellum and limbic system and their abnormalities
- Behavioral and EEG characteristics during Sleep and mechanism responsible for its production, Identification of normal EEG forms
- Physiological basis of memory, learning and speech
- Chemical transmission in the nervous system. (Outline the psychiatry element).
- CSF, blood – brain barrier.
- Examination of sensory system
- Examination of motor system
- Examination of reflexes
- Examination of cranial nerves

12. Special senses

- Smell and taste sensation, patho-physiology of altered smell and taste sensation

- Functional anatomy of ear and auditory pathways, physiology of hearing, pathophysiology of deafness, Description of hearing tests.
- Auditory evoked potentials.
- Functional anatomy of eye, physiology of image formation, physiology of vision including color vision, refractive errors, color blindness, physiology of pupil and light reflex physiological basis of lesion in visual pathway
- Physiological basis of lesion in visual pathway, visual evoked potentials
- Perimetry
- Acuity of vision
- Acuity of hearing

PAPER WISE DISTRIBUTION OF TOPICS FOR PHYSIOLOGY

Paper	Topics
I (Total marks 100)	MCQs on all topics of the paper I
	General Physiology
	Blood
	Respiratory System
	Cardio Vascular System,
	Cardio-respiratory and metabolic adjustment during exercise
	Renal system
	Gastro intestinal system
	Life style, aging, Meditation
	AETCOM module no. 1.2 & 1.3
	Scenariobased/application questions can be on any topic of the paper I
	For long answer question and scenario based / application questions, topics will not be repeated
II (Total marks 100)	MCQs on all topics of the paper II
	Endocrine Physiology
	Reproductive System, Physiology of Infancy
	Special senses
	Central nervous system including brain death
	Temperature Regulation & applied
	Nerve muscle physiology
	Scenariobased/application questions can be on any topic of the paper II
	For long answer question and scenario based / application questions , topics will not be repeated

First Year MBBS Practical Mark's Structure

Practical	80	Clinical Examination	CVS	10
			RS	10
			CNS & Special senses	10
			General & Abdomen	10
		Haematology		10
		Short Exercise	Case based scenarios/ endocrine disorders photographs.	3 X 5= 15
			Interpretation of function tests.	
			One skeletal graph	
			One cardiac graph	
			Calculation	
Human Physiology Experiment	3 X 5	15		
Viva	20		20	
Total	100		100	

BOOKS RECOMMENDED:

1) Textbooks of Physiology:

1. Guyton – Textbook of Physiology
2. Ganong - Review of Medical Physiology
3. G.K. Pal-Comprehensive Text Book of Medical Physiology.
4. Ghai's VP Varshney, Mona Bedi- Textbook of Physiology -9th Edition2019.
5. Dr. V.G. Ranade - Laboratory Manual and Journal of Physiology Practical's

2) Reference Books:

1. Best and Taylor - Physiological basis of medical practice Berne & levy. - Principles of Physiology
2. S. Wright - Applied Physiology

Department of Biochemistry

Preamble

The purpose of competency based undergraduate medical education is to produce doctors, competent in diagnosis and management of common health problems. To achieve this, understanding of basic sciences through the clinical context is required.

The term biochemistry was introduced by German chemist Carl Neuberg in 1903. Biochemistry is the chemical basis of life. It is a branch of medical science that describe the structure, organization and functions at the molecular level.

According to Dr. Alberts Sols “The biochemistry of today is the medicine of tomorrow”.

It encompasses large areas of cell biology, molecular biology and molecular genetics.

Biochemistry is very important in healthcare for diagnosis, treatment & manufacture of various biological products. Biochemical aspects of nutrition play a special role in health & disease.

The sound knowledge of biochemistry revolutionized medical science by providing the tools like genetic engineering, PCR & many more which helps in drug designing. It provides good insight regarding pathophysiology of the various diseases.

Goal:

-The goal of teaching biochemistry to undergraduate students is to provide comprehensive knowledge of biochemical reactions taking place in human body, to facilitate the understanding of biochemical basis of disease with respect to normal.

-The analysis of different biochemical analytes can throw light on diagnosis and prognosis of different diseased conditions.

-To produce doctors with proper knowledge of diagnostic tests, who can correlate the biochemical tests with the clinical conditions so as to reach the accurate diagnosis.

-Awareness regarding the short term research projects.

Objectives:

1. Knowledge: At the end of the course, the student should be able to

- a) understand molecular and functional organization of a cell, sub-cellular components & extracellular components.
- b) study of normal metabolism of various biomolecules in order to know alternations in diseased conditions.
- c) explain basic and clinical relevance of enzymology.
- d) understand biomedical importance of various nutrients in health & disease.

- e) describe central dogma of life with regulation of gene expression.
- f) study effect of mutations and genetic basis of diseases.
- g) explain principles of genetic engineering and their application in medicine.
- h) comprehend biochemical basis of cancer & role of tumor markers.
- i) study molecular concepts of body defense and their application in medicine.
- j) understand mechanisms involved in maintenance of acid-base & water electrolyte balance.
- k) describe principles of various conventional and specialized laboratory investigations and analysis and interpretation of data.
- l) understand principles and working of the instruments.

2. Skills: At the end of the course, the student should be able to

- a) estimate, analyse & interpret laboratory data for the diagnosis and prognosis of disease conditions.
- b) use of various biochemical techniques in relevance to clinical problems.

3. Attitude, Communication, Ethics: At the end of the course, the student should be able to

- a) show empathy towards the patient & be able to communicate in a better way so that patient feel accepted and built trust in doctors.
- b) apply the knowledge to real life situations which will help them to develop skills that are transferable to the real world.

BIOCHEMISTRY SYLLABUS: THEORY

1. Basic biochemistry

- Cell: Molecular and functional organization of cell and its subcellular components

2. Chemistry of Biomolecules

- **Chemistry Carbohydrates:** Classification and biomedical importance of mono, di and polysaccharides, Glycosaminoglycans & its clinical significance.
- **Chemistry of Lipids:** Classification and biomedical importance of Triacylglycerol, Phospholipids, Glycolipids, Fatty acids, Cholesterol & Lipoproteins. Prostaglandins with clinical significance
- **Chemistry of Proteins:** Classification of amino acids & proteins with examples, General properties of amino acids and proteins, Biologically important peptides, Structural organization of proteins & structure-function relationships. Plasma proteins with their functions & method of separation along with associated disorders.
- **Chemistry of Hemoglobin:** Structure & function of hemoglobin, Normal variants of Hemoglobin, Hemoglobin derivatives, Abnormal hemoglobins.

3. Enzymes:

- IUBMB classification, Cofactors & Coenzyme, Mechanism of enzyme action, Factors affecting enzyme action, Enzyme inhibitions, Regulation of enzymes, Isoenzymes, Clinical use of enzymes.

4. Biological oxidation:

- General concept of oxidation & reduction, Redox Potential, Enzymes & coenzymes involved in Biological oxidation, Electron transport chain, Substrate level & Oxidative phosphorylation, Chemiosmotic theory, Role of uncouplers & inhibitors.

5. Vitamins:

- General nature, classification, sources, RDA, active forms & metabolic role of vitamins, deficiency manifestations & hypervitaminosis.

6. Metabolism of Biomolecules

- **Metabolism of Proteins:** Digestion & Absorption & its clinical significance, amino acid pool, formation & fate of ammonia, metabolism of glycine, metabolism of aromatic amino acids & sulphur containing amino acids, common disorders associated with protein metabolism with lab investigations.

- **Metabolism of Carbohydrates:** Digestion & absorption & its clinical significance, glycolysis, significance of Rapaport Lumbering cycle, gluconeogenesis, TCA cycle and its amphibolic role, significance of HMP shunt, glycogenesis, glycogenolysis& glycogen storage disorders, disorders associated with galactose & fructose, regulation of blood glucose level, biochemistry of diabetes mellitus, Lab investigations related to disorders of carbohydrate metabolism.
- **Metabolism of Lipids:** Digestion & absorption & its clinical significance, biosynthesis and degradation of fatty acids, adipose tissue metabolism, cholesterol biosynthesis, its transport and excretion, metabolism of lipoproteins and associated disorders, metabolism of ketone bodies with ketosis, fatty liver & atherosclerosis. Lab investigations related to disorders of lipid metabolism.
- **Metabolism of Nucleotides:** Biosynthesis & breakdown of purines & pyrimidines, salvage pathway, common disorders associated with purine & pyrimidine metabolism with interpretation of laboratory results.
- **Integration of metabolism & Starvation:** Metabolic interrelationship in fed and fasting state, metabolic adaptations in starvation.
- **Metabolism of Hemoglobin:** Synthesis and breakdown of heme along with porphyrias, fate of bilirubin and different types of jaundice.

7. Organ Function Tests:

- Functions of the kidney, liver, thyroid and adrenal glands, tests that are commonly done in clinical practice to assess the functions of these organs & associated disorders.

8. Molecular Biology

- **Chemistry of nucleic acid: Nucleoside& nucleotides,** biologically important nucleotides, synthetic nucleotides, structure and function of DNA & RNA, central dogma & cell cycle, DNA replication & repair, transcription & post-transcriptional modifications, genetic code & mutation, translation & post-translational modifications, regulation of gene expression, recombinant DNA technology & its applications, PCR & blotting techniques, gene therapy.

9. Minerals:

- Classification of minerals, sources, RDA, absorption, biochemical role & deficiency manifestations of calcium & phosphorus, biomedical importance of other macrominerals, sources, RDA, absorption, biochemical role, deficiency

manifestations of iron, biomedical importance of other trace elements (copper, iodine, selenium, zinc, fluoride etc)

10. Acid-base Balance:

- General concept of acids, alkali, buffers, pH, pK, role of blood buffers, respiratory system and kidney in regulation of acid base balance, acid-base disorders

11. Water- electrolyte Balance:

- Total body water, role of hormones in water electrolyte balance, dehydration, disorders associated with electrolyte imbalance.

12. Nutrition:

- Dietary importance all nutrients, balanced diet, diet recommended in various disorders, obesity & protein energy malnutrition.

13. Xenobiotics& Biotransformation:

- Phase I & Phase II reactions with examples, Role of cytochrome p450

14. Free radicals & anti-oxidants:

- Role of oxidative stress in the pathogenesis of conditions such as cancer, complications of diabetes mellitus and atherosclerosis.

15. Oncogenesis and immunity:

- Causes of cancer along with mechanism of carcinogenesis, role of p53 & apoptosis, biochemical basis of cancer therapy, tumor markers, innate & adaptive immunity, types and structure of antibody, antigen & concepts involved in vaccine development.

16. Extracellular Matrix(ECM):

- Functions & components of ECM, involvement of ECM in health & disease, protein targeting & sorting with associated disease.

Biochemistry Syllabus: Practicals

1. General Laboratory

- Commonly used laboratory apparatus and equipments.
- Good laboratory practice & waste disposal.
- Preparation of buffers & estimation of pH.

2. Qualitative Experiments

- Normal constituents of urine
- Abnormal constituents of urine and urine report

3. Quantitative Experiments

- Estimation of blood Glucose level.
- Estimation of serum Urea level.
- Estimation of serum Creatinine
- Estimation of urine Creatinine and creatinine clearance
- Estimation of serum Total proteins, Albumin and A: G ratio.
- Estimation of serum Cholesterol
- Estimation of serum HDL- cholesterol.
- Estimation of serum Triglycerides.
- Estimation of serum Calcium
- Estimation of serum Phosphorous.
- Estimation of serum Bilirubin
- Estimation of serum ALT/ AST
- Estimation of serum Alkaline phosphatase
- Estimation of serum Uric acid

4. Demonstrations

- Glucose tolerance test
- Physical characteristics & Chemical composition of CSF
- Principle & applications of Colorimeter
- Principle & applications of Spectrophotometer
- Principle & applications of pH meter
- Principle & applications of Paper & Thin layer Chromatography
- Screening of urine for inborn errors
- Principle & applications of Electrophoresis
- Principle & applications of Immunodiffusion
- Principle & applications of ELISA
- Principle & applications of ISE
- Principle & applications of ABG Analyser
- Principle & applications of Autoanalyser.
- Quality control.
DNA Isolation from blood/ tissue

5. Interpretation of lab results (Case oriented)

- Diabetes mellitus/ Diabetic Ketoacidosis
- Dyslipidemia& Myocardial infarction.
- Nephrotic Syndrome/Renal Failure
- Jaundice
- Acid-base disorders
- Thyroid disorders
- Gout
- Pancreatitis

PAPERWISE DISTRIBUTION OF THE SYLLABUS

Paper	Topics
I (100 marks)	MCQs on all topics of the paper I
	Cell, Enzymes, Chemistry & metabolism of proteins, Extracellular matrix, Chemistry of nucleic acids, Metabolism of purines and pyrimidines, Replication, Transcription, Genetic code & mutations, Protein biosynthesis, Regulation of gene expression, Recombinant DNA Technology, PCR & blotting techniques, Gene therapy, Biological oxidation, Molecular concepts of body defence and their application in medicine, Vitamins, Nutrition.
II (100 marks)	MCQs on all topics of the paper II
	Chemistry and metabolism of carbohydrates & lipids, Integration and starvation, Chemistry and metabolism of haemoglobin, Mineral metabolism, Water electrolyte balance & acid base balance, Organ function tests, Oncogenesis & immunity, Biotransformation, Principle, application and working of colorimeter, spectrophotometer, pH meter, paper and thin layer chromatography, protein electrophoresis, PAGE, electrolyte analyser, ABG analyzer, ELISA, immunodiffusion, autoanalyzer, quality control, DNA isolation from blood/tissue, AETCOM- 1.4

Practical examination:

Case based Quantitative estimation (Group A)	Qualitative/Quantitative estimation (Group B)	Interpretation of Lab reports	Interpretation of special techniques	Spots	Practical Journal & Log book	Oral/ Viva (Theory)	TOTAL
25 marks	15 marks	10 marks	10 marks	10 marks	10 marks	20 marks	100

Group A estimations: Blood glucose, Serum urea, Serum total proteins, albumin, A:G ratio, ALT/AST, Alkaline phosphatase, Serum bilirubin, Serum creatinine, Serum triglycerides.

Group B estimations: Normal constituents of urine, Abnormal constituents of urine, Urine creatinine, Serum calcium, Serum Phosphorus, Serum uric acid, Serum cholesterol, Serum HDL.

Spots:

Principle & use of instrument

Identification of GTT, Electrophoretogram, Chromatogram

Identification & significance of laboratory test

Picture based identification

BOOKS TO BE REFERRED

1. Textbooks:

- a. Biochemistry – U. Satyanarayan
- b. Textbook of biochemistry for medical students - D. M. Vasudevan& Shree Kumari.
- c. Textbook of biochemistry for undergraduates - Rafi MD
- d. Biochemistry- Lippincott Illustrated reviews.
- e. Textbook of medical biochemistry - M. N. Chatterjea and Rana Shinde.

2. Reference Books:

- a. Harper's illustrated biochemistry
- b. Textbook of Biochemistry with clinical correlations -Thomas M. Devlin.
- c. Principles of Biochemistry- Lehninger
- d. Biochemistry -L. Stryer.

Department of Community Medicine

Preamble:

The syllabus for Phase I MBBS is in accordance with the BOG notification and Medical Council of India's, Attitude, Ethics and Communication (AETCOM) based teaching, learning and assessment.

The students will be exposed to explicit teaching of interactive cognitive base and stage appropriate opportunities for experiential learning and reflection throughout the curriculum. A framework of competencies has been designed which ensures coverage of necessary topics in terms of domains of learning. It will also help students acquire necessary competence in attitudinal, ethical and communication domains. An approach has been made to organize sessions for teaching learning and assessment mechanisms for the students.

Goal: To teach the undergraduate students by exposing from basic course subject to comprehensive learning, as per common prevailing health problems and health conditions of public health priority or emergency and as per attainment of higher domain of learning.

Objectives: At the end of the course, the student should be able to

1. Describe the evolution of medicine and contributions of scientists.
2. Understand the health care delivery system, especially at the primary health care level.
3. Discuss the evaluation of National health program/ priorities and policies
4. Understand the sociodemographic and economic characteristics of rural people and patients living in rural communities and assess their health conditions through qualitative techniques.
5. Describe the various principles and practices of health education and application of appropriate communication skills for behavior change in the community.
6. Describe health, its determinants, natural history of disease and modes of intervention at various levels of prevention.
7. Describe demography cycle, principles, vital events, consequences of population explosion and methods to control the same under National Population Policy.
8. Explain the key indicators of disease burden, health related states or events in national and international context.

9. Discuss the principles of hospital management and describe their waste management methods.
10. Discuss the principles of health economics in terms of opportunity cost and production, demand for health and need, efficiency and equity.
11. Describe the socio-economical, behavioural and cultural factors in context to human society.

Knowledge: At the end of the course the student will be able to:

- a. Explain the concepts of health and disease in terms of its natural course and applied disease prevention and control strategies.
- b. Explain the demographic cycles, trends, indicators pertaining to population dynamics.
- c. Explain the hospital management infrastructure and waste management practices of the institute.

Skills: At the end of the course the student should be able to:

- a. Demonstrate communication skills with patient, their family members, peers, seniors.
- b. Express doctor-patient relationship maintaining professionalism.
- c. Demonstrate various ways of changing behavior of people in community in terms of an action-based strategy.
- d. Reflect on visits to special care places. E.g., visit to rehabilitation centre.

Attitude, communication, ethics: At the end of the course the student should be able to:

- a. Counsel the patient, family members regarding health-related issues.
- b. Inform families the impact of underlying multifactorial causation of disease, socio-economic status, use of health schemes, home economics, nutritional factors on health.
- c. Demonstrate the ability to work in a team of peers and seniors.
- d. Develop communication skills with patient, relatives of patient, own peers, health care workers.

Syllabus -Foundation course

1. Field visit to Community Health Centre

- Visit to Community Health Centre (**PHC/RHTC**)
- Visit to Community Health Centre – (**Sub-Centre**)
- Introduction to health care workers and their role.

- Introduction to and interaction with patients

2. Orientation

- Health care system and its delivery

3. National health programme/priorities and policies

- Health care delivery system in India
- Health problems of public health importance in India
- AYUSH system of health care in India

Syllabus (1st Professional MBBS)

1. Introduction to Community medicine: Man and Medicine

- Man and Medicine towards health for all.

2. Concept of health and disease.

- Concept of health, Changing concepts, dimensions, determinants.
- Concept of disease causation, triad, multifactorial causation, web of causation, natural history of disease
- Concept of Control, Elimination, Eradication, Prevention with modes of intervention.
- Health indicators
- Evaluation of health promotion and education program.

3. Introduction -Basic epidemiology

- Epidemiology, tools of measurement in epidemiology. Morbidity and mortality indicator(s).

4. Communication for health education

- Health communication, Doctor-patient relationship
- Principles of health education
- Health education methods, advantages & disadvantages (under communication for health education)
- Methods in health communication

5. Demography, population dynamics, qualitative research.

- Family case Proforma discussion

6. Hospital waste management

7. Principles of health economics

- Components, need and importance of health economics

8. Sociology and Research (Qualitative)

- Social psychology, community behavior, socio-cultural factors, family and its types, S-E status, barrier assessment to good health, poverty, social-security.
- Basic research - qualitative research methods
- Tools in qualitative research

1st Internal assessment exam-Theory (At the end of first term)		
Theory	Practical (including 5 marks for journal & log book)	Total marks
50	50	100

1st Internal assessment exam-Practical	
1. Basic Family Study information fill ups/ logbook	(5 Marks)
2. Family Study Presentation	(15 marks)
3. Qualitative research methods presentation	(10 marks)
4. Practical/ integrated learning/ tuts/ SGT/ Field visit (e.g. record book, and formative)	(10 marks)
5. SDL	(10 marks)
Total marks	50 Marks

BOOKS RECOMMENDED:

1. Textbooks of Community Medicine:

- Park's Textbook of Preventive and Social Medicine
- Textbook of Community Medicine-Rajvirbhalwar
- J. Kishores National Health Programs of India.

- Mahajan's Methods in Biostatistics for Medical Students and Research Workers.
- Mastering practicals – Poornima Tiwari
- Community Medicine Practical Manual – RajkumarPatil.

2. Websites recommended:

- <https://mohfw.gov.in/ecitizentender/maharashtramh>
- <https://mohfw.gov.in/>

Phase II

Para-clinical phase

Distribution of Teaching hours in Phase II

Phase II of MBBS or in second professional MBBS will be of 12 months' duration. In this phase the students will be taught Para-clinical subjects consisting of namely Pathology, Pharmacology, Microbiology, Community Medicine, Forensic Medicine and Toxicology, Professional development including Attitude, Ethics & Communication (AETCOM) module and introduction to clinical subjects ensuring both horizontal and vertical integration. The subjects and the distribution of teaching hours are given in table 1.

Table 1: Second Professional Teaching hours

Subjects	Lectures (hours)	Small group learning (Tutorials/Seminars)/Integrated learning (hours)	Clinical Postings (hours)*	Self- Directed Learning (hours)	Total (hours)
Pathology	80	138	-	12	230
Pharmacology	80	138	-	12	230
Microbiology	70	110	-	10	190
Community Medicine	20	30	-	10	60
Forensic Medicine & Toxicology	15	30	-	5	50
Clinical Subjects	75**	-	540***	-	615
Attitude, Ethics & Communication Module [AETCOM]	-	29	-	8	37
Sports & Extracurricular activities	-	-	-	28	28
Total	-	-	-	-	1440

* At least 3 hours of clinical instruction each week will be allotted to training in clinical and procedural skill laboratories.

** 25 hours each for Medicine, Surgery and Gynaecology & Obstetrics.

*** The clinical postings in the second professional shall be 15 hours per week (3hrs per day from Monday to Friday)

Department of Pathology

Pathology is a branch of medical science that involves the study and diagnosis of disease. Students acquire comprehensive knowledge of mechanisms and causes of disease in order to achieve complete understanding of the natural history and manifestations of disease.

Objectives:

At the end of one year of training in Pathology, the MBBS student is expected to demonstrate:

Knowledge:

1. Understand the concepts of cell injury and changes produced thereby in different tissues and organs and the body's capacity for healing.
2. Understand the etiopathogenesis, the pathological effects and the clinico-pathological correlation of common infectious and non-infectious diseases.
3. Understand the concept of neoplasia with reference to the etiology, gross and microscopic features, diagnosis and prognosis in different tissues and organs of the body
4. Have a knowledge of common immunological disorders and their resultant effects on the human body
5. Have an understanding of the common haematological disorders and the investigations necessary to diagnose them and determine their prognosis

Skills:

1. Correlate normal and altered morphology (gross and microscopic) of different organ systems in different diseases and extent needed for understanding of disease processes and
their clinical significance.
Perform and interpret in a proper manner the basic clinico-pathological procedures.
3. Know the principles of collection, handling and dispatch of clinical samples from patients in a proper manner

Attitude, Ethics and communication:

1. To bring about holistic development of students in terms of learning basic sciences in order to provide excellent and prompt patient care.
2. To blend the passionate medical expertise with compassionate and personalised patient care.

PATHOLOGY SYLLABUS

The topics will be covered as per proposed GMER guidelines.

1. Introduction to Pathology

2. Cell Injury:

- Cell injury: Causes and Mechanism: Ischemic, Toxic.
- Reversible cell injury: Types, morphology: Swelling, vacuolation, hyaline, fatty change.
- Irreversible cell injury: Types of Necrosis

3. Amyloidosis and Calcification:

- Calcification: Dystrophic and Metastatic
- Amyloidosis: classification, Pathogenesis, Morphology

4. Inflammation and Repair:

- Acute inflammation: Features, causes, vascular and cellular events.
- Morphologic variants of acute inflammation
- Inflammatory cells and Mediators
- Chronic inflammation: Causes, types, nonspecific and Granulomatous with examples
- Wound healing by primary and secondary union, factors promoting and delaying the process
- Healing at specific sites including bone healing

5. Circulatory Disturbances:

- Oedema: Pathogenesis and types
- Chronic venous congestion: Pathogenesis and changes in Lung, Liver, Spleen
- Thrombosis and Embolism: Formation, Fate and Effects
- Infarction: Types, common sites, Gangrene
- Shock: Pathogenesis, Types, Morphologic changes
- Derangements of Fluid and electrolyte imbalance

6. Growth Disturbances and Neoplasia:

- Atrophy, Hypertrophy, Hyperplasia, Hypoplasia, Metaplasia, Malformation, Agenesis, Dysplasia

- Neoplasia: Classification, Histogenesis, Biologic Behaviour: Benign and Malignant; Carcinoma and Sarcoma
- Malignant Neoplasia: Grades and Stages, Local and distant spread
- Carcinogenesis: Environmental carcinogens, chemical, viral, occupational, Heredity and cellular oncogenes
- Tumour and Host Interactions: Systemic effects including paraneoplastic syndromes, Tumor immunology
- Laboratory diagnosis: Cytology, Biopsy, Tumor markers

7. Immunopathology:

- Immune system: organisation, cells, antibodies and regulation of immune responses.
- Hypersensitivity: types and examples, Antibody and cell mediated tissue injury with examples.
- Primary immunodeficiency
- Secondary Immunodeficiency including HIV Infection
- Auto-immune disorders like systemic lupus erythematosus; organ specific and non-organ specific such as polyarteritis nodosa, Hashimoto's disease.
- Tumor Immunity g) Organ transplantation: Immunologic basis of Rejection and Graft versus host reaction

8. Infectious Diseases:

- Mycobacterial Diseases: Tuberculosis and Leprosy
- Bacterial diseases: Pyogenic, Typhoid, Diphtheria, Gram negative infection, Bacillary dysentery, Syphilis
- Viral: Polio, Herpes, Rabies, Measles; Rickettsial, Chlamydial infection
- Fungal diseases and opportunistic infections
- Parasitic Diseases: Malaria, Filariasis, Amoebiasis, Kala-azar, Cysticercosis, Hydatid disease
- AIDS: Aetiology, modes of transmission, diagnostic procedures and handling of infected material and health education

9. Miscellaneous Disorders:

- Autosomal and sex-linked disorders with examples
- Metabolic disorders
- Protein energy malnutrition and vitamin deficiency disorders
- Radiation Injury
- Disorders of Pigment and Mineral metabolism such as bilirubin, melanin, hemosiderin

10. Hematopathology:

- Constituents of blood and bone marrow, Regulation of hematopoiesis
- Anaemia: classification and clinical features; clinical and laboratory approach to diagnosis
- Nutritional anaemias: Iron deficiency anaemia, Folic Acid/Vit B 12 deficiency anaemia including pernicious anaemia
- Hemolytic Anaemias: Classification and investigation
- Hereditary hemolytic anaemias: Thalassemia, sickle cell anaemia
- Hereditary hemolytic anaemias: hereditary spherocytosis, G-6-PD deficiency
- Acquired hemolytic anaemias
- Hemolytic Anaemias: Autoimmune, Alloimmune, Drug induced Microangiopathic and Malaria
- Aplastic Anaemia, PNH and Myelodysplastic syndrome
- Hemostatic disorders: Platelet deficiency; ITP, Drug induced, secondary
- Coagulopathies: Coagulation factor deficiency; hemophilia, DIC and anticoagulant control
- Leukocytic disorders: Leukocytosis, leukopenia, leukemoid reaction
- Acute and chronic Leukemia: Classification, Diagnosis
- Myeloproliferative disorders: Polycythemia, Myelofibrosis
- Multiple myeloma and dysproteinemias
- Blood transfusion: grouping and cross matching, untoward reactions, transmissible infections including HIV and hepatitis

11. Cardiovascular Pathology:

- Rheumatic fever and Rheumatic Heart Disease: Pathogenesis, Morphology and effects
- Infective Endocarditis: Causes, Pathogenesis and Morphology
- Atherosclerosis and Ischemic Heart Disease; Myocardial Infarction
- Diseases of blood vessels other than atherosclerosis
- Hypertension and Hypertensive Heart Disease
- Congenital Heart Disease: ASD, VSD, Fallot's tetralogy, Bicuspid aortic valve, PDA
- Pericarditis and other pericardial diseases
- Cardiomyopathy

12. Respiratory Pathology:

- Structure of Bronchial tree and alveolar walls, normal and altered lung function; concept of obstructive and restrictive lung disorders

- Inflammatory diseases of bronchi: chronic bronchitis, bronchial asthma, bronchiectasis, chronic obstructive lung disease
- Pneumonias: Lobar, Broncho, Interstitial
- Pulmonary suppuration including lung abscess: Etiopathogenesis and Morphology
- Pulmonary Tuberculosis: Primary and Secondary, Morphologic types including pleuritic
- Emphysema: Types, pathogenesis
- Atelectasis and Hyaline Membrane Disease
- Tumors: Benign; Carcinoid, Malignant; Squamous cell, Oat cell, Adeno, etiopathogenesis.
- Occupational lung disorders: anthracosis, silicosis, asbestosis, mesothelioma

13. Urinary Tract Pathology:

- Renal structure, basis of impaired function, urine analysis
- Glomerulonephritis: Classification, Primary Proliferative and Non Proliferative
- Secondary Glomerulonephritis: SLE, Purpura, Polyarteritis, Amyloidosis, Diabetes
- Nephrotic Syndrome
- Acute Renal Failure: Acute tubular and cortical necrosis
- Progressive renal failure and end stage renal disease
- Pyelonephritis, Reflux Nephropathy, Interstitial Nephritis
- Renal tumors: Renal cell carcinoma, Nephroblastoma
- Renal vascular disorders, kidney changes in Hypertension
- Urinary bladder: cystitis, carcinoma
- Urinary Tract Tuberculosis
- Urolithiasis and Obstructive Uropathy
- Renal Malformations: Polycystic kidneys

14. Pathology of the Gastro-Intestinal Tract:

- Oral Pathology: Leukoplakia; Carcinoma oral Cavity and Esophagus
- Salivary gland tumors: Mixed, Adenoid cystic, warthin's
- Peptic ulcer: etiopathogenesis and complications; gastritis: types
- Tumors of stomach: Benign; Polyp, Leiomyoma, Malignant; Adenocarcinoma, Lymphoma
- Inflammatory diseases of small intestine: Typhoid, Tuberculosis, Crohn's, Appendicitis

- Inflammatory diseases of appendix and large intestine: Amoebic colitis, Bacillary dysentery, Ulcerative Colitis
- Ischemic and Pseudomembranous enterocolitis, diverticulosis
- Malabsorption: Celiac disease, Tropical sprue and other causes
- Tumours and Tumor like condition of the large and small intestine: Polyps, Carcinoid, Carcinoma, Lymphoma
- Pancreatitis
- Pancreatic tumors: Endocrine, Exocrine and periampullary

15. Liver and Biliary Tract Pathology:

- Jaundice: Types, Pathogenesis and Differentiation
- Hepatitis: Acute and Chronic, Etiology, Pathogenesis and Pathology
- Cirrhosis: Etiology, Postnecrotic, Alcoholic, Metabolic, Pathology, Morphology (Macronodular, Micronodular, Mixed), complications
- Portal Hypertension: Types including non-cirrhotic portal fibrosis and Manifestations
- Tumors of Liver: hepatocellular and metastatic carcinoma, tumor markers
- Concept of hepatocellular failure
- Diseases of the gall bladder: Cholecystitis, Cholelithiasis, Carcinoma

16. Lymphoreticular System:

- Lymphadenitis: nonspecific, Granulomatous
- Hodgkin's and Non-Hodgkin's Lymphomas: Classification, Morphology
- Diseases of the spleen: Splenomegaly-causes and effects
- Thymus: Dysgenesis, Atrophy, Hyperplasia, Neoplasia

17. Reproductive System:

- Diseases of cervix: cervicitis, cervical carcinoma, etiology, types and cytologic diagnosis
- Hormonal influences and histological appearances of different phases of menstrual cycle and the abnormalities associated with it
- Diseases of uterus: endometritis, endometrial hyperplasia and carcinoma, adenomyosis, smooth muscle tumors
- Trophoblastic disease: Hydatidiform mole, Choriocarcinoma
- Diseases of the breast: Mastitis, abscess, Fibrocystic disease, Neoplastic lesions: Fibroadenoma, Carcinoma, Phyllodes tumor
- Prostate: Nodular Hyperplasia and Carcinoma
- Ovarian and testicular tumors

- Carcinoma of penis
- Pelvic inflammatory diseases including salpingitis
- Genital Tuberculosis

18. Osteopathology:

- Bone – general considerations, reactions to injury and healing of fractures
- Osteomyelitis: Acute, Chronic, Tuberculous, Mycetoma
- Metabolic diseases: Rickets/Osteomalacia, Osteoporosis, Hyperparathyroidism
- Tumors: Primary, Osteosarcoma, Osteoclastoma, Ewing's Sarcoma, Chondrosarcoma; Metastatic
- Arthritis: Rheumatoid, Osteo and tuberculous

19. Endocrine Pathology:

- Scope of endocrine control and investigations
- Diabetes Mellitus: Types, Pathogenesis, pathology
- Nonneoplastic lesions of thyroid: Iodine deficiency goiter, autoimmune thyroiditis, thyrotoxicosis, myxedema
- Tumors of thyroid – adenoma, carcinoma: Papillary, Follicular, Medullary, Anaplastic
- Adrenal diseases: Cortical hyperplasia, atrophy, tuberculosis, tumors of cortex and medulla
- Parathyroid hyperplasia and tumors and Hyperparathyroidism
- Pituitary tumors
- Multiple endocrine neoplasia

20. Neuropathology:

- Structural Organization, specific cell types, and reaction patterns
- Inflammatory disorders: Pyogenic and tuberculous meningitis, brain abscess, tuberculoma
- CNS tumors – primary: glioma and meningioma (excluding histopathology) and metastatic
- CSF and its disturbances: cerebral edema, raised intracranial pressure
- Cerebrovascular diseases: Atherosclerosis, thrombosis, embolism, aneurysm, Hypoxia, Infarction and Hemorrhage
- Peripheral neuropathies and demyelinating disorders
- Diseases of muscles
- Traumatic lesions of CNS

PAPER WISE DISTRIBUTION OF TOPICS:

Assessment of the student will be done through theory & practical exams. The distribution of the syllabus for theory is as follows:

Sr.No.	Paper	Topic
1	I [100 marks]	<ul style="list-style-type: none">• Introduction to Pathology• Cell injury• Amyloidosis and Calcification• Inflammation and Repair• Circulatory Disturbances• Growth Disturbances and Neoplasia• Immunopathology• Infectious Diseases• Miscellaneous Disorders• Hematopathology
2	II [100 marks]	<ul style="list-style-type: none">• Cardiovascular Pathology• Respiratory Pathology• Urinary Tract Pathology• Pathology of the Gastro-Intestinal Tract• Liver and Biliary Tract Pathology• Lymphoreticular System• Reproductive System• Osteopathology• Endocrine Pathology• Neuropathology

Text Books Recommended:

1. Robbin's Pathologic Basis of Diseases
2. Text-Book of Pathology by Harsh Mohan
3. Walter and Israel's General Pathology

Department of Pharmacology & Therapeutics

Preamble:

Pharmacology is science of drugs, (Greek pharmakos, medicine or drug and logos study). It is study of substances that interact with living systems through chemical properties, especially through binding to regulatory molecules and activating or inhibiting normal body processes. Pharmacology is both a basic and an applied science. It forms the backbone of rational therapeutics. Whereas the medical student and prescribing physician are primarily concerned with the applied aspects, correct and skillful application of drugs is impossible without a proper understanding of their basic pharmacology and therapeutics.

Pharmacology and therapeutics is part of para-clinical phase (phase-II) of medical education. In phase-II of education, the student will be studying Para clinical subjects i.e. Pathology, Pharmacology, Microbiology, Community Medicine, Forensic medicine and Toxicology, professional development including Attitude, Ethics & communication (AETCOM) module and clinical exposure ensuring horizontal and vertical integration. The learning of Pharmacology will be started after completion of 13 months of training in phase 1. The duration of learning Medical pharmacology and therapeutics will be of 12 months.

In 2019 the medical curriculum in India underwent a revision. Hence the syllabus has been designed so as to align with national goal to create an Indian medical graduate(IMG) possessing requisite knowledge, skills, attitude, values and responsiveness so that the student may function appropriately and effectively as a physician of first contact of the community while being globally relevant. Thus emphasis in medical education will be on learning as per specified competencies with stress on integrated teaching and learner centered acquisition of skills, ethical and humanistic values.

Goal:

The broad goal of teaching pharmacology to undergraduate students is to inculcate in them a rational and scientific and ethical basis of therapeutics.

Objectives:

At the end of one year of training in pharmacology, the MBBS student is expected to demonstrate:

Knowledge:

Knowledge about essential and commonly used drugs and understanding of pharmacologic basis of therapeutics.

1. Knowledge of indications, contraindications interactions and adverse drug reactions of commonly used drugs.
2. Knowledge of pharmacovigilance, essential medicine concept and sources of drug information and industry-doctor relationship.
3. Be conversant with principles of pharmacy and pharmaceutical preparations.
4. Student should be able to demonstrate a good understanding of the pharmacokinetic and pharmacodynamics principles involved in use of drugs.
5. Demonstrate familiarity with basic, clinical and translational research as it applies to care of the patient.
6. Ability to describe pharmacokinetic basis, clinical presentation, diagnosis and management of common poisonings
7. Knowledge about drugs liable for addiction and their management.
8. Evaluate the ethics and modalities involved in development and introduction of new drugs.

Skills:

1. Ability to select and prescribe medicines based on clinical condition and the pharmacologic properties, efficacy, safety, suitability and cost of medicines for common clinical conditions of national importance.
2. Ability to counsel patients regarding appropriate use of prescribed drug and drug delivery systems.
3. Identify adverse drug reactions and interactions of essential drugs.
4. Demonstrate ability to prescribe and safely administer appropriate therapies including nutritional interventions, pharmacotherapy and interventions based on the principles of rational drug therapy, scientific validity, evidence and cost that conform to established national and regional health programmes and policies.
5. Demonstrate ability to search (including through electronic means), and critically evaluate the medical literature and apply the information to patient care
6. Ability to interpret the data of experiments designed for study of effects of drugs and bioassays which are observed during the study with the help of computer simulation.

Attitude, Ethics and Communication:

1. Demonstrate ability to establish professional relationship with patients and families that are positive, understanding, humane, ethical, empathetic and trustworthy.
2. Demonstrate ability to communicate with patients in a manner respectful of patient's preferences, values, prior experience, beliefs, confidentiality and privacy.
3. Demonstrate ability to communicate with patients, colleagues and families in a manner that encourages participation and shared decision-making.
4. Demonstrate effective clinical problem solving, judgement and ability to interpret and integrate available data in order to address patient problems, generate differential diagnosis and develop individualised management plans that includes preventive, promotive and therapeutic goals.

PHARMACOLOGY SYLLABUS

The topics will be covered as per proposed GMER guidelines.

- General Pharmacology
- Introduction to Pharmacology
- Drug Development and animal studies, screening of new drugs, computer simulated experiments
- Sources of drug information and critical evaluation of promotional literature
- Basic principles of pharmacy
- Absorption, distribution, metabolism and elimination of drugs, routes of drug administration, dissolution and disintegration of tablets
- Pharmacodynamics
- Basic principles of drug action
- Adverse reactions to drugs, Pharmacovigilance
- Factors modifying drug response
- Pharmaco-economics
- P- drug concept and essential medicine list
- Rational drug therapy and prescription writing
- Critical evaluation of fixed dose combinations
- Drug and cosmetic act and drug schedules

1. Autonomic nervous system & Peripheral nervous system

- Neuro-humoral transmission
- Sympathetic nervous system - sympathomimetic, sympatholytic
- Parasympathetic - Cholinergic, Anticholinergics, Ganglion stimulants and blockers & Skeletal muscle relaxants
- Local anaesthetics

2. Central nervous system

- General principles - neurotransmitters, definition and common transmitters
- Drug therapy of various CNS disorders like epilepsy, depression, Parkinson's disease, schizophrenia, neuro- degeneration etc.
- Pharmacotherapy of pain
- General anaesthetics
- Drugs for arthritis & gout

3. Autacoids

- Histamine and antihistaminic
- Prostaglandins, leukotrienes, thromboxane and PAF
- Substance P, bradykinin

4. Cardiovascular system

- Drug therapy of hypertension, shock, angina, cardiac arrhythmias
- Renin angiotensin system
- Diuretics
- Coagulants and anticoagulants, antiplatelet drugs
- Hypo-lipidemics

5. Gastrointestinal and respiratory system

- Emetics and antiemetic
- Drugs for constipation and diarrhoea
- Drug treatment of peptic ulcer
- Drug therapy of bronchial asthma
- Pharmacotherapy of cough

6. Hormones

- Reproductive hormones - testosterone, oestrogen, progesterone, contraceptives
- Drug therapy of Diabetes

- Thyroid hormones
- Pituitary-hypothalamic axis
- Corticosteroids
- Oxytocin and drugs acting on uterus
- Drugs affecting calcium balance

7. Chemotherapy

- General principles of antimicrobial chemotherapy, rational use of antibiotics
- Chemotherapeutic agents - Penicillin, cephalosporin, fluoroquinolones, macrolides, aminoglycoside, tetracycline, chloramphenicol and polypeptide antibiotics etc.
- Chemotherapy of tuberculosis, leprosy, UTI
- Chemotherapy of parasitic infection
- Chemotherapy of fungal infections
- Cancer Chemotherapy

8. Miscellaneous

- Immunomodulatory Drugs
- Drug therapy of glaucoma and cataract
- Treatment of poisoning
- Drug- drug interactions, interaction with food
- Case studies for few important conditions of national importance
- Treatment protocols for emergency conditions and diseases such as Angina Pectoris, Congestive heart failure, Diabetes mellitus, Hypertension, Bronchial Asthma, Diarrhoea, Anaemia, Psoriasis, Scabies etc.
- Prescriptions in special cases such as pregnancy, elderly, liver and kidney diseases

PAPER WISE DISTRIBUTION OF TOPICS:

Assessment of the student will be done through theory & practical exams. The distribution of the syllabus for theory is as follows:

Sr.No.	Paper	Topic
1	I [100 marks]	<ul style="list-style-type: none">• General Pharmacology• Autonomic nervous system• Peripheral Nervous System• Cardiovascular system• Drugs acting on kidney• Drugs affecting blood & blood formation• Drugs affecting Gastro-intestinal system• Ocular pharmacology• Drugs used in extremes of age, pregnancy• Diagnostic & chelating agents• Environment & chelating pollutants• Vitamins
2	II [100 marks]	<ul style="list-style-type: none">• Drugs affecting Central nervous system• Chemotherapy• Endocrinology• Dermatology• Autacoids• Respiratory system• Immune pharmacology• Vaccines and sera• Antiseptic and disinfectant

Text Books Recommended:

1. Goodman & Gilman's - The Pharmacological Basis of Therapeutics
2. Basic & Clinical Pharmacology by Bertram G, Katzung
3. Clinical Pharmacology by DR Lawrence, PN Bennett & MJ Brown
4. Essentials of Medical Pharmacology by K.D. Tripathi
5. Pharmacology and Pharmacotherapeutics by RS Satoskar, SD Bhandarkar, SS Ainapure
6. Fundamental of Experimental Pharmacology by MN Ghosh

Department of Microbiology

Preamble

Medical Microbiology is a branch of medical science which deals with the study of organisms too small to be seen with naked eye. It is concerned with the diagnosis, prevention and treatment of infectious diseases.

Goal

The goal of teaching Microbiology is to provide understanding of the natural history of infectious diseases & microorganisms causing infectious diseases, in order to deal with the etiopathogenesis, pathogenicity, laboratory diagnosis, treatment, control and prevention of these infections and infectious diseases & also to provide knowledge about Infection Control in the healthcare setting & inculcate practices of infection control in day to day.

Objectives:

At the end of one year of training in Microbiology the MBBS student is expected to demonstrate:

Knowledge:

At the end of one year, the student should be able to: -

1. Understand commensal, opportunistic and pathogenic organisms of human body and describe host parasite relationship.
2. List pathogenic micro-organisms and understand & describe the etiology & pathogenesis of the diseases produced by them
3. State or indicate the modes of transmission of pathogenic and opportunistic organisms and their sources, including insect vectors & their role in transmission of infection
4. Choose appropriate laboratory investigations required for clinical diagnosis and apply that knowledge in the diagnosis, treatment, prevention and control of communicable diseases caused by microorganisms
5. Describe the mechanisms of immunity to infection
6. Acquire knowledge on suitable antimicrobial agents for treatment of infection and scope of immunotherapy and different vaccine available for prevention of

communicable diseases

7. Apply methods of disinfection and sterilization to control and prevent hospital and community acquired infections
8. Recommend laboratory investigations regarding bacteriological examination of foodwater, milk and air.

Skills:

1. Plan and interpret laboratory investigations for diagnosis of infectious diseases
2. correlate the clinical manifestations with the etiological agent.
3. Identify common infectious agents with the help of laboratory procedure.
4. Acquire knowledge of antimicrobial agents, use of antimicrobial sensitivity tests to select suitable antimicrobial agents for treatment.
5. Perform simple laboratory tests, which help to arrive at rapid diagnosis.
6. Know proper methods of collection, storage & transport of clinical material for microbiological investigations.
7. Understand the principles of immunology and its application in the diagnosis and prevention of infectious diseases including immunization schedule
8. Acquire knowledge of the scope of immunotherapy and different vaccines available for the prevention of communicable diseases.
9. Learn methods of disinfection and sterilization and their application to control and prevent hospital and community acquired infections including standard precautions and waste disposal.
10. Know laboratory investigations regarding bacteriological examination of food, water, milk and air.
11. Acquire the knowledge of prevalent communicable diseases of national importance and of the newer emerging pathogens for the same.

Attitude, Ethics & Communication:

1. The student will be regular, sincere, punctual and courteous and regular in studies.
2. The student will follow all the rules laid down by the department and participate in maximum possible activities.
3. The student will understand the importance of standard precautions and practice hand hygiene, asepsis, waste segregation and appropriate disposal.

4. The student will understand the importance of, and practice the best methods to prevent the development of infection in self and patient. (E.g. hand washing, using aprons for hospitals in hospitals only, regularly washing the aprons, wearing gloves (as and when required / handling specimens etc.).
5. The student will understand the judicious & rational use of the different antimicrobial agents including antibiotics & will have prescribing attitude to prevent misuse
6. The student will understand the significance of vaccinations and will receive appropriate vaccines (e.g. TT, Hepatitis B and any other as per needs).
7. The student will wash his/her hands with soap after each practical class.
8. The student will leave the area allotted for his practical neat and tidy.
9. The student will discard the slides in the appropriate container provided for the same.
10. The student will report any injury sustained in class, immediately.
11. The student will report any breakage occurring during class times immediately.
12. Understand and apply principles of bioethics and law as they apply to medical practice and research understands and apply the principles of clinical reasoning as they apply to the care of the patients,
13. Understand and apply the principles of system based care as they relate to the care of the patient,
14. Understand and apply empathy and other human values to the care of the patient,
15. Communicate effectively with patients, families, colleagues and other health care professionals.
16. Understand the strengths and limitations of alternative systems of medicine,
17. Respond to events and issues in a professional, considerate and humane fashion,
18. Translate learning from the humanities in order to further his / her professional and personal growth

MICROBIOLOGY SYLLABUS

The topics will be covered as per proposed GMER guidelines.

Theory Topics-

1. General Microbiology

- Introduction and History
- Microscopy Sterilization and Disinfection
- Overview of bacterial infections and Bacterial Taxonomy

- Morphology of Bacteria
- Bacterial Genetics
- Antimicrobials: Antimicrobial Agents, Antimicrobial Resistance, Antimicrobial Susceptibility Testing, Monitoring of antimicrobial therapy, Antimicrobial stewardship
- Overview of Viral infections and General Virology
- Overview of parasitic infections and General Parasitology
- Overview of fungal infections and General Mycology
- Epidemiology of infectious diseases

2. Immunology

- Immunity (Innate and Acquired)- Immunological mechanisms in health
- Components of Immune System-Organs, cells and products 2
- Antibody
- Antigen-Antibody Reaction
- Complement
- Immune Responses: Cell-mediated and Antibody-mediated
- Hypersensitivity
- Autoimmunity
- Immunodeficiency Disorders
- Transplant and Cancer Immunology
- Immunoprophylaxis and Immunohematology

3. Systemic Microbiology (Infectious Diseases)

3.a. Blood Stream and Cardiovascular System Infections

- Blood stream infections, sepsis, septic shock, CRBSI
- Infections of CVS (in detail)-Rheumatic fever and Infective endocarditis (including HACEK group)
- Other infections of CVS (in brief) - myocarditis and pericarditis, suppurative thrombophlebitis, infective endoarteritis, mycotic aneurysm, mediastinitis
- Major etiological agents of blood stream and CVS infections
- Enteric (typhoid) fever
- Rickettsial infections

- HIV
- Dengue, chikungunya, and Zikavirus
- Malaria (in detail)
- Babesiosis (in brief)
- Leishmaniasis
- Lymphatic filariasis

3.b. Gastrointestinal and Hepatobiliary System Infections

- Normal commensals
- Gastrointestinal infective syndromes (in brief)
- Diarrheal diseases- Diarrhoea, gastroenteritis, dysentery, food poisoning, traveller's diarrhoea
- Acute vomiting
- Peritonitis and Intra-peritoneal Abscesses
- Infections of the liver and biliary system (liver abscess, cholangitis, cholecystitis)
- Pancreatic infection, splenic abscess, appendicitis, diverticulitis and typhlitis
- Cholera and halophilic Vibrio infections
- Intestinal amoebiasis
- Balantidiasis
- Intestinal nematodes- Ascaris, hookworm, Trichuris,
- Enterobius and Strongyloides
- Agents of Viral Hepatitis
Hepatitis viruses Yellow fever, Cytomegalovirus
Epstein-Barr virus

3.c. Skin, Soft Tissue Infections and Musculoskeletal System Infections

- Infective syndromes of skin, soft tissue, musculoskeletal systems (in brief)
- Primary skin lesions: Macule, papule, plaque, nodule, vesicle, bulla, pustule, abscess
- Secondary skin lesions: Scale, ulcer, erysipelas, impetigo, cellulitis, hidradenitis
- Ecthyma
- Warts
- Hair follicle infections: Folliculitis, furuncle, carbuncle

- Subcutaneous tissue infections
- Infection of fascia and muscles: Necrotizing fasciitis, pyomyositis, myonecrosis
- Lymphadenitis and lymphangitis
- Skeletal system infections: Osteomyelitis and septic arthritis, orthopaedic implant–associated infections
- Miscellaneous: Burn Infections, bite infections, injection site abscesses, factitial disease (Self-induced abscesses)
- Staphylococcal infections (detail)
- Gas gangrene (*Clostridium perfringens*)
- Tetanus (*Clostridium tetani*)
- Infections due to non-spring anaerobes
- Viral exanthemas (in detail)- Measles, rubella, parvovirus,
- HHV-6, Pox viruses, Varicella zoster (chickenpox and zoster) Herpes simplex virus (in detail)
- Superficial fungal infections
- Subcutaneous fungal infections
- Cutaneous and mucosal Candidiasis
- *Penicillium Marneffe*

3.d. Central Nervous System Infections

- Infective syndromes of CNS (in brief)
- Meningitis- Acute (pyogenic, aseptic-viral, spirochetal, parasitic) and chronic
- Encephalitis
- Focal CNS lesions (e.g., brain abscess, subdural empyema, and epidural abscess)
- Suppurative Intracranial Thrombophlebitis
- CSF Shunt and Drain Infections
- Agents of pyogenic meningitis: *Neisseria meningitidis*,
- *Streptococcus pneumoniae*, *Streptococcus agalactiae*,
- *Haemophilus influenzae*, *Listeria*
- Viral agents of encephalitis-: Rabies and HSV encephalitis, Arboviral encephalitis (JE and West Nile), Nipah virus infection, Slow viral infections
- Tetanus, botulism

- Neurocysticercosis

3.e. Respiratory Tract Infections

- Normal commensals and defense mechanisms
- Infective syndrome of respiratory system (in brief)
- URTI- Rhinitis (common cold), sinusitis, pharyngitis (sore throat), tonsillitis, laryngitis, laryngotracheobronchitis (croup), epiglottitis
- LRTI- Bronchitis, bronchiolitis, pneumonia (CAP, HAP), pleural effusion, empyema
- Viral URTI-1: Influenza-like illness and orthomyxovirus
- Tuberculosis including non-tuberculous mycobacteria

3.f. Genitourinary Tract Infections and Sexually Transmitted Infections

- Normal commensals of genitourinary tract
- Urinary tract infections
- Upper UTI: Pyelonephritis, ureteritis
- Lower UTI: Cystitis, urethritis
- Agents of genital ulcers-1- Syphilis
- Agents of vaginal discharge- Bacterial vaginosis,
- Trichomonas vaginalis, Candida
- Agents of genital warts- HPV (Human papilloma virus)

4. Hospital Infection Control

Hospital acquired infections (surveillance and prevention including care bundle) – CAUTI, CRBSI, VAP, SSI

Antimicrobial stewardship and Rational use of antimicrobial agents

1. National Health Program

Practical Topics

- Microscopy
- Sterilization and Disinfection
- Physiology of Bacteria
- Gram staining
- Morphology of common bacteria, Bacterial growth curve

- Culture Media and Culture Methods
- Specimen collection and transport
- Identification of Bacteria (Conventional methods)
- Identification of Bacteria (Automations and Molecular methods)
- Antimicrobial Susceptibility Testing
- Laboratory diagnosis of viral infections- microscopy, cultivation, serology, molecular tests
- Laboratory diagnosis of parasitic infections
- Laboratory diagnosis of fungal infections--KOH mount, Gram stain (yeast), India ink, LPCB mount
- Normal Microbial Flora of Human Body
- Microbial Pathogenesis
- Acid fast staining
- Antigen
- Antigen-Antibody Reaction (conventional)- agglutination and precipitation
- Antigen-Antibody Reaction (newer)- ELISA, ELFA, CLIA, IFA, western blot, rapid methods
- Stool microscopy
- Hospital acquired infection (definition, risk factors, hand hygiene and PPE)
Biomedical waste, Needle stick injury, Hand hygiene and PPE
- Infections causing anaemia
- Sepsis, CRBSI, Rheumatic fever, Infective endocarditis
- Brucellosis, Leptospirosis and Borreliosis
- Enteric (typhoid) fever, Brucellosis, Leptospirosis
- Plague
- Other viral hemorrhagic fever- Kyasanuar forest disease,
- Ebola and Marburg virus, Hantaviruses
- HIV and Dengue
- Trypanosomiasis and Schistosomiasis
- Malaria, Leishmaniasis, Lymphatic filariasis
- Systemic mycosis and Candidiasis
- Shigellosis

- Nontyphoidal salmonellosis
- Diarrheogenic E. coli
- Dysentery(Shigellosis)
- Diarrhea (cholera)
- Helicobacter infection (acid peptic disease)
- Campylobacter infections
- Yersiniosis
- Food poisoning- Bacillus cereus, Clostridium botulinum,
- mycotoxins
- Antibiotic associated diarrhea- Clostridiodes difficile
- Viral gastroenteritis
- Giardiasis
- Intestinal coccidian parasites and microsporidia infections
- Intestinal amoebiasis, Giardiasis, Intestinal coccidian parasite
- Intestinal cestode infections - Diphyllbothriumlatum,
- Taenia, Hymenolepis
- Intestinal trematodes infections – Fasciolopsisbuski
- Intestinal cestode and nematode infection
- Echinococcosis (hydatid disease)
- Other parasitic infections of liver- amoebic liver abscess,
- Fasciola hepatica infection
- Parasitic infections infecting bile duct- Clonorchis, Opisthorchis
- Viral Hepatitis, parasites causing liver infection
- Streptococcal infections pertaining to SSTI
- Anthrax (Bacillus anthracis)
- Staphylococcal, Streptococcal infections and Anaerobic infections
- Leprosy
- Infection due to non-fermenters (Pseudomonas,
- Acinetobacter, Stenotrophomonas, Burkholderia including Melioidosis)
- Infection due to Actinomycetes and Nocardia
- Anthrax, Leprosy, Pseudomonas, Melioidosis, Actinomycetes and Nocardia
- Tissue nematode infections of skin and soft-tissue-

- Onchocerca, Loa loa, Mansonella and Dracunculus,
- Trichinella, cysticercosis, Larva migrans and other parasitic infections of lower animals infecting man
- SSTI due to Superficial and Subcutaneous fungal infections,
- Cutaneous and mucosal Candidiasis
- Agents of pyogenic meningitis (N. meningitidis,
- Streptococcus pneumoniae, S. agalactiae, Haemophilus
- Agents of aseptic meningitis- Viral agents (including polio, coxsackie virus, mumps), Other agents (Spirochaetal meningitis, tubercular meningitis, cryptococcal meningitis and other fungi affecting CNS)
- Parasites causing encephalitis: Primary amoebic meningoencephalitis (Naegleria), granulomatous amoebic encephalitis (Acanthamoeba and Balamuthia), toxoplasmosis (in detail)
- Neurocysticercosis
- Aseptic meningitis (tubercular meningitis, cryptococcal meningitis) and Encephalitis
- Bacterial URTI: Diphtheria, Group A Streptococcus
- Viral URTI-: Rhinovirus, adenovirus and infectious mononucleosis (EBV)
- Fungal URTI: Zygomycosis
- URTI (beta haemolytic streptococci, diphtheria, influenza)
- Pneumococcal pneumonia
- Haemophilus influenza
- Bordetella infections
- Laboratory diagnosis of tuberculosis and Acid fast stainin
- Agents of atypical pneumonia(Bacterial): Mycoplasma, Chlamydia and Legionella
- Viral agents of LRTIParamyxovirus infections- Parainfluenza, RSV, Coronaviruses including SARS-CoV and MERS CoV
- LRTI (Pneumococcal pneumonia, Haemophilus influenza, agents of atypical pneumonia)
- Fungal agents causing respiratory tract infection: Zygomycosis, aspergillosis, pneumocystis
- Parasitic agents causing respiratory tract infection: Paragonimiasis
- Agents of UTI Uropathogenic E. coli, Klebsiella, Proteus, Enterococcus (in detail), Staphylococcus saprophyticus, Streptococcusagalactiae

- UTI (Uropathogenic E. coli, Klebsiella, Proteus, Enterococcus,
- Staphylococcus saprophyticus, Streptococcusagalactiae)
- Sexually transmitted infections (in brief)
- Infections of the female reproductive organs: Urethritis, Vulvovaginitis, cervicitis, endometritis, oophoritis, salpingitis, tubo-ovarian abscess, pelvic inflammatory disease
- Infections of the male reproductive organs: Urethritis, Prostatitis, epididymitis, and orchitis
- Agents of urethritis- Gonorrhoea and non-gonococcal urethritis (including Chlamydia, Ureaplasma, HSV, Candida
- Agents of genital ulcers-- LGV, Granuloma inguinale, soft chancre, HSV
- STI (Gonorrhoea, Syphilis, Trichomonas, Candidia)
- Environmental surveillance (bacteriology of water, air, milk and surface)
- Infective syndromes of eye (in brief) Conjunctivitis, keratitis, uveitis, endophthalmitis
- Periocular/ periorbital Infections: Eye lid infections (hordeolum, chalazion and marginal blepharitis), Lacrimal gland infection (dacryoadenitis, canaliculitis and dacryocystitis), Preseptal infection and orbital infections
- Fusarium and Penicillium (in detail)
- Infective syndromes of ear, nose and oral cavity (in brief)
- Ear infections:
- Otitis externa, otitis media, and mastoiditis • Nasal cavity infections: Rhinitis (common cold), sinusitis, turbinate hypertrophy
- Oral cavity infections
- Orofacial Odontogenic Infections: Dentoalveolar infections, gingivitis and periodontal infections, deep fascial space infections, suprahyoid space infections and infrahyoid space infections
- Orofacial Nonodontogenic Infections: Infections of the oral mucosa (stomatitis and oral thrush), infections of the salivary gland,
- Miscellaneous:
- Suppurative cervical adenitis, infected embryologic cysts, suppurative thyroiditis
- Zoonotic infections
- Congenital infections (TORCH)

- Opportunistic infections (immunocompromised patients) including Transplant infections
- Organisms of oncogenic potential
- Emerging and Re-emerging Infections
- Microbial agents of Bioterrorism
- Vector-borne infections
- Laboratory acquired infections
- Choose appropriate laboratory test in diagnosis of infectious disease (Rational use of microbiological investigations)

PAPER WISE DISTRIBUTION OF TOPICS:

Assessment of the student will be done through theory & practical exams. The distribution of the syllabus for theory is as follows:

Sr.No.	Paper	Topic
1	I [100 marks]	General Microbiology Immunology Infections of Blood stream and Cardiovascular System Gastrointestinal tract Hepatobiliary system
2	II [100 marks]	Infections of Skin, Soft tissue and Musculoskeletal System Central Nervous System Respiratory System Genitourinary System and Sexually-transmitted infections Hospital infections and control Zoonotic and miscellaneous

TEXT BOOKS RECOMMENDED:

1. Textbook of Microbiology- ApurbaSastry
2. Textbook of Microbiology - R. Ananthanarayan C. K. JayaramPanikar
1. A Textbook of Microbiology - P. Chakraborty
2. Textbook of Medical Microbiology - Rajesh Bhatia &Itchpujani
3. Textbook of Medical Microbiology - Arora and Arora
4. Parasitology (Protozoology and Helminthology) K.D. Chatterjee
5. Textbook of Medical Parasitology - S.C. Parija

6. Textbook of Medical Parasitology - C. K. JayaramPanikar
7. Textbook of Medical Parasitology - Arora and Arora
8. A Textbook of Parasitology - Dr. R.P. Karyakarte and Dr. A.S. Damle
9. Microbiology in clinical practice - D. C. Shanson

REFERENCE BOOKS:

1. Mackie McCartney practical Medical Microbiology- Colle JG, Fraser AG
2. Principles of Bacteriology, Virology & Immunology vol. 1,2,3,4,5- Topley Wilsons
3. Medical Mycology (Emmons)- Kwon – Chung
4. Review of Medical Microbiology (Lange)- Jawetz, Melnick and Adelberg's Medical Microbiology Geo F. Brooks, Stephen A. Morse, Janet S. Butel
5. Immunology- Weir DM
6. Medical Microbiology- David Greenwood, Richard Stack, John Pentherer
7. Medical virology- Timbury MC
8. Microbial infections- Marmion BP, Swain RHA
9. Hospital Infection Control – ApurbaSastry

Department of Community Medicine

GOAL:

To prepare undergraduate students to recognize various health problem of public health importance and make them competent in diagnosis and management of it at the individual and the community level.

OBJECTIVES:

At the end of one year of training in Community Medicine the MBBS student is expected to demonstrate:

Knowledge

Define epidemiology. Describe the various tools of measurements in epidemiology. Describe the basic measurements in epidemiology.

1. Describe the various emerging and re-emerging diseases.
2. Describe the communicable & non-communicable diseases with high burden, aimed for achieving elimination and control and also with least public health importance.
3. Describe the role of genetic predisposition in common disorders and various preventive and social measures under genetics and health.

Skills:

At the end of the course the student should be able to:

1. Demonstrate the use and evaluation of screening tests.
2. Identify and describe the food groups pertaining to nutrition and nutritional problems of public health importance.
3. Identify and describe the environmental models in public health.

Attitude, Ethics and Communication: At the end of the course the student should be able to:

1. Demonstrate ability to work in a team of peers.
2. Counsel the patient, family members regarding health related issues.
3. Inform families the impact of socioeconomic, environmental and nutritional factors on health.

COMMUNITY MEDICINE SYLLABUS:

The topics will be covered as per proposed GMER guidelines.

1. Principles of epidemiology and epidemiological methods

- Epidemiology: definition, components, approaches, measurements (mortality & morbidity)
- Epidemiological methods: Descriptive epidemiology
- Analytical epidemiology: case control study & cohort study
- Experimental study
- Association and Causation, uses of epidemiology
- Infectious disease epidemiology, Dynamics of disease transmission, Modes of transmission
- Health advice to travelers, Investigation of epidemic, Screening for diseases
- Host defenses, vaccines, cold chain, AEFI
- Disinfection
- Family case study

2. Health information and basic statistics and its applications

- Definition, components, uses and sources of health information. Formulate a research question for a study
- principles and demonstrate the methods of collection, classification, analysis, interpretation and presentation of statistical data
- the application of elementary statistical methods including test of significance in various study designs
- Common sampling techniques, simple statistical methods, frequency distribution, measures of central tendency and dispersion
- Health information and Vital statistics

3. Epidemiology of communicable and non- communicable diseases without emergency preparedness

- Epidemiological and control measures for communicable diseases:
Respiratory / Airborne infection (smallpox, chicken pox, influenza, diphtheria, whooping cough, TB with related national health programme)

- Intestinal infection (Hepatitis, with related national health programme)
- Acute diarrhoeal diseases
- Typhoid
- Amoebiasis, Ascariasis, Hookworm, Dracunculosis
- Arthropod borne infections (Lymphatic Filariasis, Chikungunya fever, with related national health programme)
- Zoonotic Diseases (Nipah virus, Japanese Encephalitis, KFD with related national health programme)
- Brucellosis, Human salmonellosis
- Zoonotic Diseases: Rickettsial diseases (Scrub typhus, Murine typhus. Q fever, Tick typhus, taeniasis)
- Zoonotic Diseases: Rickettsial diseases (Hydatid diseases, Leishmaniasis)
- Surface Infections (Trachoma, Yaws with related national health programme)
- Emerging & Re-emerging infectious diseases, Hospital acquired infections
- Epidemiological and control measures for non-communicable diseases: (Diabetes, Hypertension, obesity, RHD, etc. with related national health programme.) – I
- Epidemiological and control measures for non-communicable diseases: (Cancer, Blindness etc. with related national health programme.) – II

4. Nutrition and health

- Classification of food, Nutritional significance, concept of reference man and woman, Balanced diet, dietary goals
- Nutritional problems of public health importance, social aspects of nutrition, community nutrition programme
- Assessment of nutritional status, 24 hr recall method
- Food Toxicants, Food additives

5. Environment and health

- Safe and wholesome water, water borne diseases, water purification processes, concepts of water conservation and rainwater harvesting.
- Physical environment -I: Health hazards of air, noise, radiation and pollution

- Physical environment –II: Light, Ventilation, Air temperature, Humidity, Housing, Overcrowding
- Medical Entomology I (Mosquito, Sand fly, Rat flea, Mite)
- Medical Entomology II (Housefly, Louse, hard tick, Soft tick, Cyclops)
- Insecticide

6. Tribal health

- Demographic Profile, Disease burden, Health care infrastructure

7. Genetics and health

- Basics of Genetics and Mendelian Theory, Chromosomal Disorders, Eugenics and Euthenics, Prevention measures for Genetic Disorders

Integration: At the end of the integrated teaching the student should acquire an integrated knowledge of an update to the topic under discussion and their preventive and control measures as provided by the health authorities.

- 20% of total syllabus under integrated teaching.
- Both vertical and horizontal integration will be carried

Vertical – General Medicine, Paediatrics, Obstetrics and Gynaecology

Horizontal – Department of Microbiology & Pathology

ASSESSMENT

Eligibility to appear for Professional examinations

The performance in essential components of training are to be assessed, based on:

- Attendance:** The learner must have 75% attendance in theory and 80% in practical in each phase of instruction in that subject.
- Internal Assessment:**
 - Internal assessment shall be based on day-to-day assessment.
 - Regular periodic examinations shall be conducted throughout the course.
 - Day to day records and log book.

There shall be **two** internal assessment exams based on both formative (MCQs and Objective structured clinical exam [OSCE] and objective structured practical examination [OSPE]) and summative assessment.

I-exam (At the end of first term)			II-exam (At the end of Second term)		
Theory	Practical (including 5 marks for journal & log book)	Total marks	Theory	Practical (including 5 marks for journal & log book)	Total marks
50	50	100	50	50	100

TEXTBOOKS RECOMMENDED:

1. Park’s Textbook of Preventive and Social Medicine
2. Textbook of Community Medicine-Rajvirbhalwar
3. Kishores National Health Programs of India.
4. Mahajan’s Methods in Biostatistics for Medical Students and Research Workers.
5. Mastering practicals – Poornima Tiwari
6. Community Medicine Practical Manual – RajkumarPatil.

3) Websites recommended:

1. <https://mohfw.gov.in/ecitizentender/maharashtramh>
2. <https://mohfw.gov.in/>

Forensic Medicine Including Toxicology

Preamble:

The subject of Forensic Medicine Including Toxicology is divided in two parts i.e. Forensic Medicine & Toxicology. Forensic Medicine deals with application of medical and paramedical knowledge to aid in administration of justice. It deals with crime against human being in which medical examination and evidence are required, aiming to administration of justice in both civil and criminal cases. It is incumbent upon doctors (Indian Medical Graduates) to have good knowledge of law governing their profession, in order not to transgress the law. Toxicology deals with the medical and legal aspects of the harmful effects of various poisons on human beings. It includes study of different poisons with respect to their properties, actions, diagnosis, toxicity, fatal dose, detection and estimation, interpretation of results of toxicological analysis and treatment and post-mortem appearance which will help doctors (Indian Medical Graduates) to deal with medical and legal duties in case of suspected poisoning.

As per Competency Based Undergraduate Curriculum for The Indian Medical Graduate, Forensic Medicine Including Toxicology (FMT) is included in two phases of medical education i.e. Para-clinical phase (phase II) of duration 12 months & Clinical phase (Phase III Part I) of duration 13 months. Subject of Forensic Medicine Including Toxicology (FMT) is studied under two headings –Forensic Medicine and Toxicology & aligned and integrated horizontally and vertically with subject of Human Anatomy, Pharmacology, Radio diagnosis, Psychiatry, General Medicine, Obstetrics & Gynaecology and General Surgery by recognizing the importance of medico-legal, ethical and toxicological issues as they relate to the practice of medicine. The Emphasis is given on Indian Medical Graduates to understand the medical and legal duties in medical practice, and to perform medico-legal autopsy in an ethical manner by providing reasonable coverage of the subject as a whole with use of foundation course, AETCOM module, early clinical exposure, self-directed learning, competencies learning, skills training, as suggested by MCI in the Competency Based Undergraduate Curriculum for the Indian Medical Graduate.

Educational Goal:

The goal of the teaching of undergraduate students in Forensic Medicine Including Toxicology is to produce a Indian Medical Graduates who are well informed about medico-legal responsibilities in practice of Medicine. He/she will also be capable of making observations and inferring conclusions by logical deductions to set enquiries on the right track in criminal matters and connected medico-legal problems. He/she acquires knowledge of law in relation to medical practice, medical negligence and respect for codes of medical ethics.

Educational Objectives:

The educational objectives of the teaching of undergraduate students in Forensic Medicine are classified according to domain (Knowledge, Skills, Attitude & Communication) in Competency Based Undergraduate Curriculum as per proposed GMER guidelines to produce Indian Medical Graduates who at the end of the course in the Forensic Medicine & Toxicology are well informed and able to demonstrate knowledge, skills, attitude, ethics & communication.

Knowledge:

At the end of the course in the Forensic Medicine & Toxicology, the Indian Medical Graduate student will be:

1. Able to understand the basic concept of the subject and its importance.
2. Aware of inquest, legal and court procedures applicable to medico-legal and medical practice.
3. Able to understand the physician's responsibilities in criminal matters by rational approach to the investigation of crime based on scientific and legal principles,
4. Able to understand medico-legal responsibilities of physicians in primary and secondary care settings,
5. Able to understand codes of conduct and medical ethics,
6. Able to understand medico-legal aspects and findings of post-mortem examination in cases of death due to common unnatural conditions
7. Able to diagnose and manage the cases of acute and chronic poisoning / overdose and related medico-legal issues.

8. Able to understand medico-legal issues and findings of post-mortem examination in cases of death due to poisonings / overdose.
9. Able to understand general principles of analytical, environmental, occupational toxicology including toxic vigilance, predictive toxicology
10. Able to understand the medico-legal framework of medical practice and medical negligence,
11. Able to understand the importance of medico-legal, ethical and toxicological issues as they relate to the practice of medicine.
12. Aware of latest advances in Forensic Medicine & Toxicology and their medico-legal importance.
13. Aware of latest decisions/notifications/ resolutions/circulars/standing orders, acts related to medico-legal practice issued by Courts/Government authorities etc.

Skills:

At the end of the course in the Forensic Medicine & Toxicology, the Indian Medical Graduate student will be:

1. Able to identify the medico-legal cases, carryout medical examination in such cases and prepare medico-legal report as per the law of the land.
2. Able to identify, examine, draw medico-legal inference and opinion from various biological and non-biological exhibits, histopathological slides etc. in respect to various medico-legal cases.
3. Able to preserve and despatch relevant various articles, trace evidences, biological samples including viscera in poisoning cases, in medico-legal cases/ autopsy examination and handing over the same to appropriate agencies.
4. Able to identify & interpret autopsy findings and results of other relevant investigations for logical conclusion and framing the opinion on cause, manner and time since death in medico-legal post-mortem/autopsy.
5. Able to identify & draw medico-legal inference from common poisons and carry out medico-legal duties in suspected cases of poisoning
6. Able to record and certify medico-legal cases like age estimation, sexual assault, dying declaration, various medical certificates etc.
7. Able to diagnose and certify death,

8. Able to document and certify trauma.
9. Able to do legal documentation related to emergency cases
10. Able to give medical/medico-legal evidence in court of law.

Attitude, Ethics & Communication:

At the end of the course in the Forensic Medicine & Toxicology, the Indian Medical Graduate student will be:

1. Able to respect to the directions of courts, code of conduct while appearing as witness to depose medical/medico-legal evidence in court of law.
2. Able to work in a team for conduction of medico-legal autopsies in cases of death following alleged medical negligence, dowry death, death in custody or following violation of human rights as per National Human Rights Commission Guidelines on exhumation
3. Able to demonstrate the professionalism while dealing with victims of torture and human right violations, sexual assaults psychological consultation, rehabilitation
4. Able to demonstrate respect to laws relating to medical practice and Ethical code of conduct prescribed by Medical Council of India and rules and regulations prescribed by it from time to time
5. Able to conduct research in pursuance to guidelines or research ethics, bioethics
6. Able to communicate appropriately by exchanging information by verbal, or nonverbal communication to the doctors, peers, family members, law enforcing agency and judiciary, government officials & public health authority, public and media.
7. Able to use local resources whenever required like in mass disaster situations
8. Able to counsel family members of a patient with suspected poisoning about the clinical and medico legal aspects with empathy
9. Able to administer informed consent to a person wishing to undergo medical procedure.
10. Able to demonstrate Professionalism and empathy to the patient undergoing surgery
11. Able to discuss various medico-legal issues in surgical practice

Syllabus:

The topics will be covered as per GMER guidelines.

Phase II

A – Forensic Medicine

1. Basics of Forensic Medicine (General Information)

- Definition of Forensic Medicine, Clinical Forensic Medicine, Forensic pathology, State Medicine, Legal Medicine and Medical Jurisprudence, Medical Ethics, Medical Etiquettes.
- History of Forensic Medicine.

2. Legal procedure

- Criminal procedure code, Indian penal Code, Indian evidence Act,
- Civil & Criminal cases, Civil Law (Case Law), Criminal Law, Common Law.
- Definition of Inquest, Different types of inquest procedures - police inquest, Magistrate's inquest, Coroner's inquest, Medical Examiner System, Jury.
- Cognizable and non-cognizable offences, Punishments authorised by law.
- Different types of courts in India and their powers – Supreme court, High Court, Session Court, Magistrate's court, Labour court, Family court, Executive Magistrate Court and Juvenile Justice Board, Juvenile Court.
- Court procedures: Summons, conduct money, recording of evidence in court of law - oath, affirmation, Types of examination in court - Examination in chief, Cross examination, Re- examination, court questions, definition and types of witnesses, hostile witness, Types of Evidence – Oral, Documentary, Medical evidence, Medical Certificate, dying declaration, dying deposition, chain of custody of evidence, Recording of evidence in court, Conduct and duties of a doctor in witness box, conduct and duties of doctor in crime scene investigations. Giving expert medical/ medico-legal opinion in Court of Law

- Offenses in the court – Perjury, Court strictures vis-à-vis Medical Officer
- Latest decisions/notifications/resolutions/circular/standing orders related to medico-legal practice issued by courts/Government authorities etc.
- Cause of death & ICD 10 Code document
- Documentation in medical practice in regard to medico-legal examinations, Medical Certificates and medico-legal reports especially-
 - Maintenance of patient case records, discharge summary, prescribed registers to be maintained in Health Centres.
 - Maintenance of medico-legal register like accident register.
 - Documents of issuance of wound certificate
 - Documents of issuance of drunkenness certificate
 - Documents of issuance of sickness and fitness certificate.
 - Documents for issuance of death certificate.
 - Documents of Medical Certification of Cause of Death - Form Number 4 and 4A
 - Documents for estimation of age by physical, dental and radiological examination and issuance of certificate.
 - Recording and certification of dying declaration

3. Forensic Pathology

- Thanatology- Definition of death, Types of Death - Somatic/Clinical/Cellular, Molecular and Brain death including cortical death and Brainstem death, Natural and Unnatural death, Suspended animation, Moment of death, Modes of death – Coma, Asphyxia & Syncope, Presumption of death and Survivorship and Sudden death.
- Organ transplantation & The Human Organ Transplant (Amendment) Act 2011, Ethical issues in Organ Donation.

4. Clinical Forensic Medicine

- Establishment of identity of living persons –definition and types, importance of Identification, Corpus Delicti, Race, sex, religion, complexion, stature, age determination using morphology, teeth-eruption, decay, bite marks including forensic odontology, bones-ossification centres, medicolegal aspects of age. Foetal age determination, Identification of criminals, unknown persons, dead bodies from the

remains- hairs, fibers, teeth, anthropometry, dactylography, foot prints, palate-prints, lip-prints, ear-prints, nose-prints, retina scan, iris scan, scars, tattoos, deformities, moles, poroscopy and Superimposition, clothes and ornaments, handwriting, speech and voice, gait, tricks of manner and habit, memory and education, use of X-rays in identification.

- Examination and preparation of report of estimation of age of a person for medico-legal and other purposes.
- Examination, interpretation and medico-legal aspects from examination of hair (human & animal), fibre.

5. Medical Jurisprudence

- Medical Ethics & its historical emergence, Oath- Hippocrates, Charaka and Sushruta and procedure for administration of oath, the Modified Declaration of Geneva and its relevance.
- The Code of Medical Ethics 2002 conduct, Etiquette and Ethics in medical practice and rules & regulations prescribed by MCI from time to time, unethical practices & the dichotomy
- Indian Medical Council Act 1956, Medical Council of India, State Medical Councils- Their functions and disciplinary control, Role. Indian Medical Register, infamous conduct, disciplinary procedures, warning notice & penal erasure.
- Rights, privileges and duties of a Registered Medical Practitioner towards the patients and society, Doctor – Patient relationship: professional secrecy and privileged communication, duties, privileges and rights of patients, physician –patient relationship
- Prenatal diagnostic techniques Act, Human organ transplantation Act, ESI Act, medico-legal issues in relation to family violence, Violation of human rights, NHRC and Doctors, Doctors, public and media, ethics related to HIV patients, Bioethics, Ethical Principles: Respect, for autonomy, non-maleficence, beneficence & justice, constitution and functions of ethical committee, Ethical guidelines for Biomedical Research on Human Subjects & Animals, Clinical research & ethics, Human experimentation including clinical trials, Legal & Ethical issues in stem cell research.

- Social aspects of Medico-legal cases with respect to victims of assault, rape, attempted suicide, homicide, domestic violence, dowry- related cases
- The challenges in managing medico-legal cases including development of skills in relationship management– Human behaviour, communication skills, conflict resolution techniques.
- The principles of handling pressure – definition, types, causes, sources and skills for managing the pressure while dealing with medico-legal cases by the doctor.
- Negligence - Professional (Medical) Negligence/Medical Malpraxis/Malpractice- Civil, Criminal and ethical (Infamous conduct) Negligence, Contributory Negligence, Corporate Negligence, vicarious liability, the doctrine of Res Ipsa Loquitur, Novus Actus Interveniens, Prevention and precautions of medical negligence and defences in medical negligence litigations, Supreme court of India guidelines on medical negligence, Medical records, Consumer Protection Act – 1986 (Medical Indemnity Insurance, civil litigations and compensations), Medical Indemnity Insurance, Workman’s Compensation Act & ESI Act, Therapeutic Privilege, Malingering, Therapeutic Misadventure, Products liability, Professional Secrecy, Human Experimentation, Laws in relation to medical practice - IPC related to medical Practice,.
- Consent, Types of consent, informed consent and its ingredients, Rules of Consent and importance of consent in relation to age, emergency situation, mental illness and alcohol intoxication, euthanasia and its types.

B. Toxicology

1. General Toxicology

- History of Toxicology, Definition of Toxicology, Forensic Toxicology, Clinical toxicology and Poison. Laws in relation to poisons including NDPS Act, Medico-legal aspects of poisons, Nature of poisoning, Classification of poisons, Toxicokinetics and Toxicodynamics, types of poisoning, diagnosis of poisoning in living and dead, General symptoms, principles of diagnosis of common poisons encountered in India, and

treatment & management of common poisons encountered in India- decontamination, supportive therapy, Antidotes and its types, procedures of enhanced elimination. Duties of medical practitioner in a case of suspected poisoning. The procedure of intimation of suspicious cases or actual cases of foul play to the police, maintenance of records, despatch of viscera and relevant samples for chemical analysis and laboratory analysis. Medico-legal autopsy in cases of poisoning, preservation and despatch of viscera and relevant samples for chemical analysis and laboratory analysis, Simple bedside clinical tests to detect poison/drugs in a patient's body fluids.

- The correct technique of clinical examination in a suspected case of poisoning & preparation of medico-legal report in a simulated/ supervised environment & the technique in collecting, preserving and dispatch of the exhibits in a suspected case of poisoning.

Distribution of teaching hours in Forensic Medicine Including Toxicology:

	Second Professional MBBS Teaching Hours (Phase II)
Theory Lectures	15
Small group learning (Practical, Seminars)/ Tutorials, Integrated learning	30
Self-directed learning	05
Total	50

Paper wise distribution of syllabus:

Forensic Medicine & Toxicology – 1 Paper – All Syllabus

Text-Books to be referred:

1. Dr. K.S.N. Reddy- The essential of Forensic Medicine & Toxicology 34th Edition 2002. Published by-Jaypee Brothers Medical Publishers
2. Dr. C.K. Parikh- A text book of Medical Jurisprudence, Forensic Medicine & Toxicology,8th Edition 2019, CBS Publishers, Delhi.
3. Dr. Apurba Nandy- Principles of Forensic Medicine, 3rd Edition 2010(reprint 2019), New Central Book Agency(P) ltd. Kolkata
4. Text Book of Forensic Medicine – J.B. Mukherjee,5th edition,2018, edited by R. N. Karmakar, published by Academic Publishers, Kolkata
5. Toxicology at a Glance by Dr S.K. Singhal,9th edition 2017, published by National book house
6. Textbook of Forensic Medicine & Toxicology by V V Pillay, 19th edition 2019 published by EDUCA books

7. Modern Medical Toxicology-V V Pillay,4th edition 2013, Jaypee Brothers Medical Publishers
8. Principles of Forensic Medicine and Toxicology-Rajesh Bardale,2nd edition 2017, Jaypee Brothers Medical Publishers
9. Dr. Krishnan Vij- Text book of Forensic Medicine & Toxicology- Principles and Practice, 6th edition, 2014, Elsevier BI Churchill Livingstone, New Delhi, 6th edition, 2014
10. Modi 's Textbook of Medical Jurisprudence and toxicology- Edited by K Kannan 26th edition 2019, LexisNexis

Reference books:

1. Russell S. Fisher & Charles S. Petty: Forensic Pathology
2. Keith Simpson: Forensic Medicine
3. Jurgen Ludwig: Current Methods of autopsy practice.
4. Gradwohl – Legal Medicine
5. A Doctors Guide to Court – Simpson
6. Polson C.J.: The essentials of Forensic Medicine
7. Adelson, L.: The Pathology of Homicide.
8. Atlas of Legal Medicine (Tomro Watonbe)
9. Sptiz, W.U. & Fisher, R.S.: Medico-legal Investigation of Death.
10. A Hand Book of Legal Pathology (Director of Publicity)
11. Taylor's Principles & Practice of Medical Jurisprudence. Edited by A. Keith Mant, Churchill Livingstone.
12. Ratanlal & Dhirajlal, The Indian Penal Code; Justice Hidayatullah & V.R. Manohar
Ratanlal & Dhirajlal, The Code of Criminal procedure; Justice Hidayatullah & S.P. Sathe
13. Ratanlal & Dhirajlal, The Law of Evidence; Justice Hidayatullah & V.R. Manohar
14. Medical Law & Ethic in India – H.S. Mehta
15. Bernard Knight: Forensic Pathology
16. Code of medical ethics: Medical Council of India, approved by Central Government, U/S 33 (m) of IMC Act, 1956 (Oct 1970)
17. Krugman, W.M.: The human skeleton in legal medicine.
- 18. FE Camps, JM Cameron, David Lanham: Practical Forensic Medicine**

ASSESSMENT: PHASE I AND PHASE II

- Assessment will be in the form of formative assessment (conducted during the course of phase I) and summative assessment (conducted at the end of the Phase I)
- The formative assessment consists of the **internal assessment examinations** while the summative assessment consists of the **University examination**

Internal assessment (IA) examinations:

1. The performance of students in the foundation course will not contribute to the internal assessment marks.
2. There will be 3 internal assessment examinations conducted during academic year in Phase I and II. First internal assessment examination will be held in December, second internal assessment examination will be held in March and third internal assessment examination will be held in July.

I-Exam (December)
<ul style="list-style-type: none">• Theory (Max. marks) =100• Practical (Including 05 Marks for Journal&Log book) (Max. marks) = 50• Total Marks = 150
II-Exam (March)
<ul style="list-style-type: none">• Theory (Max. marks) =100• Practical (Including 05 Marks for Journal&Log book) (Max. marks) = 50• Total Marks = 150
III-Exam (July)
<ul style="list-style-type: none">• Theory (Max. marks) =200• Practical (Including 10 Marks for Journal&Log book) (Max. marks) = 100• Total Marks = 300

3. It is mandatory for the students to appear for all the three internal assessment examinations.
4. Two IA tests will also be conducted in Phase II for- Forensic Medicine and Toxicology, Community Medicine, General Medicine*, General Surgery** and Obstetrics and Gynaecology.

*General Medicine includes Psychiatry, Dermatology, Venereology and Leprosy and Respiratory Medicine including Tuberculosis.

****General Surgery includes Orthopaedics, Dentistry, Anaesthesiology and Radiodiagnosis.**

5. The Phase II will also have “end of posting” (EOP) examinations at each clinical posting including those of allied subjects
6. Internal assessment marks for theory and practical will be converted to out of 40 as below.

	Theory	Practical
First IA	100	50
Second IA	100	50
Third IA (Prelim)	200	100
Total	400	200
Internal assessment marks: Conversion formula (out of 40)	Total marks obtained divided by 10	Total marks obtained divided by 5
Eligibility to appear for final University examination (after conversion out of 40, individually in theory and practical)	16	16
Eligibility to appear for final University examination (after conversion out of 80, combined in theory and practical)	40	

7. Learners must secure at least 50% marks of the total marks (combined in theory and practical / clinical; not less than 40 % marks in theory and practical separately) assigned for internal assessment in a particular subject in order to be eligible for appearing at the final University examination of that subject.
8. Internal assessment marks will reflect as separate head of passing at the summative examination.
9. There will be only one additional examination for absent students (due to genuine reason) after approval by the Institutional Grievances Committee. It will be taken

after preliminary examination and before submission of internal assessment marks to the University

10. Day to day records and log book (including required skill certifications) will be given importance in internal assessment. Internal assessment will be based on competencies and skills. Completion of Log book as well as Journals with requisite signatures and stamps of teachers and Head of the Departments is mandatory in order to be eligible for appearing at the final University examination of that subject.

11. 1st Remedial internal assessment examination for students of phase I/

Phase II:

All the students who were unable to secure the necessary qualifying internal assessment marks (as specified earlier) will attempt to secure the necessary qualifying marks through the 1st remedial internal assessment examination for that phase. The 1st remedial internal assessment examination will be organized by the college before the summative examination of the affected students. The revised internal assessment marks (converted out of 40 each) of such students will be sent to the University immediately.

Remedial Examinations (Marks pattern)

- Theory (Max. marks) =200
- Practical (Including 10Marks for Journal&Log book) (Max. marks) = 100
- Total Marks = 300

12. Those students, who fail to secure qualifying internal assessment marks even after the 1st remedial internal assessment examination for their Phase, shall not be allowed to sit for the summative examination
13. Attendance requirements are 75% in theory and 80% in practical /clinical for eligibility to appear for the University (summative) examinations in that subject. 75% attendance in AETCOM module is required for eligibility for final examination in each professional year.

University examinations (Summative):

14. Summative assessment consists of University examinations. University Examinations for the Phase I shall be held at the end of first Professional training (1+12 months), in the subjects of Human Anatomy, Physiology and Biochemistry. A maximum number of four permissible attempts would be available to clear the first Professional University examination, whereby the first Professional course will have to be cleared within 4 years of admission to the said course. Partial attendance at any University examination shall be counted as an availed attempt.
15. Only those students having the qualifying internal assessment marks can attempt the University examination.
16. Marks distribution for the various subjects is given in the table below.

Subject	Number of papers	Written-Theory total marks	Practical /Orals total marks
Human Anatomy	2	200	100
Physiology	2	200	100
Biochemistry	2	200	100
Pharmacology	2	200	100
Pathology	2	200	100
Microbiology	2	200	100

17. A candidate shall obtain 50% marks in University conducted examination separately in Theory and Practical (practical includes: practical/ clinical and viva voce) in order to be declared as passed in that subject. Theory marks will be marks scored in the theory paper only and practical marks will consist of score in the practical examination and the score in the viva. (practical = practical/ clinical + viva)
18. In case of subjects where there are 2 papers, the learner must secure at least 40% marks in each of the papers and minimum of 50% marks in aggregate (sum of total of the 2 papers) to pass in theory in the said subject.
19. Internal assessment marks will not to be added to marks of the University examinations. Internal assessment marks will reflect as separate head of passing at the summative examination

20. **Supplementary University examination** shall be held within 45-90 days of declaration of results of first professional University examinations.
21. A **2ndremedial internal assessment examination will be held before supplementary examination.** Those students, who had failed to secure qualifying internal assessment marks even after the 1st remedial internal assessment examination, (and were therefore not allowed to sit for the summative examination) will appear for this 2ndremedial internal assessment examination.
22. Those students, who fail to secure qualifying internal assessment marks even after the 2ndremedial internal assessment examination, shall not be allowed to sit for the supplementary University examination
23. Following students will appear for the Supplementary examination:
- i. Those who did not pass the University examination
 - ii. The students who have secured at least 50% marks of the total marks (combined in theory and practical / clinical; not less than 40 % marks in theory and practical separately) assigned for internal assessment in a particular subject in the 2nd remedial internal assessment examination
 - iii. Any student who may have missed the University examination (due to illness or otherwise) but was otherwise qualifying for the University examination as per above given norms, with due permission of the concerned authority of the Medical College and University.
24. Passing criteria for the supplementary university examination will be same as that for the regular university examination.
25. The rules for those students who do not clear the supplementary examination and those candidates who were unable to secure the qualifying internal assessment marks even after 2nd remedial examination, will remain similar to the students admitted in next regular batch.