MBBS
CURRICULUM

(Revised with effect from 2019-2020 onwards)

PHASE I

Semester I & II

The Phase I subjects are Anatomy, Physiology, Biochemistry and Community Medicine. Train- ing in Community Medicine extends from the 1st Semester to the 7th Semester. During the 1st semester, Community Medicine classes will be held on all Saturdays for 12 weeks. Therefore the teaching schedule changes from the 13th week.

The teaching programme of the basic sciences Anatomy, Physiology and Biochemistry extends over 40 weeks, excluding the last 8 weeks set apart exclusively for the final examinations. There will be 232 teaching days with 7 hours of instruction, from 8 am to 4 P.M. everyday. Approximately 1628 teaching hours will be available. In actual practice this may be less as holidays are to be excluded. The distribution of teaching hours is given below.

Total Hours of Lectures/Practical/Innovative Sessions:

Subject	Lectur Hours	Practical/ Innovative Sessions-Hours	Total
Anatomy	258	392	**650**
Physiology	160	320	**480**
Biochemistry	80	160	**240**
Community Medicine	6 0		**60**

ANATOMY (U19MBB101)

Goal

The main aim of teaching Anatomy to undergraduate medical students is to provide comprehen- sive knowledge of gross and microscopic structures and development of the human body so as to understand the anatomical basis of various disease presentations, thus enabling them to practice medicine and communicate effectively.

Competencies

The Indian Medical Graduate will acquire the knowledge and skills necessary to attain the following competencies.

1. Identify the normal disposition, gross structure and clinically relevant inter-relationships of various structures in the human body and comprehend the functional correlations, and cross sectional anatomy, so as to apply the knowledge of the same in medical and surgical scenarios.
2. Identify, assign sides, state articulations and relevant attachments of all bones.
3. Mark the topography of clinically relevant structures on the living body and understand the contextual relevance of surface anatomy.
4. Should understand the principles of imaging techniques, and should be able to identify and locate structures in a given skiagram, CT scan etc.
5. Identify the microscopic structure of various tissues and organs in the human body and cor- relate the structure with the functions as a prerequisite for understanding their pathology in disease.
6. Should acquire basic knowledge of operating computers and should be able to make a powerpoint presentation for symposiums, seminars or conferences.
7. Demonstrate the ability to work as a team following professional etiquette and demeanour towards self, peers and guides/ facilitators.

Educational Objectives

A. Knowledge

At the end of first year, a graduating student should:

1. Be able to comprehend the structure, functions, and connections of the nervous system to analyse the integrative and regulative functions of organs and organ systems and should be able to localize the site of lesions according to deficits.
2. Have knowledge of basic principles of embryology and stages involved in the development of the organs and organ systems from the time of conception till birth so as to compre- hend the developmental basis of occurrence of major variations, abnormalities and con- genital anomalies.
3. Recognize the critical stages of normal human development and the effects of

common teratogens, genetic mutations and environmental hazards on the same.

4. Comprehend the basic principles of genetic inheritance, karyotyping genetic counselling and have basic knowledge of common genetic syndromes.
5. Have knowledge of the anatomical basis of common clinical procedures like injections, bi- opsies and diagnostic/interventional procedures.
6. Comprehend the sacredness of human body donation, follow bioethical principles and ac- cord the cadaver the dignity and respect deserved.
7. Understand the principles of handling bio hazardous materials and policy of biomedical waste disposal.
8. Be aware as to how to handle a light microscope proficiently

B. Skills

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

a) Localize pulsations of important arteries and also structures against which pressure can be applied in case of bleeding from a particular artery.
b) b) To elicit superficial and deep reflexes, muscle power, and movements of joints.
c) c) To locate the site of lumbar puncture, sternal puncture, pericardial tapping, liver biopsy etc.
d) d) To locate veins for venipuncture.
e) e) To locate sites for emergency tracheostomy.

C. Integration

Through horizontal integration with other basic sciences departments, the students should be able to comprehend the regulation and integration of functions of the organs and systems in the hu- man body and through vertical integration with various clinical departments, interpret the anatomi- cal basis of disease processes.

Course Outcomes

CO1: Attain comprehensive knowledge of gross and microscopic structures in the human body.

CO2: Attain comprehensive understanding of development of the human body.

CO3: Have an understanding of the anatomical basis of various disease presentations

CO4: Be able to use the anatomical knowledge in the practice of medicine.

CO5: Competency to identify the normal disposition, gross structure and clinically relevant inter- relationships of various structures in the human body and comprehend the functional correla- tions, and cross sectional anatomy, so as to apply the knowledge of the same in medical and surgi- cal scenarios.

CO6: Ability to dentify, assign sides, state articulations and relevant attachments of all bones.

CO7: Ability to mark the topography of clinically relevant structures on the living

body and un- derstand the contextual relevance of surface anatomy.

CO8: Knowledge of the principles of imaging techniques, and should be able to identify and lo- cate structures in a given skiagram, CT scan etc.

CO9: Competence to identify the microscopic structure of various tissues and organs in the hu- man body and correlate the structure with the functions as a prerequisite for understanding their pathology in disease.

CO10: Ability to work as a team following professional etiquette and demeanor towards self, peers and guides/ facilitato

I. Syllabus

Details of the course

Duration : - 2 semesters (each of 120 working days)

Semester I - 24weeks

Semester II - 16weeks

Total number of hours : 650

Lectures : 236 hours

Integrated teaching : 22 hours

Symposiums/group discussion : 38 hours

Practicals (including innovative sessions) :328hours

Formative assessment : 26 hours approximately

Sl. No.	Schedule of Lectures	Hours
I	**Introduction/General Anatomy**	**14 hrs**
	1. Introduction to Anatomy	**1**
	2. Introduction to Anatomical Nomenclature	**1**
	3. Skin and fascia	**1**
	4. Cardiovascular system	**1**
	5. Lymphatic system	**1**
	6. Nervous system	**2**
	7. Muscular system	**1**
	8. Introduction to skeleton and classification of bones	**1**
	9. Osteology - Terminology	**1**
	10. Parts of a growing long bone and blood supply	**1**
	11. Ossification of bones	**1**
	12. Joints	**2**
II	**Embryology (General & Systemic)**	**30 hrs**
	1. Introduction to embryology	**1**
	2. Spermatogenesis	**1**
	3. Oogenesis	**1**
	4. Menstrual cycle	**1**

	5. Fertilization	1
	6. Implantation and cleavage	1
	7. Formation of germ layers to folding of embryonic disc	3
	8. Placenta and membranes	1
	9. Twinning	1
	10. Teratology	1
	11. Development of pharyngeal arches	1
	12. Development of pharyngeal pouches	1
	13. Development of face	2
	14. Development of CNS	1
	15. Development of respiratory system	1
	16. Development of heart	3
	17. Pharyngeal arch arteries	1
	18. Development of veins	1
	19. Foetal circulation	1
	20. Development of foregut	1
	21. Development of midgut	1
	22. Development of hindgut	1
	23. Development of kidney, ureter, urinary bladder	1
	24. Development of genital system	2
	Integrated Teaching	**2 hrs**
	Departments - Fetal Medicine, Genetics, Neonatology, Paediatric Surgery, Paediatric Cardiology	2
III	**Upper Limb**	**21 hrs**
	1. Pectoral region	1
	2. Mammary gland	1
	3. Axilla	1
	4. Brachial plexus	1
	5. Scapular region	1
	6. Shoulder joint	1
	7. Front of arm	1
	8. Back of arm	1
	9. Cubital fossa	1
	10. Front of forearm	1
	11. Palm	2
	12. Palmar spaces	1
	13. Back of forearm	1
	14. Elbow joint and radio- ulnar joints	1
	15. Wrist and first carpometacarpal joint	1
	16. Median and ulnar nerves	2
	17. Radial and axillary nerves	1

	18. Venous and lymphatic drainage of upper limb	**1**
	19. Brachial plexus injuries	**1**
	20. X-Rays of upper limb	**1**
	Integrated Teaching	**2 hrs**
	Departments – Radiology & Orthopaedics	**2**
	Symposiums/Group Discussions	**5 hrs**
	Brachial plexus injuries	**1**
	Nerves of upper limb	**1**
	Mammary gland	**1**
	Shoulder joint	**1**
	Intrinsic muscles of hand	**1**
IV	**Lower Limb**	**17 hrs**
	1. Femoral triangle	**1**
	2. Medial compartment of thigh	**1**
	3. Gluteal region	**2**
	4. Back of thigh	**1**
	5. Popliteal fossa	**1**
	6. Hip joint	**1**
	7. Front of leg & dorsum of foot	**1**
	8. Lateral compartment of leg	**1**
	9. Back of leg	**1**
	10. Venous and lymphatic drainage of lower limb	**1**
	11. Knee joint	**2**
	12. Ankle and subtalar joints	**1**
	13. Sole	**1**
	14. Arches of foot	**1**
	15. X-Rays of lower limb	**1**
	Integrated Teaching	**2 hrs**
	Departments – Radiology & Orthopaedics	**2**
	Symposiums/Group Discussions	**5 hrs**
	1. Femoral hernia	**1**
	2. Movements of hip joint	**1**
	3. Movements of knee joint	**1**
	4.Subtalar joints	**1**
	5. Venous drainage of lower limb	**1**
V	**Abdomen**	**22 hrs**
	1. Anterior abdominal wall	**1**
	2. Rectus sheath	**1**
	3. Inguinal canal	**1**
	4. Testis and spermatic cord	**1**

	6. Subphrenic spaces	1
	7. Stomach - Coeliac trunk	1
	8. Small intestine and superior mesenteric artery	1
	9. Large intestine, Caecum, appendix	1
	10. Duodenum	1
	11. Portal vein and porto- caval anastomosis	1
	12. Pancreas	1
	13. Liver	1
	14. Extrahepatic biliary apparatus	1
	15. Suprarenal gland	1
	16. Kidney	1
	17. Ureter	1
	18. Diaphragm including development	1
	19. Posterior abdominal wall	**2**
	20. X-Rays of abdomen	1
	Integrated Teaching	**5 hrs**
	Departments - General Surgery, OBG, Radiology, Urology, GI Sur- gery & Gastroenterology Physiology and Biochemistry	**5**
	Symposiums/Group Discussions	**5 hrs**
	1. Inguinal canal	1
	2. Rectus sheath	1
	3. Diaphragm	1
	4. Subphrenic spaces	1
	5. Prostate	1
VI	**Pelvis and Perineum**	**11 hrs**
	1. Introduction to perineum and perineal pouches	1
	2. Ischiorectal fossa	1
	3. Ovary and uterine tube	1
	4. Uterus	1
	5 Ureter	1
	6. Urinary bladder	1
	7. Prostate	1
	8. Urethra	1
	9. Anal canal.	1
	10. Pelvic diaphragm	1
	11. Vessels and nerves of pelvic cavity	1
	Integrated Teaching	**1 hrs**
	Departments - OBG, General surgery, Radiology, Urology,	1

VII	**Thorax**	**12 hrs**
	1. Introduction to thoracic wall & typical intercostal space	**1**
	2. Pleura	**1**
	3. Lung	**1**
	4. Introduction to mediastinum and superior mediastinum	**1**
	5. Pericardium	**1**
	6. Heart- surface features	**1**
	7. Right atrium	**1**
	8. Blood supply of heart	**1**
	9. Posterior mediastinum	**2**
	10. Thoracic sympathetic chain	**1**
	11. X-Rays of thorax	**1**
	Integrated Teaching	**2 hrs**
	Departments - C.V.T.S, Pulmonology, Cardiology & Radiology, Physiology and Biochemistry	**2**
	Symposiums/Group Discussions	**6 hrs**
	1. Typical intercostal space	**1**
	2. Heart-External features, blood supply, interior of chambers	**1**
	3. Lungs	**1**
	4. Oesophagus	**1**
	5. Azygos system of veins	**1**
	6. Superior mediastinum	**1**
VIII	**Head and Neck**	**39 hrs**
	1. Scalp	**1**
	2. Superficial dissection of face	**1**
	3. Deep cervical fascia	**1**
	4. Posterior triangle	**2**
	5. Suboccipital triangle	**1**
	6. Submental and digastric triangles	**1**
	7. Carotid and muscular triangles	**2**
	8. Hypophysis cerebri	**1**
	9. Dural folds	**1**
	10. Dural venous sinuses , cavernous sinus in detail	**1**
	11. Midline structures of neck, thyroid gland	**1**
	12. Scalenous anterior and its relations, subclavian artery	**2**
	13. Extraocular muscles	**1**
	14. Vessels and nerves of orbit	**1**
	15. Parotid gland	**1**
	16. Muscles of mastication	**1**
	17. Mandibular nerve	**1**
	18. Maxillary artery	**1**
	19. Temporomandibular joint	**1**

	20. Submandibular region	**1**
	21. Introduction to pharynx and nasopharynx	**1**
	22. Oropharynx and palatine tonsil	**1**
	23. Soft palate	**1**
	24. Nasal cavity, nasal septum	**1**
	25. Lateral nasal wall	**1**
	26. Maxillary nerve and pterygopalatine ganglion	**1**
	27. Paranasal air sinuses	**1**
	28. Larynx	**1**
	29. Tongue	**1**
	30. Middle ear	**2**
	31. Internal ear	**1**
	32. Eyeball	**2**
	33. Lymph nodes of head and neck	**1**
	34. X-Rays of head and neck	**1**
	Integrated Teaching	**3 hrs**
	Departments - Radiology, ENT, Neurosurgery, Ophthalmology, Head & Neck Surgery Physiology	**3**
	Symposiums/Group Discussions	**8 hrs**
	1. Cranial nerves-3,4,5,6 &7	**5**
	2. Cervical fascia	**1**
	3. Hyoglossus and its relations	**1**
	4. Nasal cavity	**1**
IX	**Brain and Spinal Cord**	**37 hrs**
	1. Introduction to brain	**1**
	2. Spinal cord – External features and blood supply	**1**
	3. Spinal cord – Internal features	**1**
	4. Ascending tracts of spinal cord and brain stem	**2**
	5. Descending tracts of spinal cord and brain stem	**2**
	6. Meninges of brain and cisterns	**1**
	7. Medulla	**2**
	8. Pons	**1**
	9. Midbrain	**1**
	10. Cerebellum	**1**
	11. 4^{th} ventricle	**1**
	12. Cerebrum – Sulci, gyri	**2**
	13. Cerebrum - Functional areas	**2**
	14. White matter of cerebrum	**1**
	15. Internal capsule	**1**
	16. 3^{rd} ventricle & Interpeduncular fossa	**1**

	17. Lateral ventricle	1
	18. Thalamus	1
	19. Metathalamus, epithalamus	1
	20. Basal ganglia	1
	21. Arterial supply of cerebrum	1
	22. Venous drainage of brain	1
	23. Oculomotor Nerve	1
	24. 4th and 6th cranial nerves	1
	25. 9th cranial nerve	1
	26. 7th cranial nerve	2
	27. 11th and 12th cranial nerve	1
	Integrated Teaching	**3 hrs**
	Departments –Medicine, Neurology, Neurosurgery, Radiology &Surgery Physiology	3
	Symposiums/Group Discussions	**7 hrs**
	1. Spinal Cord—Cross section – Cervical, Thoracic, Lumbar & Sac-ral levels	1
	2. Brain (i) Mid sagittal section, (ii) Horizontal at I.V. foramen	1
	3. Cross section of brain (iii) At anterior commissure, (iv) At mammillary body	1
	4. Medulla levels (i) Pyramidal decussation, (ii) Sensory decussation & (iii) Inferior olivary nucleus	2
	5. Pons levels (i) Upper part, (ii) Lower part	1
	6. Midbrain levels (i) Superior colliculus, (ii) Inferior colliculus	1
X	**Histology (General & Systemic)**	**30 hrs**
	1. Simple epithelium	1
	2. Stratified epithelium	1
	3. Connective tissue	1
	4. Cartilage	1
	5. Bone	1
	6. Muscle tissue	1
	7. Nervous tissue	2
	8. Blood vessels	1
	9. Lymph node and thymus	1
	10. Spleen and tonsil	1
	11. Skin	1
	12. Salivary glands	1
	13. General plan of GIT, Oesophagus	1
	14. Tongue	1
	15. Stomach - Fundus, pylorus	1
	16. Duodenum, Jejunum, Ileum	1
	17. Large intestine, Appendix	1

	18. Liver, gall bladder	**1**
	19. Pituitary and thyroid gland	**1**
	20. Suprarenal gland and Pancreas	**1**
	21. Trachea and lung	**1**
	22. Kidney, ureter, urinary bladder	**1**
	23. Testis, epididymis	**1**
	24. Prostate, Vas deference	**1**
	25. Uterus, uterine tube	**1**
	26. Ovary, Mammary gland	**1**
	27. Placenta, umbilical cord	**1**
	28. Retina, Cornea	**1**
	29. Cerebrum, Cerebellum	**1**
	Horizontal Integration Physiology	**2 hrs**
XI	**Genetics**	**3 hrs**
	1. Genetics	**3**

Sl. No	Schedule of Practical/Demonstrations	Hours
I	**Upper Limb**	**37 hr**
	1. Introduction to skeleton and classification of bones	**2**
	2. Osteology - Clavicle, Sternum	**2**
	3. Osteology - Scapula, Humerus	**2**
	4. Pectoral region	**2**
	5. Axilla	**2**
	6. Brachial plexus	**2**
	7. Scapular region	**2**
	8. Front of arm, cubital fossa	**4**
	9. Osteology – radius, ulna	**2**
	10. Front of forearm	**2**
	11. Palm	**4**
	12. Osteology – Skeleton of hand	**1**
	13. Back of arm	**2**
	14. Back of forearm	**2**
	15. Joints of upper limb	**4**
	16. X- rays & Surface markings	**2**
II	**Lower Limb**	**34 hrs**
	1. Introduction to bones of lower limb, hip bone	**3**
	2. Femur	**2**
	3. Front of thigh, Femoral triangle	**4**
	4. Medial compartment of thigh	**2**

	5. Gluteal region	**4**
	6. Back of thigh	**2**
	7. Osteology –Tibia, patella	**2**
	8. Osteology – Fibula	**1**
	9. Popliteal fossa	**2**
	10. Back of leg	**2**
	11. Front of leg & Dorsum of foot	**4**
	12. Lateral compartment of leg	**2**
	13. Osteology -Skeleton of foot	**2**
	14. X-rays & Surface markings	**2**
III	**Abdomen**	**45 hrs**
	1. Introduction to pelvis, sacrum, lumbar vertebrae	**4**
	2. Anterior abdominal wall	**2**
	3. Rectus sheath	**2**
	4. Inguinal canal	**3**
	5. Testis and spermatic cord	**2**
	6. Peritoneal folds	**2**
	7. Subphrenic spaces	**2**
	8. Stomach and coeliac trunk	**2**
	9. Small intestine and superior mesenteric artery	**2**
	10. Caceum and appendix	**2**
	11. Large intestine and inferior mesenteric artery	**2**
	12. Duodenum	**2**
	13. Pancreas	**2**
	14. Liver	**2**
	15. Extrahepatic biliary system	**2**
	16. Suprarenal gland	**2**
	17. Kidney	**2**
	18. Ureter	**2**
	19. Diaphragm	**2**
	20. Posterior abdominal wall	**2**
	21. X-rays & Surface markings	**2**
IV	**Pelvis, Perineum**	**18 hrs**
	1. Osteology of sacrum, bony pelvis	**2**
	2. Ischiorectal fossa	**2**
	3. Uterine tube and ovary	**2**
	4. Uterus	**2**
	5. Urinary bladder	**2**
	6. Prostate	**2**
	7. Pelvic diaphragm	**2**

	8. Vessels and nerves of pelvis	**2**
	9. Superficial and deep perineal pouches	**2**
V	**Thorax**	**21 hrs**
	1. Osteology of thorax	**2**
	2. Thoracic wall including osteology in detail	**4**
	3. Lungs & pleura	**2**
	4. Pericardium	**2**
	5. Heart including surfaces, chambers & blood supply	**4**
	6. Mediastinum	**2**
	7. Posterior mediastinum	**3**
	8. X-rays & Surface markings	**2**
VI	**Head and Neck**	**85 hrs**
	1. Introduction to skull	**1**
	2. Norma verticalis, norma occipitalis	**2**
	3. Scalp	**2**
	4. Norma frontalis	**2**
	5. Superficial dissection of face	**2**
	6. Posterior triangle	**4**
	7. Osteology – mandible	**2**
	8. Osteology – cervical vertebrae, hyoid bone	**2**
	9. Suboccipital triangle	**2**
	10. Submental triangle	**2**
	11. Digastric triangle	**2**
	12. Carotid and musclular triangle	**4**
	13. Cranial fossa	**6**
	14. Dural folds	**2**
	15. Dural venous sinuses	**2**
	16. Midline structures of neck	**2**
	17. Thyroid gland	**2**
	18. Scalenous anterior and its relations , subclavian artery	**2**
	19. Extraocular muscles	**2**
	20. Orbit-vessels and nerves	**2**
	21. Parotid gland	**2**
	22. Norma Lateralis	**2**
	23. Muscles of mastication	**2**
	24. Infratemporal fossa	**3**
	25. Submandibular region	**2**
	26. Pharynx	**2**
	27. Norma basalis	**4**
	28. Nasal septum	**2**

	1. Lateral nasal wall	**2**
	2. Larynx	**2**
	3. Tongue	**2**
	4. Middle ear	**2**
	5. Eyeball	**2**
	6. Parietal andoccipital bone	**2**
	7. Frontal, Maxilla	**2**
	8. Sphenoid & Temporalbone	**2**
	9. Foetal skull	**1**
	10. X-Rays & Surface markings of head and neck	**2**
VII	**Brain**	**26 hrs**
	1. Spinal cord	**2**
	2. Medulla	**1**
	3. Pons	**1**
	4. Midbrain	**1**
	5. Cerebellum	**1**
	6. 4th ventricle	**2**
	7. Cerebrum – sulci ,gyri and functional areas	**4**
	8. White matter of cerebrum	**2**
	9. Lateral ventricle	**2**
	10. Third ventricle	**2**
	11. Interpeduncular fossa & circle of willis	**2**
	12. Thalamus, metathalamus	**2**
	13. Arterial supply of cerebrum	**2**
	14. Brain sections	**2**
VIII	**Histology (General & Systemic)**	**60 hrs**
	1. Simple epithelium	**2**
	2. Stratified epithelium	**2**
	3. Connective tissue	**2**
	4. Cartilage	**2**
	5. Bone	**2**
	6. Muscle tissue	**2**
	7. Nervous tissue	**4**
	8. Blood vessels	**2**
	9. Lymph node and thymus	**2**
	10. Spleen and tonsil	**2**
	11. Skin	**2**
	12. Salivary glands	**2**
	13. General plan of GIT, Oesophagus	**2**
	14. Tongue	**2**

	15. Stomach - Fundus, pylorus	**2**
	16. Duodenum, Jejunum, Ileum	**2**
	17. Large intestine, Appendix	**2**
	18. Liver, gall bladder	**2**
	19. Pituitary and thyroid gland	**2**
	20. Suprarenal gland and Pancreas	**2**
	21. Trachea and lung	**2**
	22. Kidney, ureter, urinary bladder	**2**
	23. Testis, epididymis	**2**
	24. Prostate, Vas deference	**2**
	25. Uterus, uterine tube	**2**
	26. Ovary, Mammary gland	**2**
	27. Placenta, Umbilical cord	**2**
	28. Retina, Cornea	**2**
	29. Cerebrum,Cerebellum	**2**
IX	**Genetics Chart Discussion**	**2 hrs**

.

Distribution or Marks for Internal Assessment and University Examinations.

University Examination					Internal Assessment		
Theory-I	Theory-II	Viva	Practical	Total	Theory	Practical	Total
50	50	20	40	160	20	20	40

Total final marks = University examination marks + internal assessment marks = 160 +40= 200 marks

Ist MBBS Degree Examination in Anatomy (1st Professional Examination in Anatomy). Theory – Division of Topics

Paper I (50 Marks)	Paper II (50 Marks)
Section -A Abdomen, pelvis & perineum -25 marks (Including relevant embryology and histology) **Section -B** Lower limb - 12 marks General embryology } General anatomy } 13 marks General histology }	**Section -A** Head & Neck, Brain & Spinal cord - 28 marks * Including relevant embryology & histology **Section -B** Upper limb & Thorax - 20- marks Genetics - 3marks * Including relevant embryology & histology from the above topics.

Distribution of Practical Topics and Marks

Practical No.	Name of the practical	Marks	
Practical - I	**Gross Anatomy/Dissection**		
	a) Spotting – 10 numbers		**10**
	b) Discussion – 2 prosected specimens		**10**
	1) Above diaphragm	**5**	
	2) Below diaphragm	**5**	
Practical - II	**Histology**		
	a) Spotting – 09 numbers + 1 genetics card		**10**
	b) Discussion – 2 slides		**10**
	1) General histology	**5**	
	2) Systemic histology	**5**	
	Grand Total		**40**

Viva Voce : Total 20 marks added to theory score .
Four stations - 5 marks each.

1. Osteology
2. Embryology
3. Radiology
4. Surface Anatomy

Items for Histology Practicals:

1. Heamtoxylin and Eosin pencils
2. Histology Record

Recommended Books				
Name of the Books		**Author**	**Edn**	**Publishers**
Gross Anatomy				
Textbooks:				
*	Cunningham's Manual of Practical Human Anatomy Regional & Applied - Vol: I, II & III*	G.J. Romanes	Latest	Oxford Medical Publications
*	Clinical Anatomy for Medical Students*	B.D. Chaurasia	Latest	CBS Publishers & Distributors
Reference Books:				
	Clinical Anatomy for Medical Students	Richard Snell A. Halim	Latest	Lippincott Williams & Wilkins
	Clinically Oriented Anatomy	Keith L. Moore	Latest	Modern Publishers, New Delhi
	Clinical Anatomy (A problem solving approach) –Volume- I & II	Neeta V.Kulkarni	Latest	Jaypee publishers
	Essentials of Human Anatomy - 3 Volumes	A.K.Dutta	Latest	Lippincott Williams &Wilkins
	Human Anaomy- Volume I,II & III.	Inderbir singh	Latest	Current Book International
	Textbook of Anaomy-3 volumes	Peter L. Williams	Latest	Jaypee
	Gray's Anatomy	Anne M. R. Agur	Latest	Churchill Living-stone
	Atlas of Human Anatomy	Frank H.Netter	Latest	Elsevier
	Gray's Anatomy for Students	Richard L. Drake, A.Wayne Vogi, AdamW.M. Mitchell	Latest	Elsevier
Embryology				
Textbook:				
*	Human Embryology*	Inderbir singh	Latest	Macmillon
Reference Books:				
	Langman's Medical Embryology	T.W.Sadler	Latest	Lippincott Wil-liams &Wilkins
	The Developing human clinically oriented embryology	Keith L. Moore K. V.N. Persaud	Latest	Elsevier
Neuro Anatomy				
Textbook:				
*	Text book of Human Neuro Anatomy*	I.B. Singh	Latest	Jaypee
Reference Books:				

	Clinical Neuroanatomy for Medical Students	Richard Snell	Latest	Lippincott Williams & Wilkins
	Neuro Anatomy Textbook	Vishram Singh	Latest	Elsevier
Histology				
Textbook:				
*	Histology*	I.B. Singh	Latest	Jaypee
Reference Books:				
	Atlas of Histology with Functional Correlations	De Fiore	Latest	Lippincott Williams & Wilkins
	Histology a Text and Atlas	Michael H.Ross Edward J Reith	Latest	Lippincott Williams & Wilkins

***The students need to buy ONLY the books marked**

HUMAN PHYSIOLOGY (U19MBB102)

GOAL

The broad goal of teaching Physiology for undergraduate students aims at providing the student

1. Comprehensive knowledge of the normal functions of all organ systems of the body.
2. Facilitate an understanding of the physiological basis of health and disease.
3. Understand basic biophysical principles involved in functioning of body organs in nor- mal and diseased conditions

COMPETENCIES

The Indian Medical Graduate will acquire the knowledge and skills necessary to attain the follow- ing competencies.

Core competencies

- Ability to explain the normal functioning of all organs and organ systems in human body and its alterations in diseased state, co relating the same with classical clinical fea- tures and outline the basic principles of management.
- Ability to perform detailed clinical examination of each system in a systematic manner and interpret the findings.
- Ability to accurately measure blood pressure in humans.
- Ability to perform all basic haematology laboratory tests and interpret the results and outline the possible causes for the abnormal results.
- Ability to draw and explain normal recordings of ECG, Spirogram, Audiogram, Stetho- graphy, Perimetry, Physiograph and interpret basic abnormalities.
- Draw and explain normal skeletal muscle and cardiac muscle graphs and variations in different physiological states.

Non core competencies

- Ability to explain the technical aspects of all lab tests in haematology and principles underlying the test.
- Ability to explain how to perform human physiology experiments like ECG, Spi- rogram, Audiogram, Stethography, Perimetry, Physiograph.

- Ability to explain method of recording of amphibian skeletal and cardiac muscle graph.

OBJECTIVES

Knowledge

- Outline the structure and function of cell membrane (briefly) and the physiological role of different organelles.
- To explain functional anatomy of all organs and organ systems, specific functions of each and the role in homeostasis.
- Interactions of different organ system for well co-ordinated total body functions (maintenance of mileu interior)
- Outline the basic physiological responses and adaptations to exercise, altitude and gravitational forces.

Skills

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

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

Integration

Minimum of 6 vertical integration sessions per year and horizontal integration and when feasi- ble.

Course Outcomes

CO1: Ability to describe the structure of cell membrane with reference to ion channels. Ho- meostasis, Transport across cell membrane and Bioelectric potentials

CO2: Ability to discuss the classification of muscles-Morphology of skeletal muscle, Mecha- nisms of muscle contraction

CO3: Ability to explain the Morphology and properties of a neuron. Neuroglia, Action poten- tial, Nerve injuries.

CO4: Ability to discuss the Body fluid compartments, Homeostasis, Plasma proteins, RBC, WBC, Platelets, Coagulation of Blood, Blood Group, Lymph and Tissue fluid.

CO5: Ability to explain Mechanism of Breathing, surfactant. Ventilation, Pulmonary Circula- tion, Transport of gases, Regulation of respiration, Hypoxia, exercise, artificial respiration

CO6: Ability to describe Functional anatomy of heart and blood vessels, Properties of Cardiac muscle, Cardiac cycle, Normal ECG, Cardiac output, .Haemodynamics. Blood pressure, Re- gional circulation,. Shock.

CO7: Ability to discuss organisation of nervous system and functions. Synapse, Reflex action. Sensory system, Motor System, and higher functions of brain.

CO8: Ability to describe the physiology of vision, audition, smell and taste

CO9: Ability to discuss the secretory and motor functions of gastrointestinal tract

CO10: Ability to explain the role of kidney in formation of urine, regulation of pH and body fluid volume and also clinical implications

CO11: Ability to describe the mechanism of action, functions and abnormalities in secretion of endocrine glands.

CO12: Ability to describe the development of male and female characteristics, hormonal changes, menstrual cycle, fertilization, pregnancy and contraceptive methods.

CO13: Ability to perform common hematological tests and interpret the results.

CO14: Ability to perform common human physiology experiments and interpret the results

CO15: Ability to draw amphibian skeletal and cardiac muscle graphs and discuss the physio- logical basis.

Teaching Schedule

Duration of the Course: 2Semesters

Teaching Hours

Total teaching hours 480
Lectures : 160 Hrs. Practicals 320
Innovative sessions* : Part of practicals
(*Tutorials, seminars, structured discussion, integrated teaching, formative evaluation and revision)

Schedule of Lectures

Topic

1. General and Nerve-Muscle Physiology **12 Hr**

Structure of cell membrane with reference to ion channels. Transport across cell membrane, sim- ple diffusion, facilitated diffusion, uniport, antiport, primary active transport, secondary active transport, endocytosis, exocytosis. Bioelectric potentials-RMP, Action potential- definition, ionic basis, measurement.

2. Nerve Physiology

Morphology and properties of a neuron. Stimulus-definition & types, Neuroglia- classi- fication and functions – Action potential, Ionic basis, measurement and properties (monophasic and bi - phasic APs). Propagation of action potential. Conduction of im- pulses in Myelinated and unmyelinated nerve fibres. Velocity of conduction of nerve im- pulses. Classification of nerve fibres. The peripheral nerve. Compound action potential. Nerve injuries. Degeneration and regeneration of nerve fibres.

Muscle Physiology

Classification of muscles-Morphology of skeletal muscle, Mechanisms of muscle contrac- tion- Excitation, Contraction coupling, Sliding filament mechanism, Changes during muscle contraction- Chemical , Thermal, Mechanical.

Types of contraction: Relationship between length and tension during contraction, Effect of load etc., Properties of skeletal muscle. [(simple muscle twitch, effect of two suc- cessive stimuli, beneficial effect, tetanus, fatigue, fasciculation and fibrillation–(to be stud- ied in practicals)], Neuro muscular junction -in detail including drugs affecting it and dis- eases. Cardiac muscle - basic structure & comparison with skeletal muscles. (Details to be taken along with CVS). Smooth muscles structure, innervation, properties neuro- muscular transmission, mechanism of contraction, plasticity, tonus.

3. Haematology **18 Hr**

Homeostasis : Body fluid compartments. Blood– normal volume, composition and func- tions

Plasma proteins: Types, quantity, functions, applied aspects.

Red blood cells : Morphology, Count & its variations, functions, ESR and

PCV Defini- tion normal values, factors affecting, variations. Fragility of RBC. Haemoglobin – out- line of normal basic structure, derivatives, functions, Haematological indices. Erythro- poiesis - stages, factors regulating, life span of RBC and its destruction - Reticulo- endothelial system (mention only) Anaemias - Definition, Classification. Physiological ba- sis of anaemias (very briefly) Iron deficiency anaemia, Pernicious anaemia, Aplastic anaemia, Haemolytic anaemia, polycythaemia, Jaundice (briefly).

White blood corpuscles: Morphology, life span, classification and functions of different WBC's, normal count and variations of WBC's, Agranulocytosis, leukemias (mention only) Leucopoiesis. Tissue macrophage system

Immunity : Types and mechanism of immunity, role of different WBCs in immune mecha- nism, mention important abnormalities, e.g.: AIDS.

Platelets : Structure, normal count, properties and functions, Abnormalities, Thrombopoiesis. Haemostasis mechanisms.

Coagulation of Blood : clotting factors, intrinsic and extrinsic system of clotting, Tests for clotting, Anti-coagulants. Factors preventing intravascular clotting. Basis of Haemorrhagic disorders.

Blood Group : ABO system. Landsteiner's laws, method of determination. Importance, Rh blood group, Rh incompatibility, Erythroblastosis foetalis. Other blood group systems. Inheritance of blood group. Blood transfusion, indications, precautions, Complications of incompatible blood transfusion. Blood banking, preservation injuries Lymph and Tissue fluid formation, Starling hypothesis, Circulation and functions, oedema.

4. Respiratory System 16 Hrs

General Organisation

Structure and Functions of Respiratory tract. Mechanics of respiration.
Mechanism of Breathing : Pressure changes in the pleural cavity and lungs. Spirometry. Lung volumes and capacities, Pressure volume relationship, compliance, work of breath- ing, Airway resistance, Bronchial tone (role) Surface tension of the lung and surfactant. Ap- plication of Law of Laplace in alveolar stability.
Pulmonary Ventilation & **Alveolar Ventilation:** Dead space volume and measure- ment. Pulmonary Circulation: Special features, Ventilation – perfusion ratio. Respiratory membrane – Diffusion of gases and factors affecting it. Transport of O_2 & CO_2. Factors affecting the transport of O_2 & Control of respiration – Neural and chemical.
Hypoxia: Definition, classification. Effects of hypoxia. Mountain sickness. Acclimatiza- tion at high altitude, Therapeutic uses of O_2.
Disturbance in Respiratory Functions: Periodic breathing, Apnoea and breath holding, Dyspnoea, Orthopnoea, hyperpnoea, Decompression sickness, cyanosis, asphyxia. Respira- tory changes during exercise, artificial respiration (mouth-to-mouth breathing, Mechanical methods ventilators briefly.)

Non Respiratory Functions of Lung:

5. Cardiovascular System 20 Hrs

Functional anatomy of heart and blood vessels. Properties of cardiac muscles, conduct- ing system of heart, original spread of cardiac impulse.
Cardiac cycle - Events of cardiac cycle, pressure changes in ventricle, atria, jugular vein, aorta and pulmonary artery, volume changes in ventricle, heart sounds, murmurs, cardiac catheterization (principle only), arterial pulse, Echocardiography (principle only).

Normal ECG - waves, segments, leads, classical changes in myocardial infarction, arrhyth- mias, heart block (mention only).
Cardiac output - Normal values and regulation through stroke volume and heart rate.
Blood pressure - systolic pressure, diastolic pressure, pulse pressure, mean arterial pres- sure, measurement (details in practical class), determinants, regulation of blood pressure (short term, long term), hypertension.

Regional circulation - coronary, cerebral, cutaneous, splanchnic.
Shock - definition, classification, pathophysiology, treatment (principles only). Effect of exercise and g'forces on CVS.

Haemodynamics: physical principles governing blood flow in heart and blood vessels.
Foetal Circulation - Brief outline only.

6. Renal System **10 Hrs**

Role in homeostasis, role as an endocrine organ. Functional anatomy, Renal circulation, special features, Renal blood flow, regulation, measurement. Glomerular filtration: Defini- tion, measurement, calculation, normal value, Factors governing GFR, Filtration fraction. Tubular reabsorption – general mechanisms, reabsorption of sodium & glomerulo- tubular balance, glucose reabsorption, Tubular maximum, renal threshold & splay in glu- cose titration curve, water reabsorption and concentration mechanism in urine forma- tion, Tubular secretion of K+ & H+ ions, Acidification of urine and its significance, buffers in urine. Urinary bladder : Innervation Cystometrogram (mention), micturitione flex and its higher control, abnormal bladder function. Disorders of renal function. Mention normal and abnormal constituents of urine & basis of albuminuria, Diuretics, Artificial Kidney & Dialysis (Mention principle only)

7. Skin and Temperature Regulation **1 Hr**

Biophysics (to be taken along with the relevant systems): Physical principles of transport across cell membranes and across capillary wall. Bio potentials. Physical principles gov- erning flow of blood in heart and blood vessel; Also physical principles governing flow of air in air passages.

8. Gastrointestinal System: **11 Hrs**

Functional Anatomy, Enteric nervous system, General principles of exocrine secretions. Composition, functions and regulation of Salivary secretion, Gastric secretion, Pancreatic secretion, Intestinal secretion, Biliary secretion. Functions of gall bladder. Gastric acid se- cretion and its regulation in detail, Gastric mucosal barrier, peptic ulcer- Physiological basis of genesis & management.

Endocrine functions of G. I. tract.

Motor Functions of G. I. Tract. Mastication, Deglutition, Movements of stomach, Small intestinal movements, Large intestinal movements, Defaecation reflex. Gall bladder filling and emptying, gall stones. Vomiting, Dumping syndrome, paralytic ileus.

Absorptive Functions of G. I. Tract. Absorption of Carbohydrates, protein, fat.

8 . Nervous System **34 Hrs**

Introduction. Organisation of nervous system and functions. General morphology of Brain, Spinal cord including Lamination. Cranial nerves (practicals) and spinal nerves - origin from spinal cord.

Synapse Definition, classification, functional anatomy. Mechanism of Synaptic trans- mission, EPSP, IPSP and Ionic basis and properties of synapse.

Reflex action. Definition, Reflex arc and its components, Bell- Magendie Law, Prop- erties of reflex action. Mono and Polysynaptic reflexes.

Sensory system : Classification of senses – conscious and unconscious sensations. Physi- ology of receptor –Types ,classification and properties – Two important sensory pathways. Sensory pathways for different sensations from body and face. Pain – Types, Receptor, different pathways, visceral pain in detail –Referred pain and its basis. Pain modula- tion in the body and abnormalities of pain sensation. Synthetic senses. Sensory cortex, thalamus.

Motor System: 3 levels of integration, spinal integration – spinal reflexes, Muscle spindle

- Stretch Reflex and inverse stretch reflex, its higher control and role in muscle tone. Cortical integration – voluntary activity. Motor cortex. Pyramidal and extrapyramidal tracts. Effect of lesions of motor pathways and effect of lesions of spinal cord. Basal gan- glia, Reticular formation, Cerebellum. Vestibular apparatus – Posture regulation. Cerebral cortex and Prefrontal lobe. Higher function- speech, learning, memory, sleep. Auto- nomic nervous system and its higher control. Hypothalamus, limbic system. Cerebrospi- nal fluid.
EEG- standard waves, pattern in sleep, clinical uses.

Special Senses **10 Hrs**

Vision: Functional anatomy of the human eye, intraocular tension and variations (mention). Refractory media of the eye, extra ocular muscles Visual pathway, Visual cortex, Accommodation of the eye, Refractory errors of eye and its correction. Far and near points, Retina and image formation, visual acuity, Photochemistry of vision, adaptation of receptors, Colour vision and colour blindness. Field of vision, electro-retinogram. Pupillary reflex.

Audition: External ear, Middle ear–Structure and functions, Inner ear-structure and function of Organ of Corti, auditory pathway, mechanism of hearing. Tests for hearing. Audiometry (briefly).

Smell and taste : Receptor organs and pathways. Primary taste sensations, after taste ionic basis.

9. Endocrinology 18 Hrs

Introduction- Endocrine glands in the body. Hormones – definition, Chemical nature of hormones – mechanisms of action, actions of hormones in general, Regulation of glands in general, Radio immuno assay, para crine secretions.

Pituitary gland: Functional anatomy, Anterior lobe, Cell types, hormones secreted by anterior lobe. Growth hormone -physiological actions, Regulation of secretion. Physiology of growth – growth curves, factors influencing growth and development, dwarfism. (other pituitary hormones to be dealt along with target glands.) Beta Lipotropin, Inter- mediate lobe hormones. Effects of hypophysectomy. Clinical disorders – gigantism, ac- romegaly. Neurohypophysis – hormones – physiological actions – regulation of secre- tions- disorders.

Thyroid: (Anatomy and histology) Hormones, synthesis, transport, metabolism, Actions in detail, Regulation of secretions, thyroid function tests, abnormalities of thyroid func- tion
Adrenal cortex: Histology (to be mentioned) Adrenal cortical hormones, classifica- tion, biosynthesis (to be mentioned), Glucocorticoids - Actions, regulation of secretion, Excess secretion, Cushing syndrome. Mineralocorticoids – Actions, regulation of secre- tion, effects of hypersecretion (primary and secondary). Adrenal androgens– Physio- logical significance, abnormalities of secretions, enzyme deficiency, effects of adrena- lectomy, adrenal cortical insufficiency.

Adrenal Medulla : Hormones, Biosynthesis, metabolism, Physiological actions, Epinephrine, Norepinephrine, dopamine, uses, regulation of secretion. Abnormal rate of secretion, Pheochromocytoma.. Role of adrenal medulla and adrenal cortex in counteracting stress.

Pancreas- Cell types, Hormones, Physiological actions, Regulation of secretion, hormonal control of blood glucose level. Insulin deficiency. Pathophysiology of Diabetes mellitus, oral hypoglycemic agents, Insulin excess – symptoms.
Local Hormones: Ectopic hormones, thymus, pineal (very briefly).

10. Reproductive System 10 Hrs

Introduction, development and differentiation of male and female characteristics. Role of genetic and hormonal factors. Sex chromatin. Male reproductive system - functional anatomy, spermatogenesis and regulating factors. Semen – composition and function of constituents - Hormonal functions of testes, testicular abnormalities. Female reproductive system - functional anatomy, onset of puberty, menstrual cycle-ovarian and uterine cy- cle and their hormonal basis. Fertilisation, implantation, foeto placental unit; Physiol- ogy of pregnancy - placenta and its functions, Tests of pregnancy (Immunological tests.). Parturition and its regulation, Lactation and its regulation.
Contraception - basic principles.

Schedule of Practicals

Haematology 110 Hrs

1. Use and care of compound microscope and microscopic examination of blood.

    1. PCV, ESR
    2. Haemoglobin estimation and blood indices.
    3. RBC count.
    4. WBC count.
    5. Examination of peripheral blood smear.
    6. Differential WBC count.
    7. Bleeding time, clotting time, blood grouping and Rh typing.

.

System Examination

General examination

1. Examination of respiratory system.
2. Examination of CVS.
3. Examination of higher functions and sensory system.
4. Examination of motor system.
5. Examinations of reflexes.
6. Examination of cranial nerves 1-6 & 7-12

Experimental Physiology – only Photo/Video Graph Discussions 30 hrs

1. Appliances in experimental physiology laboratory including Physiograph, stu- dent's stimulator and Kymograph.
2. Pithing, nerve muscle preparation, mounting, effects of different types of stimuli.
3. Simple muscle twitch.
4. Two successive stimuli.
5. Fatigue and recovery.
6. Genesis of tetanus and starling's law of muscle.
7. Effects of variations of temperature on muscle contraction.
8. Velocity of nerve impulse.
9. Normal cardiogram of frog's heart.
10. Effects of heat and cold.
11. Stannius ligatures.
12. Demonstration of extra systole, compensatory pause.
13. Effects of vagal stimulation on heart.

Human Physiology Practical 10 hrs

1. Record of Blood Pressure and its variations with posture and exercise.
2. Demonstration of a) ECG b) Perimetry (optional to have demonstration of EEG, EMG, Ophthalmoscopic examination.) c) Physiograph d) Spirometry e) Stethography.

Innovative Teaching: Seminars/Group Discussions etc.

List of seminars 30 hrs

Blood

1. Haemostasis
2. Blood groups

Muscle and Nerve

3. Mechanism of muscle contraction.
4. Neuromuscular junction.

Endocrinology

5. Calcium homeostasis
6. Hormonal control of blood glucose

Reproductive System

7. Physiology of lactation, menstrual cycle, ovulation.

Renal System

8. Renal concentration mechanism of urine

Central Nervous System

9. Hypothalamus – connection, nuclei and functions
10. Skin and temperature regulation.

Cardio Vascular System

11. Cardio respiratory changes during exercise

Respiratory System

12. High altitude physiology and acclimatization

13. Pulmonary function tests

Special senses

14. Colour vision

15. Tests for hearing

Topics for Tutorials/ Group Discussions **100 hrs**

1. Cell structure, transport across cell membrane
2. Action Potential
3. Erythropoiesis.
4. Immunity.
5. Body fluids – Composition and regulations of volume.
6. Cardiac cycle – phases and pressure changes.
7. Blood pressure.
8. Shock and compensatory mechanism.
9. Pressure changes and volume changes.
10. Gas exchange, Oxygen transport and CO transport.
11. Renal blood flow and autoregulation.
12. Reabsorption of glucose.
13. Movements of GIT.
14. GIT Hormones.
15. Endocrine pancreas.
16. Actions of Thyroid Hormone.
17. Properties of synapse and reflexes.
18. Pain pathway.
19. Functions of thalamus.
20. Cortico spinal tract.
21. Basal ganglia.
22. Hypothalamus.
23. Neuromuscular junction.
24. Visual pathways.
25. Errors of refraction.
26. Functions of Middle ear.
27. Tests for hearing.
28. Mechanism of hearing.

Clinical Orientation/Vertical Integration – Videos of Cases/Procedures to be Shown to Stu- dents.

Vertical integration for Haematology, CVS, Respiration, GIT, Nervous System, Endocrinol- ogy and Special Senses (at least 6 sessions).

Distribution of Marks for Internal Assessment and University Examination:

University Examination					Internal Assessment		
Theory I	**Theory II**	**Practical**	**Viva voce**	**Total**	**Theory**	**Practical**	**Total**
50	50	40	20	160	20	20	40

Internal Assessment

Internal assessment should be based on the performance in the regular periodical sessional ex- aminations, practical, Viva, Tutorials and seminars.

Weightage for the internal assessment shall be 20% of the total marks of each subject. There will be periodic revision sessions both for theory and practicals.

Internal Assessment examinations will be of three hours duration each. Final internal assess- ment examination will be of the same pattern as the University examination.

University Examination Pattern:

Theory

Paper I

Blood, CVS, Respiration (including environmental physiology), Renal system and skin and temperature regulation, Digestive system. (50 marks, 3 hours)

Paper II

Nervous System, Special Senses, Muscle and nerve, Endocrinology, Growth and development, Reproductive system. (50 marks, 3 hours)

The weightage for each topic should be proportional to the number of hours allotted.

Practical - Total : 40 marks

Practical I		**Marks**
Short Experiments:	One amphibian graph:	5
	One haematology short experiment.	5
Spotters	Two Calculations, Two observations, Three interpretations, 10 2 Graphs, One Clinical skill test. (total ten stations X 1)	
Practical II		
Long Experiment:	One Haematology Experiment	10
	One System Examination (write full format, demonstrate as required by examiner).	10
Total		**40**

Via -voce **: 20 marks**

Four examiners – Topics to be divided and all examiners to be examine each student.

Textbooks Recommended

1. Review of Medical Physiology: W. F. Ganong - (Lange Medical Book).
2. Text Book of Medical Physiology : Guyton & Hall - W.B Saunders (Elsevier)

Reference Books

1. Text Book of Medical Physiology: N. Geetha - (Paras Publications)
2. Berne & Levy Physiology - (Mosby).
3. Textbook of Medical Physiology: G.K. Pal - (Universities Press India, Private Limited)
4. Essentials of Medical Physiology: Indu Khurana - (Elsevier)
5. Textbook of Medical Physiology: Venkatesh & Sudhakar - (HH Lippincott)

BIOCHEMISTRY (U19MBB103)

Goal

The broad goal of teaching undergraduate students in biochemistry is to make them under- stand the scientific basis of the life processes at the molecular level and to orient them towards the application of the knowledge acquired in solving clinical problems.

Competencies:

1. Estimate the levels of blood urea, Creatinine, Glucose, Total protein and Albumin us- ing colorimeter in a given sample and interpret its results.
2. Identify the biologically important substance in a given sample and interpret its results.
3. Demonstrate the normal constituents of urine.
4. Detect any abnormal constituents in a given urine sample and interpret its results.
5. Interpret specific gravity of a given urine sample using urinometer.
6. Interpret problem solving data on Jaundice**,** Diabetes mellitus, Myocardial Infarction , Nephrotic syndrome etc.

Objectives

Knowledge

At the end of the course, student shall be able to:

- Describe the molecular and functional organization of a cell and list its subcellular components.
- Delineate structure, function and inter-relationship of bio molecules and consequences of deviation from normal.
- Summarise the fundamental aspects of enzymology and clinical application wherein regulation of enzymatic activity is altered.
- Describe digestion and assimilation of nutrients and consequences of malnutrition.
- Enumerate biochemical role of vitamins and minerals.
- Integrate the various aspects of metabolism and their regulatory pathways.

- Outline the structure and function of Hb and abnormal Hb.
- Explain the biochemical basis of inherited disorders with their associated sequelae.
- Outline the molecular mechanisms of gene expression and regulation, the principles of genetic engineering with applications and modern techniques in molecular biology with application in medicine.
- Describe mechanisms involved in maintenance of body fluid and pH homeostasis.
- Familiarise with the principles of various conventional and specialized labora- tory investigations and instrumentation analysis and interpretation of a given data.
- Outline the biochemical basis of environmental health hazards, biochemical basis of cancer and carcinogenesis, biochemistry of AIDS.
- Summarise the molecular concepts of defense and their application in medicine.
- Suggest experiments to support theoretical concepts and clinical diagnosis.

Skills.

At the end of the course, the student shall be able to:

- Make use of conventional techniques and instruments to perform biochemical analysis rele- vant to clinical screening and diagnosis.
- Analyse and interpret investigative data.
- Demonstrate the skills of solving scientific and clinical problems and decision making.

Integration

The knowledge acquired in biochemistry shall help the students to integrate molecular events with structure and function of the human body in health and disease.

Course Outcomes

CO1: Knowledge about the cell and subcellular organelles, molecular functions and membrane transport, digestion and absorption of nutrients, chemistry & metabolism of biomoecules and in- born errors.

CO2: Knowledge about fat and water soluble vitamins, macro and trace minerals, Enzymes and Clinical enzymology, TCA cycle, ETC ,integration of metabolism, immunology, plasma proteins. **CO3:** Knowledge of the structure and function of Hemoglobin, abnormal Hb, thalassemias, func- tion tests- LFT, TFT, RFT, PFT, mainatainance of homeostasis- acid base and fluid and electro- lyte.

CO4: Understanding of molecular biology- replication,transcription,translation, gene expression mutation, Molecular techniques and gene therapy.

CO5: Understanding of biochemistry and immunology of cancer and AIDS, Study of xenobiotics, biochemistry practicals-identification of biomolecules, spotters, lab data interpretation, quantita- tive experiments.

Teaching Hours
Duration of the course - 2 semesters
No. of hours - 240
Lectures - 80
Practicals - 160

Innovative session (projects, seminars, structured discussion, integrated teaching, formative evaluation and revision - Along with practicals).

1. **Cell structure & function**, sub cellular organelle, bio membrane (transport and ion channels. Will be covered in Physiology. So to be excluded from biochem- istry.) **1 hr**

2. **Digestion and absorption of nutrients** discussed in details in physiology so to be excluded from biochemistry. **2 hrs**
   a. Glucose Transporters
   b. Disorders of digestion and absorption
   c. Malnutrition – PEM

3. **Enzymes** **10 Hrs**

Nature of enzymes, coenzymes and cofactors, classification 1 hr

Mechanism of action, specificity of enzymes, active site. 1 hr

Enzyme kinetics, factors affecting enzyme activity, Km value and significance (derivation not required) 1 hr

Enzyme inhibition – competitive, noncompetitive, allosteric, feed back, therapeutic agents like antimetabolites as examples 2 hrs

Enzyme regulation in biological systems – allosteric regulation. 1 hr

Covalent modification, zymogen activation, induction and repression (mention only) 1 hr

Isoenzymes and their significance with suitable examples 1 hr

Clinical enzymology – Diagnostic importance of enzymes (LDH, CPK, AST, ALT, ACP, GGT, GPD, 5'Ntase, Cholinesterase, Amylase, Lipase) 2 hrs

4. **Chemistry and metabolism of Proteins** **18 Hrs**

(i) Chemistry

a. Classification based on structure, ionic properties of amino acids, isoelectric pH, buffering action of amino acids and proteins 1 hr 2 hrs

b. Structural organization of proteins – primary, secondary, tertiary and quarternary forces involved in maintaining . Examples – Insulin, collagen. 1 hr

c. Protein denaturation, coagulation, isoelectric precipitation using salt solutions, classification of proteins (colour reactions to be covered with practicals) 1 hr

d. Electrophoresis and chromatography – brief mention on separa- tion techniques (details of techniques and application in practical dem- onstration)

(ii) Metabolism

a. Body amino acid pool, dynamic state of body proteins, inter - organ transport of amino acids, nitrogen balance, glucogenic and ketogenic amino acids. — 1 hr

b. Transamination (reaction only), decarboxylation, oxidative deamina- tion, trans deamination, formation of ammonia. Disposal of Ammonia, — 2 hrs

Urea cycle, Hyper -ammonemias — 2 hrs

c. Metabolism of glycine, compounds synthesized, creatine and creatinine, Heme and glutathione, hyper – glycinemias — 2 hrs

d. Metabolism of sulphur containing aminoacids, (methionine and cys- teine), trans sulphuration, transmethylation reactions, formation of taurine, PAP, excretion of sulphur, homocystinuria, cystinuria and cystino- sis. — 2 hrs

e. Phenyl-alanine and tyrosine – metabolism, PKU and alkaptonuria, syn- thesis of thyroid hormones , synthesis and catabolism of catecholamines, albinism, tyrosinemia — 2 hrs

f. Tryptophan – formation of NAD (important steps only), serotonin and 5 HIAA xanthurenic acid, melatonin, formation of indican, Hartnup's dis- ease. Branched hain amino acids- MSUD (pathway not required) — 1 hr

g. Glutamic acid, glutamine, GABA, aspartic acid, asparagine, serine (metabolic role and compounds synthesized using these amino acids), poly- amines.

5. Chemistry and metabolism of Carbohydrates — 17 hrs

(i) Chemistry

a. Classification – monosaccharides- glucose, fructose, galactose and man- nose. Reactions, (reducing property, oxidation, reduction), isomers, ano- mers and epimers. Derivatives like amino sugars and deoxy sugars. Gly- cosidic bond. — 2 hrs

b. Disaccharides- lactose, sucrose, maltose. Polysaccharides-starch, gly- cogen, dextrins, glycosaminoglycans (basic structural features and functions only) , blood group antigens. — 2 hrs

(ii) Metabolism — 3 hrs

a. EMP Pathway: Reactions, regulation in brief, energetics, Rapaport leubering cycle, fate of pyruvate in aerobic and anaerobic conditions, PDH reaction.

b. Gluconeogenesis-key enzymes, regulation and significance. Cori's cycle — 1 hr

c. Glycogen synthesis and degradation, regulation (brief), inborn errors associated

6. **Vitamins** 8 hrs

a. Classification, chemical nature (detailed structure not required), coenzyme forms, biochemical role, sources, requirements, deficiency and toxicity of the following vitamins (briefly only) A, D, E, K and free radicals — 4 hrs / 4 hrs

b. Biochemical role, co-enzyme function, sources ,requirement and deficiency of thiamine, riboflavin, niacin, biotin, pyridoxine, pantothenic acid, folic acid, one carbon groups, B-12 and ascorbic acid

7. **Minerals** **5 hrs**

a. Sources, requirement, absorption, biochemical role ,deficiency and toxicity of the following minerals - calcium, sodium, potassium, sulphur, chloride and phos- phorus – role of PTH, 1,25 DHCC. — 4 hrs

b. Iron, copper and anemia — 1 hr

8. **Haemoglobin** **4 hrs**

a. Synthesis and degradation — 3hrs

b. Haemoglobinopathies, thalassemias and porphyrias (brief mention only as examples in each case). — 1 hr

9. **Liver function Tests:** **3 hrs**

Including formation of bilirubin, hyper bilirubinemias and differential diagno- sis of jaundice (S. bilirubin, enzymes, A/G ratio, BSP test, urine test)

10. **Specialized Laboratory investigations** **1 hr**

RIA, ELISA, principles of colorimetry

11. **Radioactivity** **1 hr**

Applications-Diagnostic, research and therapeutic. Radiation hazards

12. **Chemistry and metabolism of Lipids** **13 hrs**

(i) Chemistry of Lipids

a. Definition, classification with example, saturated and unsaturated fatty acids, triacyl glycerol, phospholipids. Structure and function of biomem- brane.

(ii) Metabolism of Lipids

a. Beta oxidation of fatty acids, role of carnitine, regulation and energetics

b. Synthesis of fatty acids, fatty acid synthase complex , regulation, elon- gation and desaturation

c. Formation and utilization of ketone bodies, ketoacidosis in diabetes and starvation

d. Transport of plasma lipids, lipoprotein metabolism, apoproteins, func- tions, lipid profile and dys- lipidemias, atherosclerosis, biochemical basis of management of hyper - lipidemias – diet, PUFA, dietary fibre and hypo- lipidemic drugs. Lipid storage diseases. 2 hrs

e. Eicosanoids – prostaglandins , thromboxanes and leukotrienes. 1 hr

f. Phospholipids and sphingolipids - Inborn errors. 1 hr

13. TCA Cycle **4 hrs**

a. Reactions, regulation and energetics 1 hr

b. Interrelation of carbohydrate, lipid, and amino acid metabolism. Anaplerotic reactions, amphibolic role of TCA cycle and metabolic adaptations during fed state and starvation. 1 hr 2hrs

c. Electron transport chain - components and sites of ATP synthesis , inhibitors and uncouplers of ATP synthase complex and mechanism of oxidative phos- phorylation (Briefly)

14. Maintenance of homeostasis **6 hrs**

a. Acid base regulation, acid and bases, pH ,buffers, Henderson- Hasselbach's equation, (derivation not necessary) buffer capacity 1 hr

b. Acid and Bases in the body , plasma buffers, respiratory and renal regulation of pH 2 hrs

c. Acidosis and alkalosis, major causes and compensatory mechanism, anion gap, assessment of acid base status. 2 hrs

d. Fluid and electrolyte balance – distribution of body water and disorders (Hormonal regulation covered in Physiology) 1 hr

15. Nucleic Acids (Chemistry and metabolism) **17 hrs**

a. Structure of purines , pyrimidines, nucleosides and nucleotides 1 hr

b. Purine – Nucleotide synthesis and catabolism (Synthetic pathway need not be considered in detail with names of intermediates. Only the source of different atoms and sequence of addition). salvage pathway and regulation , hyper-uricemia and gout, Lesch Nyhan syndrome. 2 hrs

c. Pyramidine – nucleotide synthesis, regulation, orotic aciduria, formation of de- oxynucleotide, thymidylate synthase reaction , folic acid antagonist., nucleotide analogues as chemotherapeutic agents 1 hr

d. Nucleic acid – structure of DNA, different types of DNA, mitochondrial DNA, base pairing rule, difference between DNA and RNA, mention different types of RNA. 2 hrs

e. DNA replication , DNA polymerase, DNA repair 1 hr

f. Genetic code, transfer RNA, mRNA , rRNA. 1 hr

16.	**Biochemistry of Cancer**	**2 hrs**
	Mutagens, carcinogens and its role in carcinogenesis, viruses in carcinogene- sis, tumour markers and oncogenes.	
	Vertical Integration Classes:	**10 hrs**
	a. Malnutrition and PEM (Pediatric department)	1hr
	b. Diabetes mellitus (Internal Medicine)	1hr
	c. Jaundice (Internal Medicine)	1hr
	d. Clinical enzymology (Internal Medicine)	1hr
	e. Inborn errors of carbohydrates and protein metabolism (Pediatric)	1hr
	f. Calcium and phosphorus metabolism-derangement (Orthopaedics)	1 hr
	g. Atherosclerosis – Ischemic heart diseases (Cardiology)	1 hr
	h. Acid base balance in clinical settings (Internal Medicine)	1 hr
	i. Etiology and management of cancers (Oncology)	1 hr
	j. AIDS (Internal medicine)	1 hr
	Seminar/ Tutorials	**27 hrs**
	a. Cell structure, function and abnormalities	1 hr
	b. Biomembrane structure and transport mechanism	1 hr
	c. GIT enzymes, digestion and absorption of carbohydrates, lipids and pro- teins	2hrs
	d. Disorders of digestion and absorption	1 hr
	e. Clinical enzymology, isoenzymes	2h
	f. Fat soluble vitamins	1hr
	g. Thiamine, riboflavin, niacin, biotin, pyridoxine, panthothenic acid	3hrs
	h. Folic acid, Vitamin B 12, Ascorbic acid	1 hr
	i. Minerals: Macro elements	1 hr
	j. Micro elements	1 hr
	k. Glycolysis, gluconeogenesis, keyenzymes and regulation	2hrs
	l. Regulation of glycogen metabolism	1 hr
	m. Diabetes mellitus, glycosurias, GTT , glycated Hb	1 hr
	n. Formation and disposal of ammonia	1 hr
	o. Inborn errors of aminoacid metabolism	2 hrs
	p. Formation and fate of bilirubin& jaundice	1 hr
	q. Steroid hormones	1 hr

r. mutation 1 hr

Horizontal Integration

a. Haemoglobin (Physiology) 4 hrs

b. Liver Function Tests (Anatomy and Physiology) 4 hrs

c. Synthesis of thyroid hormones (Anatomy and Physiology) 5 hrs

Schedule of Practicals **(80 hrs)**

1.	Reactions of Carbohydrates: Glucose 1 session	2 hrs
2.	Reactions of Carbohydrates: Fructose 1 session	2 hrs
3.	Reactions of Carbohydrates: Lactose 1 session	2 hrs
4.	Reactions of Carbohydrates: Sucrose 1 session	2 hrs
5.	Identification of unknown Carbohydrate 2 sessions	4 hrs
6.	Reactions of Proteins: Colour reactions 1 session	2 hrs
7.	Reactions of Proteins: Precipitation reactions 1 session	2 hrs
8.	Reactions of Albumin 1 session	2 hrs
9.	Reactions of urea and uric acid (Specific urease test for urea. Benedict's uric acid test and Schiff's test for uric acid.) 1 session	2 hrs
10.	Identification of biologically important compounds in given solution 2 sessions	4 hrs
11.	Normal urine : organic constituents 1 sessions	2 hrs
12.	Normal Urine: inorganic Constituents 1 session	2 hrs
13.	Abnormal urine: Report	4 hrs
14.	Introduction to clinical chemistry, collection of samples, anticoagulants and pre- servatives , principles of colorimetry	2 hrs
15.	Estimation of glucose in blood 1 session	2 hrs
16.	Estimation of urea in serum, calculation of clearance from given values of U, V and P	2 hrs
17.	Estimation of creatinine in serum. 1 session	2 hrs
18.	Estimation of total protein and albumin in serum– A/G ratio 1 session	2 hrs
19.	From given values of HDL and TAG, lipid profile data interpretation 1 session	2 hrs
20.	Spotters (demonstration): simple instruments, graphs, tests etc. 2 sessions	4 hrs
21.	Charts 2 sessions a. Problem solving exercises: short history of different conditions are given and students will be asked to suggest investigations to arrive at a diagnosis.	b. Lab orator y data interpr

	etation- liver diseases, renal diseases, acid-base dis- turbances, diabetes mellitus, lipid disorders	4 hrs
22.	Revision: Identification of unknown substance. 4 sessions	8 hrs

1. **Distribution of Marks for Internal Assessment and University Examination**

University Examination				Internal Assessment			
Theory I	Theory II	Practicals	Viva Voce	Total	Theory	Practicals	Total
50	50	40	20	160	20	20	40

University Examination– Division of topics

Theory paper I (50 Marks)

1. Cell structure and functions, biomembrane
2. Digestion and absorption of nutrients
3. Enzymes
4. Chemistry and metabolism of carbohydrates and proteins
5. Vitamins and minerals
6. Hemoglobin
7. Liver Function Tests and Special Laboratory investigations (RIA, ELISA ,Colorimetry)
8. Radioactivity

Theory Paper II (50 Marks)

1. Chemistry and Metabolism of lipids
2. TCA cycle, electron transport chain, integration of metabolism
3. Maintenance of homeostasis- acid base balance, fluid and electrolyte balance
4. Nucleic Acids -structure and function, biosynthesis of purines and pyrimidines
5. Molecular genetics including techniques
6. Biochemistry of HIV ,cancer and cell cycle
7. Pancreatic and renal function tests
8. Xenobiotics and biotransformation

Practical Examination (40 marks)

Practicals I

a. **Quantitative experiment:** Estimation of blood urea, creatinine, glucose, total protein and albumin (skills and interpretation) 10 marks

b. **Interpretation of data/problem solving exercise** (data on jaundice, Diabetes mellitus, myocardial infarction, nephrotic syndrome etc.) 10 marks

Practicals II

a. **Qualitative experiment:** Identification of biologically important substance, demonstra- tion of normal constituents in urine, detection of abnormal constituents etc. (skills and in- terpretation) 10 marks

b. **Spotters** 10 marks

Theory/ Viva Voce (4 examiners) Topics to be divided and all examiners to examine each stu- dent. (Maximum marks 20)

Textbooks Recommended

Prescribed Books

1. Text book of Biochemistry for Medical students - Dr. D.M. Vasudevan, Dr. S. Sree- kumari (J.P Brothers).
2. Text book of Biochemistry – Dr. U .Sathyanarayana
3. Harper's Biochemistry-Murray, Rodwell

Reference Books

1. Biochemistry with Clinical Correlation - Devlin.
2. Biochemistry - Stryer
3. Principles of Biochemistry - Lehninger
4. Biochemistry – A case oriented approach - Montgomery

COMMUNITY MEDICINE (U19MBB104)

1. Vision

The Department of Community Medicine at Bhaarath School of Medicine, shall be recognized nationally and internationally for its:

1.1. Innovative, rural based, Primary Health Care oriented, value based medical education to train the medical students as "Five Star Doctors" as envisaged by the World Health Or- ganization, who are competent to work as

- *Care providers*
- *Decision makers*
- *Communicators*
- *Community leaders and*
- *Managers*

1.2. Provision of Cost effective Health Care delivery strategies characterized by equity, inter sectoral co-ordination, community participation and appropriate technology.

1.3. Innovative curriculum enriched with the principles of human values, love and empathy encompassing the spiritual dimensions of health and delivered with state of the art Infor- mation Technology through Searching,Sharing, Observation ,Participation and Action.

2. Mission

The mission of the Department of Community Medicine is :

2.1. To provide value based, rural oriented medical education to produce doctors who have the knowledge, attitude, and skills to provide Primary Health Care as per the National Health Policy.

2.2. To demonstrate that positive health can be achieved only through total development and community participation.

2.3. To demonstrate that spiritual dimension of health is also important while developing health care delivery strategies.

2.4. To provide need based refresher training on Continuous Professional Development (CPD) to all categories of health care providers.

2.5. To undertake research on health and develop low cost logistics for delivery of Primary Health Care

2. 6. To bring the benefits of the advancements in technology to the people in the villages.

3. Competencies

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies.

- To deliver evidence based, need oriented Primary Health Care in the context of the prevailing socio-cultural settings.

- To identify community health problems, prioritize them and chalk out solutions with local resources and community participation.
- To communicate effectively and appropriately with people at large and patients and their family in particular.
- To collect, compile, analyze and interpret health related data for disease surveillance us- ing epidemiological and biostatistical principles.
- To give health education using appropriate tools and educational methods with special reference to national health issues.
- To implement, monitor and evaluate national health programmes.
- To undertake multi-disciplinary programmes to achieve healthy environment for sustainable development.

4. Departmental Objectives

4.1. General Objectives

To train medical students with knowledge, attitude and skills required to function as basic doc- tors with empathy, compassion and love and who can effectively function as care providers, deci- sion makers, communicators, community leaders and managers in the rural and urban settings

4.2. Specific Objectives

At the end of the course, the student shall acquire:

4.2.1. Knowledge

- To Identify the multi-factorial determinants and dimensions of health and disease, dynamics of community behavior and human society
- To understand the structure and process of the health care delivery system in India in general and Tamil Nadu in particular.
- To identify the health needs of the community in general and small vulnerable groups in particular.
- To understand the science of applied Epidemiology and Research tools for health promotion initiatives.
- To apply principles of Biostatistics to study the phenomenon of health and disease, and to draw conclusions and to formulate policies

4.2.2 Attitude

- To provide health care in an environment of love and compassion.
- To provide evidence based and need oriented health care.
- To see the 'man in disease' against 'disease in man'.
- To perceive health as part of total development.
- To work with community hand in hand with the various sectors.
- To work in rural, tribal and urban slum areas where the services are most needed.
- To give more emphasis on prevention thereby averting the need for expensive curative care.
- To disseminate the message that positive health can be achieved through life style modifications.
- To allocate resources efficiently and cost effectively and allocate resources on the basis of contribution to health promotion.

- To imbibe the concept of essential drugs and rational drug prescription.

4.2.3. Skills

The skills shall include, but not limited to:

- Basic clinical skills including essential nursing skills.
- First aid.
- Communication skills including group interaction skills.
- History taking skills • Listening skills
- Memorizing skills • Documentation skills • Use of essential drugs
- Use of Biostatistics and Epidemiological methods to study health and diseases.
- Application of appropriate technology in preventive and promotive services.
- Use of electronic media in primary health care.
- Research skills including protocol writing, project preparation, documentation and literature search, writing a scientific paper for publication etc.
- Low cost nutrition skills and diet planning.

Course Outcomes

CO1: Knowledge, attitude and skills required to function as basic doctors with empathy, compas- sion and love.

CO2: Ability to effectively function as care providers, decision makers, communicators, commu- nity leaders and managers in the rural and urban settings

CO3: Competency to deliver evidence based, need oriented Primary Health Care in the context of the prevailing socio-cultural settings.

CO4: Competency to identify community health problems, prioritize them and chalk out solutions with local resources and community participation.

CO5: Competency to communicate effectively and appropriately with people at large and patients and their family in particular.

CO6: Competency to collect, compile, analyze and interpret health related data for disease

surveil- lance using epidemiological and biostatistical principles.

CO7: Competency to give health education using appropriate tools and educational methods with special reference to national health issues.

CO8: Competency to implement, monitor and evaluate national health programmes.

CO9: Competency to undertake multi-disciplinary programmes to achieve healthy environment for sustainable development.

Curriculum Map

Semester	Nature of Academic Activity	Course Strength (in Contact Hours)			Frequency of the Activity	
		Interactive Lectures*	Community Exercises**	Total	Day	Time
S1	Interactive Lectures/Family/ Community Exposure	30	30	60	Saturday (First 4 months)	8AM - 1PM
S3	Interactive Team Teaching	24		24	Tuesday	1 - 2 PM
S4	Interactive Team Teaching	24		24	Thursday	1 - 2 PM
S5	Interactive Team Teaching	16		16	Thursday	1 - 2 PM
S6	Interactive Team Teaching	24		24	Monday	1 - 2 PM
S7	Integrated Team Teaching	32		32	Wednesday	1 - 2 PM
R1 4 weeks in **S4**	Innovative com-munity problem solving exercises & skills training		92	92	Daily	8AM - 12PM
R2 4 weeks in **S7**	Community action programmes & Clinico social case study		92	92	Daily	8AM - 12PM
Total		**150**	**306**	**456**		

S1, S2 ….– *Semester ONE, Semester TWO*

R1, R2….- *FIRST clinical rotation, SECOND clinical rotation… etc.*

* Interactive learning which includes, but not limited to group teaching by faculty and stu- dents tutors.

** Training in the department includes, but not limited to, family visits, seminars, symposia, group interactions in the community as well as in the class rooms, debates, brain storming ses- sions, skills learning, problem based learning, clinico-social case studies, epidemiological investigations, health delivery system and management disease surveillance, health mapping, participation in national health programmes, disaster management, health screening, school health, research projects, presentations/ discussions, updating, must know rapid revision, for- mative assessments, documentation, BCC group exercises etc.

5. Profile of the Syllabus of Community Medicine:

Sl No:	Topics	Strength in Contact Hour		
		Interactive Learning*	Community based problem solving exercises**	Total
1.	Concept of health and disease and community medicine	4	5	9
2.	Basic epidemiology and screening	5	10	15
3.	Bio statistics	7	15	22
4.	Demography and National Population Pol- icy	7	6	13
5.	Environment and Health including Medical Entomology	6	24	30
6.	Health Care Waste Management	2	2	4
7.	Disaster Management	3	4	7
8.	Communicable diseases and Non-Communicable diseases	18	15	33
9.	National health programmes	10	15	25
10.	Emerging and Re-emrging diseases	2	10	12
11.	Occupational Health	3	4	7
12.	Communication for health education	4	22	26
13.	RCH and MCH including fertility regulation	6	14	20
14.	Genetics including Human Genome Project	2	2	4
15.	Nutrition in Health & Disease	4	12	16
16.	Health planning, management & health economics including Panjayati Raj & National policies.	8	14	22

17.	Health care of the community including Mil- lennium development goals, Public health standards & Health care delivery system- public private sectors	12	16	28
18.	International Health	2	4	6
19.	Mental Health	2	4	6
20.	Geriatric Health care	2	4	6
21.	Health Legislations	2	2	4
22	Implementation of Health programs in the state level	2	2	4
23	Alternate Medicine - Role in National Health	1	1	2
24	Community dentistry , Community Nursing and Community Pharmacy	1	1	2
22.	Medicine and Social Sciences including Medico- Social and ethical issues in Healthcare	2	5	7
23.	Social security, Role of NGOs, CBOs and Social Welfare organizations	2	8	10
24.	Gender issues and women empowerment	3	4	7
25	Essential medicines & counterfeit medicines	1	3	4
26	Research Methodology and Project Work	2	20	22
27	Community Diagnosis and Management	4	40	44
28	Basic Clinical Skills and First Aid	5	20	25
29	Spiritual dimension of Health - Stress Management and Personality Development	2	2	4
30	Guest lectures, Integrated teaching, '*Must know*' revision, Updates in Community Medicine.	18	-	18
	Total Strength	**154**	**310**	**464**

Interactive learning which includes, but not limited to group teaching by faculty and students tutors.

** Training in the department includes, but not limited to, family visits, seminars, symposia, group interactions in the community as well as in the class rooms, debates, brain storming ses- sions, skills learning, problem based learning, clinico-social case studies, epidemiological investigations, health delivery system and management disease surveillance, health mapping, participation in national health programmes, disaster management, health screening, school health, research projects, presentations/ discussions, updating, must know rapid revision, for- mative assessments, documentation, BCC group exercises etc.

6. Academic Programmes

6.1. Special Care is taken to ensure that all academic sessions are conducted in a **stress free, student- friendly** environment.

6.2. All academic sessions (in-house as well as in the community), will be interactive, an- chored to the leaning objectives at the MUST KNOW level To facilitate this, leaning objectives for each academic session is prepared (and maintained updated).

6.3. Periodic course evaluation and teaching evaluation are part of the academic programme Input from the students is respected and appropriate changes made.

6.4. Didactic lectures are minimized though not eliminated. Interactive

6.5. team teaching and learning through **student tutors**, are the main methods of teaching/learning

6.6. For all in-house academic activities, **white board** (which is the choice of the students) and OHP are often used. Computer and LCD is reserved for pictures, films/video- clippings, computer assisted learning (CAL), net based education etc.

6.7. Special care is taken to develop **skills** and **competencies** to solve problems in the community set up instead of overloading the students with theoretical knowledge. This includes exercises on applications of research methodology, applications of IT in medical education.

6.8. **Integrated teaching** (vertical and horizontal) with guests from appropriate department (in-house as well as extramural) are arranged as and when required.

6.9. Daily **documentation** of academic activities in the practical record is mandatory.

6.10. All **strategies**/modalities and gadgets available in the departments are used to facilitate learning in the class room as well as in the community. This includes, but not limited to

health news, health bits and health flash displayed in the wall bulletin, wall book, IEC materials in the museum, indigenously made skills training/health education film, flip charts flash cards etc.

6.10 For **health education** and **counseling** in the community, the students are encouraged to make their own health education materials. This is one of the important academic exercises on BCC strategies

7. Lectures

The curriculum map is prepared in such a way that lectures are minimized to less than 1/3rd of the total course strength. The traditional didactic lectures are replaced by interactive sessions through *group teaching* and *student tutor*. Primary focus shall be to facilitate the learning process that will help to develop the required skills and competencies needed to deliver Primary Health Care.

8. Integrated Teaching

Horizontal as well as vertical integrated teaching are conducted with in-house sister depart- ments and extramural organizations (Government and Non Government) which are involved in the delivery of primary health care, implementation of National Health Programmes and/or run- ning social welfare institutions.

9. Guest Lectures

Guest lectures are arranged by inviting guest faculties from sister departments of other Medical Colleges and/or other institutions as and when required. This will facilitate sharing of academic as well as strategic experiences.

10. Practicals

The curriculum are primarily oriented to the concept of community laboratory (as against the tra- ditional hospital laboratory). As such, the training shall be residential. The practicals are designed to develop the skills and competencies required to deliver Primary Health Care to the rural as well as urban families. These skills shall include, but not restricted to, basic clinical skills, communication skills, management skills, problem solving skills, decision-making skills, health care documentation skills, Community health programmes (organization, implementation and evaluation) skills with special reference to National Health Programme, leadership skills, ap- propriate use of essential drugs skills, community based research skills etc.

11. Record of Academic Exercises

All academic exercises (in-house as well as extramural) are documented in the Comprehensive Re- cord of Academic Exercises on a daily basis. The records are valued concurrently after each exercise by the faculty concerned. The aggregate score gained by the student, shall be com- puted out of 10, which shall be directly added to the internal assessment for practicals. (See computation of internal assessment)

Community based. Total Contact hours (S4 & S6) **184 hours**

*(*Actions and/or participatory and/or observational learning and hands on exercises (at the rate of 4 hours per day (i.e. 8–12) for 4 weeks each during S4 & S6).

12. **2. THIRD TO SIXTH Semesters (S3 to S6) Methods of Teaching/Learning**
Class room based. Total Contact hours (S3-S6) **88 hours** (Interactive group teaching / learning in the class room and/or small groups at the rate of one hour per week).
The traditional didactic lectures are minimized. **Team teaching** and **Student Tutor** con- cept is introduced. The students are encouraged to utilize the different types of **learning resource materials** like poster presentations, health news, wallpaper, health bits, wall book, album of action, museum and the department library.

There are two **sessional exams** officially scheduled by the Principal during this period of S3- S5. In addition, end of semester assessments shall also be conducted by the de- partment using appropriate tools covering smaller portions. All assessments shall be designed to measure the problem solving skills of the students.

Course evaluation is done at the end of each semester. Appropriate changes are intro- duced based on the input received from the students.

Clinical rotations during S4 & S6
The students are posted in Community Medicine in groups of 15-20 for 4 weeks each during 4th & 6th semesters. Every day, the programme starts with innovative learning like reading **health news** followed by discussion. (this includes but not limited to articles on health and related topics appearing in the news papers, journals, internet etc.). Topic dis- cussions on eminent personalities in the field of public health is also carried out. The daily activities/learning objectives achieved, are documented in the record on the same day. The major academic assignments during the clinical rotations of S4 and S6 are

- **R1 – Four weeks during 4th semester** (92 contact hours)

This is residential training. The students shall stay in the rural and/or urban field train-

ing centers. The main academic activities shall include but not limited to

1. Family studies – Community diagnosis and diet survey - Presentation
2. Nutrition - Basic concepts
3. Sociology – Basic concepts
4. Biostatistics - Basic concepts
5. Demography – basic concepts
6. Basic Clinical Skills Training
7. Entomology including field assignments
8. Visits to public health related institutions (Water treatment plant, sewage treatme- plant, biomedical waste management plant)
9. Hands on exercises in the Nutrition Skills Lab
10. Community interaction, identification and solving community health problem
11. BCC (IEC) strategies – individual & group assignments

- **R2 – Four weeks during 6th semester** (92 contact hours)

1. Family studies – follow up – Community action programme
2. Biostatistics – hands on exercises
3. Search for Research Initiatives - Hands on exercise on Research Methodology with groups of 2 to 3 students undertaking a research study.
4. Health indices – hands on exercises on collection and calculation
5. Participation in health related activities in the community
6. BCC / IEC Strategies

12. 3. SEVENTH Semester

Method of Learning/Teaching:

Classroom based -32 hours at the rate of 2 hours per week.

Integrated teaching with in-house as well as extramural departments related to public health, guest faculty from other Medical Colleges, rapid revision, problem based learning and related exercises, information update, presentation of research projects, recap as- sessments, model examination, question paper discussion, the learners choice etc.

Community based action oriented programmes (R3) 92 hours

The students are posted for 4 weeks during 7th semester every day 8-12

Highlights of R3 clinical rotation

- Epidemiological exercises
- Biostatistics and vital statistics.
- Clinico – social case studies
- Visit to Public Health Institutions implementing National Health Programmes
- Review of museum specimens, wall book, academic album, poster presentations etc.
- Objectively structured physical examination exercises.
- Review of current health issues and policies.

13. ASSESSMENT SYSTEM

13.1. Concurrent Assessment

13.1.1. The formal concurrent assessment of a student (in-house as well as community) shall start on the first day and ends with the last day in the department. All types of assessment tools shall be used for this. It shall be documented in the Register of Aca- demic Performance of students maintained in the Department.

assessment (OSPE)/viva voce and /or any other tool developed by the department from time to time. The marks scored by the students in each assessment, is documented in the Register of Academic Performance of the students. All these marks shall be consid- ered while computing the final internal assessment marks for theory and practical, which shall be forwarded to the University.

13.2. Formative assessment

13.2.1. Written

13.2.1.1. There will be **4 formal internal assessments** centrally scheduled by the Princi- pal.

13.2.1.2. The 4th and the final assessment scheduled by the principal is a **model assess- ment** of the University examination pattern.

The students are given the chance to peruse their answer books after discussing the question papers and expected answers in the class. This gives a chance for the stu- dents for self assessment and improvement.

13.2.2. Practical Assessment

13.2.2.1. There shall be minimum one practical assessment at the end of every clinical ro- tation (i.e., R1, R2 & R3) utilizing different assessment tool.

13.2.2.2. In addition, there will be a formal practical assessment of the university pat- tern conducted along with the model assessment at the end of 7th semester.

13.2.2. Viva voce

There will be a viva voce conducted along with the model assessment. Each student shall be assessed separately by each examiner. Viva voce shall be structured as far as possible.

14. INTERNAL ASSESSMENT

14.1. Strength of internal assessment

The strength of internal assessment is 40 marks, divided equally into

Written and Practical	**20**

14.2. Computation of Internal Assessment – Written

Marks scored for various written internal assessments:	20
TOTAL:	**20**

Marks scored for various written internal assessments is calculated as follows:

Best two of three i nternal assessments

Marks of model assessment under 13.2.1.2. are computed to **15** to which the marks (max **5)** awarded for viva voce under 13.2.2, shall be added to make the total 20 marks. This shall be presented to the University as the **Internal Assessment for Theory.**

14.3. Internal Assessment for Practicals:

Day-to-day community health activities/exercises done and docu- mented in the Record (which starts in the beginning of the first se- mester and ends at the end of seventh semester) as mentioned under 13.1.1.	**10** marks
Marks of end of rotation assessments (R1, R2 R3) and model exami- nation is computed to	**10** marks
Total Practical Marks	**20** marks

The practical assessments shall include, but not limited to, Biostatistical exercise, epidemiological exercises, clinico-social/family case discussion, OSPE, identifications of specimens of public health importance. To this, *state-of-the-art* assessment tools to meas- ure the skills/competencies are also applied. (see 16.5 for details).

15. UNIVERSITY EXAMINATION

16. 1. Number of written papers

There shall be two papers of three hours duration, each paper carrying 60 marks.

16.2. Distribution of topics for Theory

PAPER – I

1. Concepts of Health & Disease and Community Medicine.
2. Basic Epidemiology & Screening.
3. Biostatistics.
4. Mental Health.
5. Environment & Health including Medical Entomology.
6. Health care waste management.
7. Disaster management.
8. Communicable & Non communicable diseases and their National Health Pro- grammes.
9. Emerging and Re-emerging diseases

PAPER – II

1. Demography.
2. RCH & MCH including fertility regulation.
3. Genetics including Human Genome Project.
4. Nutrition in Health & Disease.
5. Health Planning, Management & health Economics including Panchayati Raj & National policies.
6. Health care of the community including Millennium Development Goals, Sus- tainable development goals, Public health standards & Health care delivery sys- tem - public & private sectors.
7. International health.
8. Occupational health.
9. Geriatric Health care.
10. Health legislations.
11. Medicine and Social sciences.
12. Communication for Health Education.

16.3. Valuation of answer books

Valuation of answer books shall be as per the existing policy, rules and regulations of AVV.

16.4. Viva Voce

Each student shall be individually assessed by each of the four examiners. The evaluation shall be structured and shall primarily focus on the problem-solving compe- tency of the candidate. (as against the traditional knowledge based assessment). Iden- tification and discussion on specimens, models, charts, photographs, video clippings etc. are also included under viva voce.

The viva voce shall be conducted in an informal, student friendly environment. The marks awarded by each examiner shall be pooled and finally computed to 10.

16.5. Practical

There shall be six practical assessments bearing a total of 30 marks the distribution of which is shown below:

Practical I	Clinico-social case/family health discussion	10marks
Practical II	Spotters	3 marks
Practical III	OSPE	3 marks
Practical IV	Epidemiological exercises	5 marks
Practical V	Statistical Exercise	5 marks
Practical VI	Project discussion	4 marks

Each practical shall be conducted separately.

16.6. Rounding off Marks

Rounding off marks shall be done to the final total only. For this purpose, decimals of

0.5 and above shall be rounded off to the next higher digit and decimals of less than 0.5 shall be rounded off to the next lower digit.

Reference Books

1. Park's Textbook of Preventive and Social Medicine
2. Textbook of Community Medicine- Sunder Lal
3. Introduction to Biostatistics & Research Methods- Sunder Das

MEDICAL INFORMATICS & TELE MEDICINE (U19MBB105)
Elective

Goals

The digital revolution has dramatically changed society, and India is at the forefront of this move- ment. For a variety of reasons, despite the enormous volumes of data generated in health care and the sometimes life-and-death nature of the field, healthcare systems and providers have been slow to adopt information technology as an adjunct to help them manage data to the best advan- tage. The broad goal of incorporating medical informatics and tele medicine in the undergradu- ate curriculum is to create in young physicians a solid understanding of how these important ele- ments of information technology can help them in clinical practice and in maintaining their skills and knowledge while keeping in mind the principles of Evidence- based Medicine.

Objectives

Knowledge

At the end of the course, the student shall be able to:

- Understand basic computing functions.
- Appreciate the methodology for literature retrieval and analysis.
- Enhance skills in clinical practice through exposure to effective clinical simula- tion.
- Describe how informatics can help in public health.
- Obtain an exposure to practical aspects of Tele medicine.
- Describe the utilization, benefits and challenges of an Electronic Medical Re- cord (EMR)

Skills

At the end of the course, the student shall be able to:

- Perform basic computer related tasks such as Internet, e mail and use of MS office applications.
- Retrieve literature using the Internet.
- Critically appraise literature using principles of Evidence-based Medicine.
- Demonstrate proficiency at basic clinical procedures like urinary bladder cathe- terization and ophthalmoscopy, as well as fundamental skills like clinical cardiac examination using simulation technology.
- Utilize an EMR system for retrieval of relevant clinical information

Integration

This course shall integrate with the skills learned by students in community medicine, general medicine and general surgery. It will also show students how elements of IT like Tele medicine and EMR can help in integrating the process of healthcare information capture and delivery of services.

Course Outcomes

CO1: Understanding of how information technology can help them in clinical practice.

CO2: Knowledge of the methodology for literature retrieval and analysis.

CO3: Skills in clinical practice through exposure to effective clinical simulation.

CO4: Knowledge of practical aspects of tele medicine.

CO5: Familiarity with Electronic Medical Record

Topic	Hours
Medical informatics Introduction to Health Informatics Medical databases Information filtering and information retrieval Dataware housing, data mining for public health care Remote sensing and geographical information system Standards in Hospital information system.	1hrs
Electronic Medical records Introduction to EMR Structure of a Hospital Information System (HIS) Advantages and disadvantages of EMR systems Decision support systems and Artificial Intelligence (AI) Principles of good medical documentation and communication skills.	2hrs
Medical Simulation Overview Case studies	1hrs
Tele Medicine Clinical application of Tele Medicine Choosing the right technology Ethical and legal aspects of telemedicine Future trends of telemedicine Scope, benefits, limitations of telemedicine development	2hrs

Textbooks Recommended

1) Introducing telemedicine by B.D Gupta
2) Computers in Medicine by R D Lele
3) Essentials of Telemedicine and Tele care by A C Norris
4) Clinical Research Methodology and Evidence-based Medicine: The basics by Ajit N Babu

SIMULATION BASED MEDICAL EDUCATION (U19MBB106)

Elective

Objective

Acquisition of clinical skills is an essential part of clinical medicine and plays quite an important role in the Medical education. Acquisition of skills has three stages. The first is learning by imi- tation. Second level is practice under guidance and the third is to practice independently and ac- quire proficiency. Traditional medical education is facing many challenges. There are few oppor- tunities for the students to practice their clinical skills and their dexterities are generally at a low level. Medical simulation based education is a new teaching modality and helps to improve medi- cos' clinical skills to a large degree. Simulation is the modern technique to replace or amplify real experiences with guided experiences on mannequins. Medical simulation based education has many significant advantages. It is mainly dedicated to enhancing hands-on medical education performance assessment, evaluation, improving clinical and communication skills, assuring pa- tient safety and quality of care.

Medical Council of India has suggested Clinical Skill labs mandatory for all Medical colleges in India.

Course Outcomes

CO1: Understanding the method of examination of Cardiovascular and Respiratory system. Skills like aspiration of pleural effusion, pneumothorax, pericardiocentesis etc.

CO2: Skill of palpation, incisions, suturing, intravenous and intramuscular injections, catheteriza- tion of male and female, examination of breasts, PR examination, and practice of minor surgical procedures.

CO3: Palpation identifying presentations and positions of the foetus, conduct of all types of deliv- eries, episiotomy, foetal heart monitoring, CPR of mother as well as the neonate, pervaginal and bimanual examination.

CO4: ATLS, Intubation and Lumbar Puncture. Emergency Stroke Management. ATLS, Intubation and Lumbar Puncture. Emergency Stroke Management.

CO5: ENT and Ophthalmology Examination.

CO6: BCLS and ACLS (with defibrillation)

Materials and Methods

Mannequins are artificial human body parts made up of silicon rubber and PVC, mimicking accu- rate anatomical structures. These mannequins can be fitted with electronic devices to produce normal /abnormal heart, lung and abdominal sounds. Palpation of abdomen to appreciate nor- mal/abnormal liver, spleen, intestines, male and female pelvic organs and different positions of foetus. CPR mannequins are used in basic and advanced life support skills training. Various clinical conditions and scenarios can be programmed on these simulaids. It can be used to evaluate the performance of skills, especially for the Post Graduate students of Emergency medicine.

Simulaids for utilized for basic and advanced surgical skills , various non invasive procedures as well as different surgical operations. Students can engage in repetitive practice with increas- ing levels of difficulty. Students can repeatedly practice skills to acquire proficiency.

The simulaids with programmed clinical conditions to conduct undergraduate and post-gradu- ate practical examinations instead of live patients.

The following Simulation Stations with mannequins can be used for the following teaching/ learning programmes:

I. General Medicine: Examination of Cardiovascular and Respiratory system with provision for detecting pneumothorax etc. With the help of Simulaids aspiration of pleural effusion, pneumothorax, pericardiocentesis etc. can be practiced.

II. Surgery: Simulaids can be used for acquiring basic surgical skills such as palpation of nor- mal viscera, making incisions and putting sutures, practicing intravenous and intramuscular in- jections, catheterization of male and female and examination of breasts.PR examination, ex- amination of prostate and practice of minor surgical procedures.

III. Obstetrics & Gynecology: Palpation of abdomen for identifying various presentations and positions of the foetus inside the uterus can be practiced with the help of mannequins. Simu- laids also help in practicing the conduct of all types of deliveries including normal deliv- ery, breach and other abnormal presentations and obstructed labour. Episiotomy can be prac- ticed in the mannequins. Foetal heart can be monitored with provision for CPR of mother as well as the neonate. Simulaids also help in learning all pathological conditions of the uterus and fallopian tubes by pervaginal and bimanual examination.

IV. Paediatrics: With the help of baby mannequins intravenous and intramuscular injections can be practiced. Neonatal baby care can also be practiced with the help of simulaids.

V. Orthopedic procedures: joint examinations, intra articular injections, arthroscopy.

VI Truma mannequins. These mannequins are used for administration of first aid and per- forming different types of bandaging. ATLS can be practiced.

VII. ENT : Various ENT examinations can be practiced with simulaids. Different conditions of the tympanum can be visualised through the autoscope.

VIII- Emergency Medicine /Anaesthesia : Intubation and Lumbar puncture.

VIII. Intensive Care Unit set up: With Adult CPR mannequins for cardiopulmonary resuscita- tion with monitors , provision for creating artificially various cardiac conditions. For BCLS and ACLS training (with defibrillation facilities.

PHASE II
Semester III, IV and V

The students who pass the Phase I Subjects are permitted to enter the Phase II; which extends to semesters III, IV and V. The subjects taught in this Phase are Pathology, Microbiology, Pharma- cology and Forensic Medicine, Community Medicine which extends up to semester VII is also dealt within phase II. These subjects are generally called Para clinical subjects.

During this phase, the students get exposure to clinical subjects like General Medicine, General Surgery, Obstetrics & Gynaecology, Paediatrics, Psychiatry, Radiology, Dermatology, Pulmonol- ogy, Orthopaedics, Ophthalmology, Oto rhino laryingology, Anaesthesiology and Dentistry. Every forenoon, the first hour is devoted for clinical lectures. The remaining hours are devoted for clini- cal teaching. The student will be posted to various clinical units, outpatient departments, emer- gency departments, operation theatres, clinical laboratories.

Subject	Lecture Hrs	Practical/ Clinical	Innovative Sessions	Total
Pharmacology	106	128	86	**320**
Pathology	100	100	104	**304**
Microbiology	80	80	80	**240**
Forensic Medicine	34	20	50	**104**
Community Medicine	64		192	**256**

There will be three internal assessment examinations for the Phase II subjects. The final internal examination will be conducted during the 1st week of fifth month of semester V. The 2nd Profes- sional University examination will be held in the first week of sixth month of semester V.

PATHOLOGY (U19MBB201)

1. Goal :

The goal of teaching pathology is to provide undergraduate students comprehensive knowledge of the causes and mechanisms of disease, in order to enable them to achieve complete understanding of the natural history and clinical manifestations of the disease.

2. Competencies:

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies to.

- Understand the various processes and their mechanisms which govern general pathology.
- Apply their knowledge of mechanisms to disorders arising in the major organ systems.
- Understand the epidemiology, gross and microscopic features, as well as the presenta- tion, the natural history and complications when untreated.
- Understand the basic pathology in blood disorders, identify and interpret the tests.
- Apply knowledge of disease mechanisms and processes to the unique patient at hand in the clinicopathological correlations.
- Identify, perform and interpret the different diagnostic tests in clinical pathology.
- Understand the basics of transfusion medicine to enable him/her to perform basic tests, order appropriate blood products and recognize laboratory support in adverse reactions.
- Know how to perform autopsy and correlate the various pathology in different organ systems in order to provide cause of death.
- Be aware of the newer advances in pathology and their applications in relation to im- portant diseases
- Be able to engage in group learning, peer teaching and understand the value of work- ing effectively in a muti disciplinary team meeting.

3. Educational Objectives:

a. Knowledge:

At the end of one and half years, the student shall be able to:

- Describe the structure and ultrastructure of a sick cell, the mechanisms of the cell degradation, cell death and repair. And be able to correlate structural and functional alterations in the sick cell.
-
- Explain the pathophysiological processes which governs the maintenance of homeosta- sis, mechanism of their disturbances and the morphological and clinical manifestation associated with it.

- Describe the mechanisms and patterns of tissue response to injury to appreciate the pathophysiology of disease processes and their clinical manifestations.

- Correlate the gross and microscopic alterations of different organ systems in common diseases to the extent needed to understand disease processes and their clinical signifi- cance.

- Develop an understanding of neoplastic change in the body in order to appreciate need for early diagnosis and further management of neoplasia.

- Understand mechanisms of common haematological disorders and develop a logical approach in their diagnosis and management.

b. Skills:

At the end of one and half years, the student shall be able to:

1. Describe the rationale and principles of technical procedures of diagnostic laboratory tests.

2. Interpret diagnostic laboratory tests and correlate with clinical and morphological features of diseases.

3. Perform simple bedside tests on blood, urine and other biological fluid samples.
4. Draw a rational scheme of investigations aimed at diagnosing and managing common disorders.
5. Recognize morbid anatomical and histopathological changes for the diagnosis of com- mon disorder.

c. Attitude: At the end of one and half years the student develops an ability to integrate the causes, mechanisms of disease, biobehavioural and clinical sciences to analyse and solve problems related to the diagnosis, treatment and prevention of diseases.

4. Teaching hours:

Total duration of teaching of Pathology is 300 hours in 3 Semesters of III, IV and V put together.

Distribution of Teaching Hours:

A. Theory (Didactic lectures, Symposiums) 140 hrs.
B. Practicals -100 hrs.
C. Clinical Pathology -40hrs
D. Revisions - 20hrs.

5. Syllabus:

The Broad area of study shall be:

I. General Pathology
II. Systemic Pathology
III. Haematology
& IV Clinical Pathology

Course Outcomes

CO1: Comprehensive knowledge of the causes and mechanisms of disease.

CO2: Understanding of the various processes and their mechanisms which govern general pathol- ogy and the ability to apply the knowledge to disorders arising in the major organ systems.

CO3: Knowledge of the epidemiology, gross and microscopic features, as well as the presentation, the natural history and complications of diseases when untreated.

CO4: Knowledge of the basic pathology in blood disorders, identify and interpret the tests.

CO5: Application of the knowledge of disease mechanisms and processes to the unique patient at hand in the clinicopathological correlations.

CO6: Competency to identify, perform and interpret the different diagnostic tests in clinical pa- thology.

CO7: Knowledge of the basics of transfusion medicine to enable him/her to perform basic tests, order appropriate blood products and recognize laboratory support in adverse reactions.

CO8: Knowledge of how to perform autopsy and correlate the various pathology in different or- gan systems in order to provide cause of death.

CO9: Awareness of the newer advances in pathology and their applications in relation to important diseases

I GENERAL PATHOLOGY :

1. Cell Injury:

Must know: Causes and mechanisms of cell injury. Responses to cell injury-Adaptations, Reversible, Intracellular accumulations. Irreversible: Necrosis Apoptosis; Gangrene; Free radical injury &ischemia-Reperfusion injury and antioxidants Pathological calcification.

Desirable to know: Subcellular changes in reversible injury, Autophagy Necroptosis & Pyroptosis Telomeres and cellular aging

2. Inflammation & Repair:

3.

Must know: Define and describe causes, features, vascular and cellular events, morphological types, Chemical mediators & fate of acute inflammation Definition, causes and features of Chronic inflammation; Granulomatous inflammation. & Granulation tissue; Regeneration and Repair; Wound healing by primary and secondary intention; Fracture healing; Factors promoting and delaying the process and com- plications Systemic effects of Inflammation.

Desirable to know: Neutrophil Extracellular Traps; Defects in leukocyte function

4. Hemodynamic Disorders:

Must know: Edema –Pathogenesis and types ;Exudate and Transudate. Hyperemia & Congestion; CVC Lung, liver and spleen
Thrombosis –etiopathogenesis, morphology effects and fate of throm- bosis Embolism &infarction :Definition, types of embolism &infarction; morphological changes and clinical significance
Shock: Define, classify, understand pathogenesis, stages & morphologi- cal changes in shock

5. Genetic disorders:

Must know: Normal karyotype, classification of genetic disorders, inheritance pat- tern of non-Mendelian disorders; Down's syndrome, Klinefelter's syndrome, Turner's syndrome; Marfan's; Gaucher, Nieman Pick, Meth- ods of disease diagnosis including FISH, PCR

Desirable to know: Glycogen storage disorders; Other Lysosomal storage disorders, Single gene disorders; genomic imprinting; Microarray.

6. **Immunopathology:**

Must know: Hypersensitivity reactions; Autoimmune diseases-SLE; Amyloidosis: AIDS-Pathogenesis, investigations, infections & malignancy associated.

Desirable to know: Immunodeficiency syndromes. Transplant rejection; GVHD.

7. **Neoplasia:**

Must know: Definition, Nomenclature and classification; differentiate benign from malignant Neoplasms; Hallmarks of cancer; Precancerous conditions; Carcinogenesis-etiological agents & steps involved in chemical carcino- genesis;
by radiation & microbial agents
Metastasis, grading and staging
Molecular basis of cancer –Oncogenes, Proto-oncogenes, Tumour suppressor genes
Anti-apoptotic genes; Oncoproteins; Paraneoplastic syndromes; Lab diagnosis of tumours.

Desirable to know: Carcinogenesis by hereditary & occupational causes.
Genomic instability; Epigenetics; Tumour immune surveillance and cancer Knudson's theory

8. **Infectious diseases:**

Must know: TB,Leprosy, Typhoid fever, Syphilis. Histoplasmosis, Actinomycosis, Fungal diseases – Aspergillosis, Candidiasis, Mucormycosis & oppor- tunistic infections, Malaria, Filaria, Amoebiasis, Rhinosporidiosis, Her- pes, Measles, CMV, EBV.

9. **Environmental and Nutritional diseases:**

Must know: Radiation injury,air & food pollution, PEM, Vitamin & Zinc deficiency disorders,

Desirable to know: Obesity

10. **Diseases of Infancy & Childhood:**

Must know: Cystic fibrosis, Hyaline membrane disease; fetal hydrops; Malignant tumours- Neuroblastoma, Nephroblastoma, Retinoblastoma.

Desirable to know: Congenital anomalies**;** Prematurity

II. Hematopathology:

Must know: RBC: Hematopoiesis, Anemia and its classification, iron deficiency anemia; Megaloblastic anemia, Hemolytic anemia- classification, workup, Thalassemia, Hereditary spherocytosis, SCA, AIHA: Aplastic anemia. **WBC:** Leukocytosis, Leukopenia, Leukemoid reaction,Acute and chronic leukemias; Multiple myeloma,
Myeloproliferative disorders: Polycythemia & myelofibrosis Hemostaatic disorders: Platelet deficiency, ITP Coagulation disorders: Hemophilia, DIC

Desirable to know: MDS,G6PD deficiency, PNH, TTP/HUS, MAHA, Hairy cell leukemia.

III Systemic Pathology:

11. **CVS**:

Must know: Atherosclerosis; Hypertension; vasculitis, aneurysms, vascular tumours Ischaemic heart disease; Rheumatic heart disease: Infective endocarditis, Differential diagnosis of cardiac vegetations; Heart failure.

Desirable to know: Congenital heart disease; Cardiomyopathies; Cardiac tumours; Pericardial disease;

12. **Renal and Urinary Tract Pathology:**

Must know: Structure of glomeruli,renal function tests &urine analysis, Glomerulonephritis –Primary proliferative and non proliferative, Sec- ondary (SLE, Amyloidosis, Diabetes)
Nephrotic syndrome and the nephritic syndromes
Pyelonephritis , reflux nephropathy, Nephrolithiasis & obstructive nephropathy
Cysts of the kidney; Renal failure; Acute tubular injury;
Tumours of Kidney and Pelvis

Desirable to know: Hypertensive renal disease; Thrombotic microangiopathies, drugs and toxins causing renal injury.

13. **GIT:**

Must know: Precancerous lesions and carcinoma of Oral cavity; Salivary gland tu- mours.
GERD ; Ca oesophagus.
Gastritis, Peptic Ulcer, Carcinoma stomach,
Ulcers of Intestines- Typhoid, tubercular, amoebic ulcers and bacillary dysentery.
Ulcerative colitis and Crohn's; Appendicitis;
Intestinal polyps; malabsorption syndromes-coeliac disease, Whipples Carcinoma colon; GI stromal tumours.

Desirable to know Odontogenis cysts and tumours; Hirschsprung disease; Tumours of the appendix

14. **Liver and Gall Bladder:**

Must know: Jaundice; Viral Hepatitis; NASH; Alcoholic liver disease; Cirrhosis.
Gall bladder: Cholecystitis, cholelithiasis and tumours Hepatocellular carcinoma.

Desirable to know Wilson's disease, Hemochromatosis,Portal hypertension, Autoim- mune hepatitis, primary biliary cirrhosis, primary sclerosing cholangitis Autoimmune hepatitis.
Tumours of exocrine and endocrine Pancreas.

15. **MGS and Lower Urinary Tract:**

Must know: . Cryptorchidism; Tuberculous epididymo orchitis, Tumours of testis Benign prostatic hyperplasia; Carcinoma Prostate and urinary bladder; Carcinoma Penis

Desirable to know Congenital anomalies of MGS; Malakoplakia; Prostatis, Metaplas- tic lesions of bladder.

7. **FGS and Breast:**

Must know: Carcinoma Cervix; Carcinoma Uterus; Leiomyoma; Endometriosis and adenomyosis.
Tumours of Ovary; Complete and Partial Hydatidiform mole; Choreo- carcinoma,
Fibroadenoma, Phyllodes tumour, & Carcinoma breast

Desirable to know: Tumours of Vulva and Vagina; Pagets disease of Vulva; Endo- metrial polyps & hyperplasia; PCOD; PID

18. **Endocrine system:**

Must know: Diffuse & multinodular goiter; Hashimoto's thyroiditis; Grave's disease; carcinoma of thyroid
Diabetes mellitus
Parathyroid hyperplasia and tumours
Pheochromocytoma ; Cushings syndrome

Desirable to know Addison's disease; MEN syndromes; Pituitary adenomas; Prolac- tinoma

19. **Bones Joints and Soft Tissue Pathology:**

Must know: Osteomyelitis-acute chronic, tuberculous,
Rickets/osteomalacia; Osteoporosis; Paget's disease, Rheumatoid ar- thritis,
Osteoarthritis & Gout
Bone tumours - Osteosarcoma, Osteoclastoma, Ewing's sarcoma; Plasmacytoma
Soft tissue tumours -Lipoma, Neurofibroma, Schwannoma heman- gioma

Desirable to know: Fibrous dysplasia; Aneurysmal bone cyst; Osteochondroma; Chondrosarcoma ; Synovial sarcoma;

20. **Lymphoreticular System:**

Must know: Common causes of lymphadenopathy and Splenomegaly
Hodgkin's lymphoma-classification, morphology and staging
Non Hodgkins lymphoma: classification ,Lymphoblastic, Burkitt's, DLBCL, Follicular
Mycosis fungoides, Sezary syndrome

Desirable to know: Anaplastic large cell lymphoma; Hypersplenism, Thymomas

21. **CNS:**

Must know: Inflammatory disorders: various types of Meningitis,brain abscess, Tu- berculoma
WHO classification of brain tumours; Gliomas, Meningioma Cerebrovascular disease: atherosclerosis, thrombosis, embolism, aneu- rysm, hypoxia, infarction, hemorrhage; Alzheimer's disease

Desirable to know: Degenerative brain disease

22. **Dermatopathology:**

Must know: Psoriasis, Lichen planus , Skin tumours: SCC, BCC, Nevus, Malignant melanoma

PRACTICAL:

Practical classes will have slide/specimen discussion along with clinicopathological correlation (CPC) discussions at the end of each chapter. The list of histopathology slides and specimens shown to them are given below.

Histopathology slides:

1. Fatty liver 2. Monckebergs sclerosis 3. Hyaline change 4. Coagulative necrosis 5. Fat necrosis 6. Acute appendicitis 7. Osteomyelitis 8. TB intestine 9.TB lymphnode 10. FB granuloma 11. Tuber- culoid leprosy 12. CVC lung 13. CVC spleen 14. Amyloid kidney 15. Lipoma 16. Squamous cell papilloma 17. Fibroadenoma breast 18. Capillary hemangioma 19. Cavernous hemangioma 20. Se- rous cystadenoma 21. Benign cystic teratoma 22. Leiomyoma 23. Actinomycosis 24. Rhinosporidi- osis 25. Atheroma 26. Pneumonia 27. Pleomorphic adenoma 28. Signet ring cell carcinoma stom- ach 29.Adenocarcinoma colon 30. Cirrhosis liver 31. Chronic pyelonephritis 32. Nephroblastoma

33. Renal cell carcinoma 34. Transitional cell carcinoma 35. Seminoma 36. Colloid goitre 37. Hashimoto's thyroiditis 38. Papillary carcinoma thyroid 39. Hodgkin's disease 40. Secondaries lymphnode,41. Squamous cell carcinoma 42. Basal cell carcinoma 43. Malignant melanoma 44. Os- teosarcoma 45. Osteoclastoma 46. Meningioma 47. Schwannoma

Gross specimens:

1. Stones. 2. Staghorn calcululs. 3. Acute Appendicitis. 4.Acute cholecystitis. 5. TB lymphnode. 6. Gangrene intestine 7. Gangrene foot 8. CVC spleen 9. Infarct spleen 10. Hydatid cyst 11. Li- poma 12. Ca..Larynx 13. Cavity lung 14. Carcinoma lung 15. FAP colon 16. Amoebic ulcer colon

17. Carcinoma colon 18.Cirrhosis liver 19. Polycystic kidney 20. Renal cell carcinoma 21. Carci- noma bladder 22. Malignant melanoma 23.Ca penis 24.Serous pap. cyst adenoma, ovary 25. Tera- toma ovary 26. Leiomyoma uterus. 27.Carcinoma cervix 28.Carcinoma uterus 29.Fibroadenoma breast 30.Ca breast 31. MNG-thyroid. 32.Osteosarcoma 33.Osteoclastoma.

Haematology Slides:

1. Neutrophil 2. Eosinophil 3. Iron deficiency anemia 4. CML 5. AML 6. Normoblast 7.Sickle cell

8. LE cell 9. Plasma cell 10.Malarial parasite 11. Megakaryocyte 12. Spherocyte 13. Elliptocyte. 14. Target 15. Acanthocyte 16. Burr cell

Charts:

1. Iron deficiency anemia 2.Megaloblastic anemia 3.Haemolytic anemia 4.Thalassemia 5. Sickle cell anemia 6.Acute leukemia 7. AML-M4 8. CML 9. Obstructive jaundice 10. Haemolytic jaundice

11. Hemophilia 12. CSF- bacterial meningitis 13. CSF -viral meningitis 14. CSF -TB meningitis 15. Acute glomerulonephritis 16. Nephrotic syndrome 17. GTT 18. Semen analysis

Instruments:

1. LP needle 2. BM needle 3. Liver biopsy (trucut) needle 4. Albuminometer 5. L block

6. Block holder 7. Cassette 8Ayre's spatula 9. Paraffin block 10. FNAC model 11. ESR tube 12. RBC pipette 13.WBC pipette 14. Counting chamber 15. PCV tube 16. HB pipette 17. Urinometer

18. Automatic Tissue Processor

AUTOPSY:

To study and describe two autopsy reports.

DETAILS OF PRACTICALS (100 hrs)

General Pathology, Haematology, Clinical Pathology and Systemic Pathology. The practical classes include.

1. Gross specimens
2. Microscopic slides for identification
3. Identification of instruments with their uses
4. Discussion on charts
5. Peripheral smear- staining and reporting of the given smear
6. Hb estimation and blood group examination
7. Total WBC count and PCV estimation
8. Routine urine examination including Microscopic examination
9. ESR estimation from the given sample of blood

The student has to write clinical pathology, histopathology, Post Mortem findings of 2 cases in record . Clinical Pathology Posting for 15 days will be set apart, where the students will be posted to the different labs.

Distribution of Marks for University Examination:

Theory Paper I	Theory Paper II	Practical	Viva voce	Total
40	40	25	15	120

University Examination

Theory:

Division of topics:

Paper I- General Pathology, Hematology and Clinical Pathology

Paper II-Systemic Pathology

Each paper will have 2 sections- Section-A & Section –B (see model question papers on pages 177 & 178)

Practicals:

1. Spotters at 20 stations which include histopathology & haematology slides, instru- ments, charts, gross specimens, urine and haematology tests.
2. Peripheral smear preparation and staining
3. Peripheral smear reporting
4. Blood grouping
5. WBC count/Hb estimation

Evaluation of Practicals:

Spotters (20) 20x2	**Peripheral Smear Prepara-tion & Staining**	**Report-ing of Periph-eral Smear**	**BloOd Group ing**	**Hb/ WBC Estimation**	**Urie Analysis**	**Record**	**Total Score**	**Total Marks**
40	10	10	10	10	10	10	100	25

Viva voce: All examiners will individually assess each candidate. It is conducted at 4 stations cov- ering all the topics in Hematology, Clinical Pathology, General Pathology and Systemic Pathology.

Textbooks Recommended

1. Pathological basis of disease. - Robbins and Cotran
2. General and systemic Pathology – JCE Underwood
3. Clinical Haematology in medical practice – De Gruchy- Livingston
4. Hematology - Dr. Tejinder Singh
5. Textbook of pathology by Dr. Harsh Mohan
6. Preparatory manual of Pathology for undergraduate students by Dr. Ramdas Naik
7. Text book of Hematology and clinical Pathology by Dr.Ramdas Naik

MICROBIOLOGY (U19MBB202)

Goal

The broad goal of teaching undergraduate students in Microbiology is to provide an understanding of the natural history of infectious disease in order to deal with etiology, pathogenesis, laboratory diagnosis, treatment and control of infections in the community.

Competencies:

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies.

- To describe the morphology of bacteria.
- To demonstrate the various methods of sterilisation practiced in the microbiology laboratory.
- To interpret the various antigen antibody reactions
- To identify various hypersensitivity reactions.
- To diagnose Mycobacterium tuberculosis infection using laboratory techniques.
- To diagnose the syphilis using laboratory techniques.
- To diagnose MRSA infection using laboratory techniques.
- To diagnose Hepatitis B using laboratory techniques.
- To diagnose HIV using laboratory techniques.
- To diagnose intestinal parasitic infections using wet mount of stool.

Objectives

The objective of teaching medical microbiology is to enable the student to understand the natural history of infectious diseases in order to deal with the etiopathogenesis, laboratory diagnosis and

control of infections in the community and the hospital set up as well..

Knowledge:

At the end of the course, the student shall be able to:

- State the infective micro-organisms of the human body and describe the host parasite relationship;
- List pathogenic micro-organisms (bacteria, viruses, parasites, fungi) and describe the pathogenesis of the diseases produced by them.
- State or indicate the modes of transmission of pathogenic and opportunistic organisms and their sources, including insect vectors responsible for transmission of infection;
- Describe the mechanisms of immunity to infections;
- Acquire knowledge on suitable antimicrobial agents for treatment of infections and scope of immunotherapy and different vaccines available for prevention of communica- ble diseases;
- Apply methods of disinfection and sterilization to control and prevent hospital and com- munity acquired infections;
- Recommend laboratory investigations regarding bacteriological examination of food.

Skills:

At the end of the course, the student shall be able to:

- Plan and interpret laboratory investigations for the diagnosis of infectious diseases and to correlate the clinical manifestations with the etiological agent.
- Identify the common infectious agents with the help of laboratory procedures and use antimicrobial sensitivity test to select suitable antimicrobial agents;
- Perform commonly employed bed-side tests for detection of infectious agents such as blood film for malaria, filarial, gram staining and Acid Fast Bacilli (AFB) staining and stool sample for ova cyst etc.;
- Use the correct method for collection, storage and transport of clinical material for microbiological investigations.

Course Outcomes:

CO1: Knowledge of the natural history of infectious disease in order to deal with etiology, patho- genesis, laboratory diagnosis, treatment and control of infections in the community.

CO2: Competency to demonstrate the various methods of sterilisation practiced in the microbiol- ogy laboratory.

CO3: Competency to interpret the various antigen antibody reactions.

CO4: Competency to identify various hypersensitivity reactions.

CO5: Competency to diagnose Mycobacterium tuberculosis infection using laboratory techniques.

CO6: Competency to diagnose the syphilis using laboratory techniques.

CO7: Competency to diagnose MRSA infection using laboratory techniques.

CO8: Competency to diagnose Hepatitis B using laboratory techniques.

CO9: Competency to diagnose HIV using laboratory techniques.

CO10: Competency to diagnose intestinal parasitic infections using wet mount of stool.

Teaching Hours

Lecture	Practical	Innovative Sessions	Total
80	80	80	240

Schedule of Lectures

	Topic	Hours
	General microbiology (12 hours)	
1	Introduction to Microbiology	1
2	Morphology & physiology of bacteria	2
3	Culture media, identification of bacteria	1
4	Sterilization & disinfection	2
5	Bacterial genetics and drug resistance	3
6	Molecular methods in lab diagnosis	1
7	Antibacterial agents & antibiotic sensitivity tests	1
8	Infection	1
	Immunology (17 hours)	
1	Introduction , classification of immunity cells involved in immunity	1
2	Antigen	1
3	Antibody	1
4	Antigen- Antibody reactions	2
5	Structure and functions of Immune system	2
6	Immune response	2
7	Complement in health & disease	1
8	H L A antigens in health & disease	1
9	Autoimmunity	1
10	Tumour & transplantation immunity	1
11	Immunodeficiency diseases	1
12	Immuno hematology	1
	Systematic Bacteriology (30 hours)	
1	Staphylococci	1
2	Streptococci	1
3	Pneumococci	1
4	Neisseria	1
5	Coryne bacterium	1
6	Mycobacteria	1
7	Bacillus	1

8	Clostridia	2
9	Nocardia and Actinomycetes	1
10	Nonsporing anaerobes	1
11	Enterobacteriaceae	3
12	Hemophilus & Bordetella	1
13	Brucella	1
14	Yersinia , Pasteurella & Francisella	1
15	Pseudomonas	1
16	Vibrio and campylo bacter	2
17	Listeria and Legionella	1
18	Spirochaetes	3
19	Leptospira	1
20	Mycoplasma	1
21	Rickettsiae	1
22	Chlamydiae	1
23	Miscellaneous	1

Virology (20 hours)

1	General characteristics of viruses & cultivation	1
2	Virus host interactions,Replication of virus,Interferons	1
3	Diagnosis of viral infections , Bacteriophage	1
4	Poxviruses Adenoviruses & Herpesviruses	2
5	Picorna Viruses	1
6	Myxoviruses	3
7	Arboviruses	2
8	Hepatitis viruses	3
9	Slow Viruses	1
10	Miscellaneous Viruses	1
11	Human Immunodeficiency Virus	2
12	Rhabdoviruses	1
13	Retroviruses & Oncogenic Viruses	1
14	Henipavirus	1

Mycology (5 hours)

1	Introduction classification &Lab. Diagnosis	1
2	Superficial fungal infections	1
3	Sub cutaneous fungal infections	1
4	Deep mycotic infections	1
5	Opportunistic fungi	1

Parasitology -19

1	Introduction to parasitology	1
2	Entamoeba	1
3	Free living amoebae	1
4	Flagellates – Intestinal and Genital	1
5	Hemoflagellates - Leishmania	1
6	Hemoflagellates -Trypanosoma	1
7	Plasmodium & Babesia	2

8	Toxoplasma & Balantidium coli	1
9	Intestinal coccidian parasites & Microsporidia	1
10	Cestodes	2
11	Trematodes	2
12	Intestinal Nematodes I – Trichuris, Enterobius, Strongyloides	1
13	Intestinal Nematodes II – Ascaris and Trichinella	1
14	Intestinal Nematodes II – Hookworm and Larva Migrans	1
15	Tissue nematodes - Filarial Nematodes I	1
16	Filarial Nematodes II and Dracunculus	1

Applied Microbiology (4 hours)

1	Infection control practices	1
2	Healthcare associated infections	1
3	Bacteriological analysis of food, water, milk & air	1
4	Disposal of Hospital waste	1
5	Selection of Antimicrobials based on culture and sensitivity	1

Integrated learning (4 hours)

1	**Horizontal integration (3rd semester)** Topic: Hypersensitivity reactions Departments involved: Microbiology, Pathology and Pharmacology	2
2	**Vertical integration(4th semester)** Topic: Tuberculosis Departments involved: Anatomy, Microbiology, Pathology, Pharmacology, Medicine, Surgery (30 minutes for Microbiology and Pathology, 15 minutes for other	2

Schedule of Practicals

1	Microscopy	1
2	Staining methods	1
3	Simple staining	1
4	Gram staining	4
5	Culture media and culture methods	1
6	Identification of bacteria	1
7	Sterilization & Disinfection	1
8	Ziehl-Neelsen staining	4
9	Lacto phenol cotton blue mount for fungi-demonstration	1
10	Parasitology – demonstration of ova/cyst in stool	1
11	Hanging drop preparation demonstration	1
12	Spotters- Structured exercises - Covering all sections	5
13	Antibiotic sensitivity test	1
14	Antigen Antibody reactions	1

	Applied Microbiology/ Clinical Microbiology (Demonstration cum practical) 56hrs	1
1	Collection & despatch of specimens	
2	Oropharyngeal infection	2
3	Wound infections	2
4	Respiratory tract infections	1
5	Meningitis-Pyogenic/fungal	1
6	Gastrointestinal infections	2
7	Urinary tract infections	1
8	Urethritis	1
9	Aseptic meningitis & encephalitis	2
10	Blood culture techniques	1
11	Equipments/ Instruments (Lab visit)	1
12	Interpretation of lab results	1
13	Pyrexia of Unknown Origin	1
14	Zoonotic infections	1
15	Sexually transmitted diseases	1
16	Tuberculosis	1
17	Vector borne diseases	2
18	Blood borne infections	2
19	Bone and joint infections	1
20	Infections of eye and ear	1
21	Congenital infections	1
22	Immuno prophylaxis& immunotherapy	1
	Revision -Seminar/Formative evaluation/Practical tests	30

Distribution of Marks for Internal Assessment and University Examination

University Examination					**Internal Examination**		
Theory I	**Theory II**	**Practical**	**Viva voce**	**Total**	**Theory**	**Practical**	**Total**
40	40	25	15	120	15	15	30

Internal Assessment

Internal assessment consists of internal assessment examinations and continuous evaluation during the course. Continuous evaluation during the course includes practical record book maintenance, performance in theory and practical tests, evaluation of student assignment etc. Three theory internal assessment exams & one practical internal assessment exam will be con- ducted. Practical internal assessment exam will be conducted after the third theory internal as- sessment as part of the third internal assessment.

The first & the second theory internal assessment examinations will be conducted in the afternoons of the last week of semesters III and IV as examination week and the third internal assessment (theory & practical) just before the University Examination.

The duration of the first and second internal assessment examinations will be of two hours each and the question paper pattern will be same as university examination. The third theory internal assessment examination will have 2 papers and will be conducted in the actual pattern of the University Examination. Of the consolidated theory internal assessment marks, 50% may be based on the last internal assessment examination and the rest 50% based on the first & the sec- ond internal assessment examinations and continuous evaluation during the course. Weightage for the continuous evaluation during the course should be 20% of the total marks in the subject.

Universityexamination:

Theory:

There will be two papers – Paper I and Paper II Examination is to be conducted on two days. Duration of each Paper will be of two hours. Each Paper carries a total of 40 marks.

Paper I includes General Bacteriology, Systematic Bacteriology and Immunology.

Paper II includes Virology, Parasitology, Mycology, & Clinical

Practical:

Practical examination will be conducted in the laboratory. The objective of this ex- amination is to assess the proficiency in the conduct of experiment, interpretation of data and logical conclusion. Structured evaluation will be done, 25 marks are to be allotted for practical examination. The exercises will be in the following pattern:

I. Two staining techniques. Gram staining and Ziel Neelsen staining of clinical mate- rial.(5+5=10 marks)

(For each exercise above: Skill – 2 marks, Diagram – 1 mark, Interpretation – 2 marks)

II. Clinical Case –A case scenario with 4 to 5 relevant exhibits(culture plates/ photographs/charts/serological test) are placed along with a series of questions.(5marks)

III. 10 spotters-Structured exercises (Covering all topics as far as possible)
(10 x 1 = 10 marks)

e.g.- Gram stained smear of organisms, grown anaerobically on BA. Aerobic plate has no growth
What is the organism likely to be?
Mention one or more infections it can cause? What is the drug of choice?

Viva voce

Four examiners will individually examine and assess each candidate. Marks will be di- vided among the examiners.

Textbooks Recommended

Prescribed Books (Latest Edition):

1. Textbook of Microbiology – R.Ananthanarayanan & C.K. Jayaram Panicker
2. Essentials of Medical Microbiology- Apurba Sankar Sastry/Sandhya Bhat K
3. Textbook of Medical Parasitology – by C.K.Jayaram Panicker
4. Essentials of Medical Parasitology - Apurba Sankar Sastry/Sandhya Bhat K
5. Medical Microbiology - Jawetz, Melnick & Adelberg's

Reference Books

1. Basic Imunology : Functions and Disorders of the Immune System By Abdul K Abbas/ An- drew Lichtman/ Shiv Pillai
2. Textbook of Immunology by Roitt
3. Medical Microbiology & Immunology by Warren Levinson / Ernest Jawetz
4. Textbook of Parasitology by Chatterjee K.D
5. Medical Parasitology by RL Ichhpujani / Rajesh Bhatia
6. Koneman's Color Atlas and Textbook of Diagnostic Microbiology (Color Atlas & Textbook of Diagnostic Microbiology) Elmer. W. Koneman
7. Text Book of Medical Mycology by Jagadish Chander
8. Fields Virology(Knipe,Fields Virology)-2 Volume Set [Hardcover] by David M. Knipe/ Peter Howley
9. Mackie & McCartney – Practical Medical Microbiology by Collee/Fraser/Marmion/Simmons
10. Bailey & Scott's Diagnostic Microbiology by Forbes/ Sahm/Weissfeld

PHARMACOLOGY (U19MBB203)

Goal

To guide a medical graduate to study the various aspects of the pharmacology of drugs so as to gain competence in the safe and rational use of drugs for the promotive, curative and rehabilitative purposes.

Competencies:

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies.

1. To use essential medicines in the daily practice of the medical graduate.
2. To select drugs for common disease conditions based on objective criteria, individual- ise the selected drug for a particular patient and write a correct prescription.
3. To respond effectively to pharmaceutical promotion and the ability to use various inde- pendent sources of medicine information in the process of prescribing and providing treatment.
4. To use drugs, especially antimicrobials rationally.
5. To analyse prescribing in primary health facilities using WHO prescribing indicators and be able to use the same for self-analysis and improvement of own prescribing be- haviour.
6. To communicate drug and non-drug information about common diseases with a simu- lated patient.
7. Report adverse drug reactions to the pharmacovigilance centre.
8. Diagnose and manage overdosage.

The Broad Objectives

- To understand the concept of "Rational Therapy"
- To practice "Rational Use of Drugs" based on the knowledge gained from the study of pharmacology of drugs.
- To develop good prescribing habits and communication skills.
- To understand the essence of ''Essential Drug Concept'' and be competent to make/ modify the essential drug list of the institution.
- To uphold the principles of "Medical Ethics" in patient care, drug development and research.

Objectives in Detail:

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

Related to knowledge:

- Appreciate the relevance of studying the pharmacokinetics and pharmacodynam- ics of drugs.
- Understand the significance of alterations of pharmacokinetics and pharmacody- namics of drugs in the special groups like the paediatric, the geriatric, the pregnant and the lactating, the drug addict and the ethnic variant.
- Derive at the possible and probable indications, contra indications, interactions, and adverse effects of drugs based on the pharmacology of

individual drug or groups of drugs.

- Understand the importance of eliciting drug history as a routine practice.
- Familiarize with the process of rational prescribing and rational treatment for the individual and the social group
- Recognise the common signs and symptoms of poisoning due to over dosage of medicines, natural substances and chemicals and chart out the line of manage- ment.

  Understand the deleterious effects of substance abuse and the principles of pre vention and treatment.
- Understand the importance of the concept of essential drugs and to participate in the process of updating essential drug list of the institution.
- Learn the protocol to be followed during the development and clinical trial of drugs.

Related to skill:

- Cultivate good prescribing habit based on the 'WHO Guidelines to Good Pre- scribing'
- Develop communication skill.
- Prescribe drugs for common ailments.
- Learn to critically evaluate drug prescriptions and formulations.
- Familiarise with the nature of common formulations like powder, elixir, mixture, lotion ointment, paste etc. and learn the technique of compounding and dispens- ing in a small set up like a pharmacy.
- Observe/perform some of the experiments designed to study the drug effects and learn to interpret the data elicited.
- Participate in activities like adverse drug event monitoring, therapeutic serum plasma drug level monitoring etc.

Related to attitude:

- Learn to respect and uphold the principles of ethics in personal life, in patient care and also during development and research.

Training Method

- Theory classes- Emphasis is given to drugs included in the essential drug list.
- Practical exercises.
- Project work.
- Problem based learning and presentation.
- Subject seminars.
- Integrated teaching –Vertical and horizontal Integration with other departments.
- Group discussions/tutorials.
- Oral, quiz, periodical assessment.
- Continued medical education programmes.

Course Outcomes

CO1: Competency to use essential medicines in the daily practice of the medical graduate.

CO2: Competency to select drugs for common disease conditions based on objective criteria, individualise the selected drug for a particular patient and write a correct prescription.

CO3: Competency to respond effectively to pharmaceutical promotion and the ability to use various independent sources of medicine information in the process of prescribing and providing treatment.

CO4: Competency to use drugs, especially antimicrobials rationally.

CO5: Competency to analyse prescribing in primary health facilities using WHO prescribing indicators and be able to use the same for self-analysis and improvement of own prescribing behaviour.

CO6: Competency to communicate drug and non-drug information about common diseases with a simulated patient.

CO7: Competency to report adverse drug reactions to the pharmacovigilance centre.

CO8: Competency to diagnose and manage overdosage.

System wise Distribution of Lecture Hours: **Total Hours - 110**

Systems	Hours	Systems	Hours
General Pharmacology	12	Autonomic Nervous System	10
Autacoids and Related drugs	6	Respiratory System	3
Kidney	4	Cardiovascular Systems	10
Peripheral Nervous System	2	Central Nervous System	14
Antimicrobial Chemotherapy	12	Chemotherapy of Parasites	6
Chemotherapy of Neoplasm	4	Immunomodulators	3
Hormones & Antagonists	13	Blood & Blood formation	4
Gastrointestinal Function	3	Toxicology	2
Miscellaneous	2		

THEORY LECTURES:

Basic Principle:

- The common diseases of the area to be identified
- Emphasis is to be given to drugs used more often for prophylaxis and treatment.
- The prototype representing the system /class and those included in the essential drug list alone to be discussed in depth. Frequently used preparations / formulations of that group/class may be compared with the prototype..
- The pharmacology required for understanding the basis of rational use in the clinical setting alone to be discussed.
- Principles of management of common diseases and poisonings are to be included in the discussion.
- Throughout the discussion, the importance of rational use of drugs to be stressed.

Common Format For Discussion of Theory Topics:

Definition, grouping/classification (preferably therapeutic classification), commonly used prepara- tions, clinically relevant aspects of pharmacokinetics, mechanism of action, pharmacological ac- tions, adverse effects, precautions, indications, contraindications and clinically significant interac- tions (topics arranged as per the divisions in the University examination

Section A (20 marks)

1. General Pharmacology

- Introduction: Definitions, Nomenclature, Essential drug concept, Rational drug use.
- Routes of drug administration.
- Pharmacokinetics; Absorption, Bioavailability, Distribution, Biotransforma- tion and Excretion.
- Pharmacodynamics: Principles of drug action, Mechanisms of drug action, Action- effect sequence, The relationship between drug concentration and effect, Combined effect of drugs, Dosage and factors modifying drug action.
- Adverse effects of drugs

2. Autacoids & Related Drugs Antihistamines: H1 Blockers

- 5-Hydroxytryptamine & their antagonists: Preparations and clinical uses.
- Eicosanoids: Prostaglandins, Leukotrienes & Platelet- activating factors: preparations and clinical uses of major eicosanoids.
- Non opioid analgesics & non steroidal anti-inflammatory drugs.
- Principles of drug therapy of migraine.
- Drugs for gout.
- Drugs for rheumatoid arthritis

3. Autonomic Nervous System

- General considerations.
- Cholinergic drugs : Esters of choline, Natural alkaloids.
- Anticholinesterases
- Anticholinergic drugs: Anti muscarinic agents- Natural alkaloids, semisyn- thetic and synthetic compounds.
- Adrenergic drugs, catecholamines and non catecholamines.
- Adrenergic receptor blockers

4. Respiratory System:

- Drugs for cough
- Drugs for bronchial asthma
- Principles of management of bronchial asthma

Section B (20 marks)

5. **Central Nervous System & Peripheral Nervous System:**

- General anaesthetics.
- Skeletal muscle relaxants.
- Local anaesthetics.
- Alcohols: ethyl alcohol, methyl alcohol.
- Sedative- hypnotics: benzodiazepines and miscellaneous drugs.
- Opioid analgesics and antagonists.
- Drugs for anxiety disorders, affective disorders and psychoses.
- Anti seizure drugs.
- Drugs for degenerative disorders: Parkinsonism.
- CNS stimulants (psycho stimulants) and cognition enhancers
- (Nootropics) preparations and uses

6. **Cardiovascular System, Drugs Affecting Coagulation and Lipid Lowering Agents**:

- Drug therapy of heart failure.
- Drugs therapy of myocardial ischaemia.
- Drug therapy of hypertension.
- Antiarrhythmic agents: Brief discussion based on salient features of the class.
- Drugs affecting coagulation and thrombosis.
- Plasma expanders.
- Drug therapy of shock.
- Drug therapy of hyperlipidemia

7. **Renal System**

- Diuretics
- Vasopressin and other agents affecting the renal conservation of water.
- Drugs affecting rennin - angiotensin - aldosterone mechanism.

8. **Blood Forming Agents**

- Haematopoietic agents: Growth factors, iron, folic acid and vitamin B_{12}

Section A (20 marks)

Sl. No Topics

1. **Gastrointestinal Tract**

- Drug therapy of peptic ulcer.
- Drugs affecting gastrointestinal motility: Drugs for constipation, diarrhoea, emetics and anti emetics.
- Emetics and anti emetics

2. **Hormones**

- Hypothalamus and pituitary gland: Preparations and uses.
- Thyroid and antithyroid drugs.
- Pancreatic hormones and antidiabetic drugs.
- Adrenocorticosteroids and their analogues.
- Agents modifying bone mineral homeostasis: calcium, parathyroid hor- mone, calcitonin, vitamin D, biphosphonates

3. **Reproductive System**

- Gonadal hormones and inhibitors.
- Fertility and antifertility agents.
- Oxytocics, abortifacients, and tocolytics.

Section B (20 marks)

4. **Antimicrobial Chemotherapy**

- General principles of antimicrobial action.
- Sulphonamides and trimethoprim
- B -Lactam antibiotics.
- Aminoglycosides.
- Tetracyclines & chloramphenicol.
- Macrolides, Fluoroquinolones.
- Miscellaneous: examples.
- Antifungal drugs.
- Antiviral drugs.
- Antiseptics and disinfectants- examples.
- Chemotherapy of urinary tract infection and urinary antiseptics.
- Chemotherapy of tuberculosis.
- Chemotherapy of leprosy.
- Chemotherapy of sexually transmitted disorders.

5. **Chemotherapy of Parasites**

- Ectoparasites: scabies, pediculosis.
- Protozoal: malaria, amoebiasis, giardiasis, trichomoniasis.
- Helminthes: round worm, hook worm, thread worm, pin worm, whip worm, filarial worms, tape worm (Taenia solium & saginata)

6. **Chemotherapy of Neoplastic Diseases**

- General principles of Management.
- Discussion based on individual groups

7. **Toxicology**

- General principles of treatment.
- Heavy metal antagonists

8. **Immunomodulators**

- Immunosuppressants.
- Immuno stimulants.
- Gene therapy.

.

PHARMACOLOGY PRACTICAL EXERCISES:

- History of medicine & development of pharmacology as a separate discipline.
- Innovations, discoveries and inventions.
- Nature and sources of drugs.
- Chemical nature of drugs.
- Identification of the chemical nature of drugs.
- Dosage forms.
    a. Oral
    b. Parenteral.
    c. Topical.
- Method of drawing the contents from ampoules and vials.
- Routes of drug administration.
- Weights and measures.
- Calculation of dosages.
- The Prescriptions
    - Common abbreviations and symbols used in prescriptions and chart orders.
    - Rational prescribing based on "WHO Guide to Good Prescribing" and "Good Clinical Practice"
    - Prescription audit –Incompatibility, criticism and rewriting of the prescription.
- Clinical problem solving exercises.
- Effect of drugs on blood pressure, heart rate and and respiration on an anaesthetized dog (computer simulated execise).
- Effect of drugs on rabbit's eye.
- Effect of drugs on isolated frog heart.
- Effects of drugs on intestinal smooth muscle.
- Effects of drugs on skeletal muscle.
- Pharmacokinetic/ Pharmacodynamic charts.
- Bioavailability.
- Competitive antagonism.
- Non Competitive antagonism.
- Tachyphylaxis.
- An introduction to dispensing pharmacy.
- The powder: Oral rehydration salts (ORS).
- The Gargles & mouthwashes: Potassium permanganate solution.
- The Ointment: Whitefield's ointment.
- Criticism of informed consent forms.
- Pharmacovigilance.
    - Problem I
    - Problem II.
- Fixed dose drug combinations
- Drug Interaction
- Effective doctor- patient communication.

SCHEME OF UNIVERSITY PRACTICAL EXAMINATION

Time – 3 hours **Max marks: 25**

Practical I **Max marks -**

Exercises	**Number**	**12 Marks**
Spotters	10	5
Prescription writing/Prescription audit	1	3
Problem solving exercise	1	2
Calculation of dosage/ADE Form filling/ Drug Interaction	1	2

Practical II (Max. marks: 13 marks)

Dispensing pharmacy	1	4
Experimental Pharmacology	1	4
Graph/chart / flowchart	1	2
Communication skill	1	3

Max marks -15

Viva voce

1. General Pharmacology, Autacoids and Related drugs, Blood forming Agents, Gastrointestinal Tract — 3 Marks
2. Autonomic Nervous System, Respiratory System, Cardiovascular System, Drugs Affecting Coagulation & Lipid Lowering Agents — 4 Marks
3. Hormones, Reproductive System, Central Nervous System, & Peripheral Nervous System — 4 Marks
4. Antimicrobial Chemotherapy, Chemotherapy of Parasites, Chemotherapy, Chemotherapy of Malignancy, Immunomodulators, Toxicology — 4 Marks

DISTRIBUTION OF TEACHING HOURS

Lecture	**Practical**	**Innovative Sessions**	**Total**
110	128	82	320

1. Essentials of Medical Pharmacology, K D Tripathi
2. Principles of Pharmacology by HL Sharma & KK Sharma
3. Pharmacology and Pharmacotherapeutics, R.S. Satoskar and S. D Bhandarkar
4. Pharmacology for Medical Graduates (3rd Edition) by Tara v Shanbhag, Smita Shenoy

Reference Books (Latest Edition)

1. Goodman and Gilman's The Pharmacological Basis of Therapeutics, Laurence L Brunton
2. Modern Pharmacology with Clinical Application, Charles R Craig
3. Basic and Clinical Pharmacology, Bertram G Katzung
4. Clinical Pharmacology, P. N. Bennet, M.J.Brown.

FORENSIC MEDICINE & TOXICOLOGY (U19MBB204)

Goal

The broad goal of teaching undergraduate students in Forensic Medicine & Toxicology is to pro- duce a physician who is well informed about medicolegal responsibilities in the practice of medi- cine. S/he should be capable of making observations and inferring conclusions by logical deduc- tions to set enquiries on the right track in criminal matters and connected medicolegal problems. S/he must acquire knowledge of law in relation to medical practice, medical negligence and respect for codes of medical ethics.

Competencies

The Indian Medical Graduate will get the knowledge and skills necessary to attain the following competencies.

Core Competencies:

- Conduct a medico-legal autopsy of an adult, prepare an autopsy report and give evi- dence in a court of law.
- Conduct a medico-legal autopsy of an infant, prepare an autopsy report and give evi- dence in a court of law.
- Identify the cases where medico-legal autopsy is to be performed by an expert and ad- vice the law enforcement agencies in this regard.
- Collect, preserve and dispatch material objects and samples from the dead body as a part of autopsy examination.
- Identify the cases where police intimation is required and medico legal reports are to be prepared and handle such situations with necessary communication skills.
- Examine an injured individual, prepare a report and give evidence in a court of law.
- Examine an individual alleged to be intoxicated, prepare a report and give evidence in a court of law.
- Examine the victim in an alleged sexual assault case, prepare a report and give evidence in a court of law.
- Examine the accused in an alleged sexual assault case, prepare a report and give evi- dence in a court of law.
- Examine an individual for estimation of age, prepare a report and give evidence in a court of law.
- Identify and manage cases of child abuse.
- Identify the scenarios where material objects are to be collected, preserved and dis- patched from a living person.
- Identify and manage common scenarios of acute and chronic poisoning and enveno- mation.
- Manage the medico-legal aspects of acute and chronic poisoning and envenomation.
- Practice the profession in accordance with principles of bioethics.
- Appropriately manage all patient-physician interactions which require consent with necessary communication skills and attitude.
- Possess the attitude to handle professional secrets in an ethical and legally compatible manner.
- Mould the practice so as to minimize and resolve legal conflicts arising in the doctor patient relationship.

Non-Core Competencies:

- Examine a set of bones, prepare a report and give evidence in a court of law.
- Identify and manage the medico-legal aspects of a scenario where a mentally ill individ- ual is the accused in a crime.
- Do common bedside toxicological tests.
- Assess the behaviour of other physicians in their professional capacity with respect to ethical, medico-legal and social implications.

Objectives

Knowledge

At the end of the course, the student shall be able to:

- Identify the basic medicolegal aspects of hospital and general practice.
- Define the medicolegal responsibilities of a hospital or general practice.
- Appreciate the physician's responsibilities in criminal matters, and respect for the codes of medical ethics.
- Diagnose and manage common acute and chronic poisoning and identify medi- colegal aspects.
- Describe the medicolegal aspects and findings of postmortem examination in case of death due to common unnatural conditions and poisonings.
- Detect occupational and environmental poisoning, prevention and epidemiology of common poisoning, and their legal aspects particularly pertaining to Workmen's Compensation Act.
- Describe the general principles of analytical toxicology.
-

Skills

At the end of the course, the student shall be able to:

- Make observations and logical inferences in order to initiate enquiries in criminal matters and medicolegal problems.
- Diagnose and treat common emergencies in poisoning and chronic toxicity.
- Make observations and interpret finding at postmortem examination.
- Observe the principles of medical ethics in the practice of this profession.

Integration

The department shall provide an integrated approach towards allied disciplines like Pathology, Ra- diology, Forensic Sciences, Hospital Administration, etc., to impart training regarding medicolegal responsibilities of physicians at all levels of health care. Integration with relevant disciplines will provide the scientific basis of clinical toxicology – e.g., medicine, pharmacology, etc.

Course Outcomes

CO1: Competency to Conduct a medico-legal autopsy of an adult, prepare an autopsy report and give evidence in a court of law.

CO2: Competency to conduct a medico-legal autopsy of an infant, prepare an autopsy report and give evidence in a court of law.

CO3: Competency to identify the cases where medico-legal autopsy is to be performed by an ex- pert and advice the law enforcement agencies in this regard.

CO4: Competency to collect, preserve and dispatch material objects and samples from the dead body as a part of autopsy examination.

CO5: Competency to identify the cases where police intimation is required and medico legal re- ports are to be prepared and handle such situations with necessary communication skills.

CO6: Competency to examine an injured individual, prepare a report and give evidence in a court of law.

CO7: Competency to examine an individual alleged to be intoxicated, prepare a report and give evidence in a court of law.

CO8: Competency to examine the victim in an alleged sexual assault case, prepare a report and give evidence in a court of law.

CO9: Competency to examine the accused in an alleged sexual assault case, prepare a report and give evidence in a court of law.

CO10: Competency to examine an individual for estimation of age, prepare a report and give evidence in a court of law.

CO11: Competency to identify and manage cases of child abuse.

CO12: Competency to identify the scenarios where material objects are to be collected, preserved and dispatched from a living person.

CO13: Competency to identify the scenarios where material objects are to be collected, preserved and dispatched from a living person.

CO14: Competency to manage the medico-legal aspects of acute and chronic poisoning and envenomation.

CO15: Competency to practice the profession in accordance with principles of bioethics.

CO16: Competency to appropriately manage all patient-physician interactions which require consent with necessary communication skills and attitude.

CO17: Attitude to handle professional secrets in an ethical and legally compatible manner.

CO18: Ability to mould the practice so as to minimize and resolve legal conflicts arising in the doctor patient relationship

.

Teaching hours:

* (Project Work, Seminars, Structured discussion, Integrated teaching, Formative evaluation, Revi- sion

Schedule of Lectures/Innovative Sessions:

Lectures	Practicals	Innovative sessions*	Total
34	20	50	104

Topic	Hours
Forensic Medicine	**40 Hours**
Introduction of Forensic Medicine Definition, synonyms, historical aspects, modern Forensic Medicine, sub-division etc.	**1 hour**
Courts and Legal Procedures Courts and their powers, Inquest, types of evidence, Dying declaration, Types of witnesses, Recording of medical evidence, Doctor as witness	**4 hours**
Ethical and Legal Aspects of Medical Practice MCI and SMC - Functions, Duties and privileges, Medical Ethics, Infamous conduct, Medical negligence, Consent in medical practice, Doctor and Consumer Protection Act, Euthanasia	**6 hours**

Personal Identity — **3 hours**

Factors for establishing identity, Determination of age and sex in the living and dead, Medicolegal importance of age, Forensic odontology, DNA profiling — **4 hours**

Forensic Thanatology

Definition of death, moment of death, types of death - somatic and molecular, Brain- stem death & organ transplantation, Suspended animation, Sudden death, sudden infant death syndrome, Postmortem changes and estimation of time since death, Crime scene investigation

Medicolegal Autopsy — **2 hours**

Objectives – procedures - negative autopsy, Examination of skeletal remains, Exhu- mation

Asphyxial Deaths — **3 hours**

Pathophysiology, classification, cardinal features, Hanging - definition, types, mecha- nisms of death, postmortem appearances, medicolegal importance; Strangulation - definition, types, postmortem appearances, medicolegal importance; Suffocation - types, postmortem appearances, medicolegal importance; Drowning - definition, types, mechanisms of death, postmortem appearances, diatoms test, medicolegal im- portance

Forensic Traumatology — **8 hours**

Classification of mechanical injuries, Blunt force injuries - abrasion, contusion, lac- eration, Sharp weapon injuries - incised and stab wound. Firearm injuries.

Regional injuries - head, spine, thorax, abdomen and limbs. Injuries in road traffic accidents, Medicolegal aspects of injuries - hurt, grievous hurt, culpable homicide, classification of fatal injuries, etc. Injuries from physical agents - burns, electricity and lightning, Non-accidental trauma in children

Human Sexual Function — **3 hours**

Medicolegal considerations of virginity, sex offences and paraphilias, pregnancy, de- livery, Medical Termination of Pregnancy Act - provisions – criminal abortion, impo- tence, sterility, artificial insemination, sterilisation, surrogacy

Infanticide — **2 hours**

Blood, Semen and Hair — **1 hour**

Identification of blood, semen and hair - collection and preservation, chemical tests for blood and semen, precipitin test, blood groups

Forensic Psychiatry — **3 hours**

Symptoms of mental illness, classification, Mental Health Act, Restraint of insane, civil and criminal responsibilities, feigned insanity

Toxicology — **25 Hours**

Occupational and Environmental Toxicology — **4 hours**

Non metallic irritants - phosphorus, halogens (chlorine)
Metallic irritants - arsenic, lead, mercury, copper and iron
Asphyxiants - CO, cyanide, H_2S

Plant Poisons — **2 hours**

Abrus precatorius, Datura, Oleanders, Odallum, Castor, Strychnos nux vomica, Croton tiglium, Calotropis, Semecarpus anacardium — **3 hours**

Bites and Stings

Snakes - identification, diagnosis and management of snake bite, scor- pion sting, bee & wasp sting — **3 hours**

Alcohols — **3 hours**

Ethyl and methyl alcohol, ethylene glycol

Pesticides

Organophosphates, carbamates, organochlorines, pyrethroids, zinc phosphide, aluminium phosphide, paraquat — **1 hour**

Antipyretics and Analgesics

Paracetamol, Aspirin

Opium and Opiates — **1 hour**

Barbiturates and Benzodiazepines — **1 hour**

Food Poisoning — **1 hour**

Microbial, chemical,
Mushrooms - clinical presentation and management

Substance Abuse: — **2 hours**

NDPS Act.
Synthetic & semi-synthetic narcotics, Heroin
Description and medicolegal importance relating to alcohol, tobacco, cannabis, cocaine, opiates, hypnotics, amphetamines, and hallucinogens

Integrated Teaching — **9 Hours**

a. With Emergency Medicine — **2 hours**

Identification of mechanical injuries, wound certification, ethical aspects of consent, examination of assault victim/s and accused, sexual assault victim examination, drunkenness examination

b. With Poison Control Centre — **6 hours**

Toxicology - Clinical aspects
Medicolegal issues involved in drug therapy, drug overdose, drug hyper- sensitivity, mistaken prescription/administration of drugs,
Drug dependence — **1 hour**

c. With Analytical Toxicology Laboratory

Toxicology - basic analytical aspects.

Seminars/Symposia	**5 Hours**
Euthanasia	**1 hour**
Plant poisons, chemicals and substance abuse	**3 hours**
Bites and stings	**1 hour**

Group Discussions **21 Hours**

I. Ethical and legal aspects of medical practice **2 hours**

II. Forensic thanatology **3 hours**

III. Medicolegal autopsy **3hours**
1. Objectives - Procedures- Negative autopsy
2. Examination of skeletal remains.
3. Exhumation

IV. Asphyxial deaths 3 **3 hours**

V. Forensic traumatology **10 hours**

VI. Clinical and medicolegal issues - poisoning **1 hour**

VII. Recent trends in toxicology **1 hour**

Schedule of Practicals

Specimens of poisons, venomous creatures, weapons, arms and ammuni- tion, etc. **6 hours**

Bones, X-Rays and photographs **4 hours**

Autopsy certificate, Wound certificate **4 hours**

Certificate of drunkenness **2 hours**

Examination of rape victim/accused **4**

hours Viscera/material objects: collection, preservation/dispatch **2**

hours Case of poisoning - problem solving exercise **4**

hours

Distribution of marks for Internal assessments and University examinations

University Examination				Internal Assessment		
Theory	**Practical**	**Viva voce**	**Total**	**Theory**	**Practical**	**Total**
40	30	10	80	10	10	20

.

Summative Assessment:
3 theory (40 marks each) and 3 practical internal examinations (30 marks each) may be held. Low- est marks secured for any internal assessment (theory) will not be considered for calculating the internal assessment average. At the end of the 5th semester, every student shall submit a record of 10 different medicolegal autopsies they have witnessed during the past 3 semesters. 10 marks allot- ted to the work record will be added to the marks of practical examinations and average will be taken as internal assessment.

At the end of the fifth semester of MBBS, one paper of University theory examination, one practi- cal examination and viva voce must be conducted.

University Examination

Theory **40 marks**

One paper including the whole subject. The marks will be divided in the following manner.

Ethics:	4 marks
Clinical Forensic Medicine:	8 marks
Forensic Pathology:	14 marks
Toxicology:	14 marks

Practicals **30 marks**

Assessment of Practical Skills
In the practical examination, any 4 of the following exercises may be chosen by the examiners for a particular day of examination:

- Age estimation and issuance of age certificate in the supplied proforma after perusing data/x-rays.
- Issuing wound certificate in the supplied proforma after analyzing set of data &/or photographs.
- Issuing drunkenness certificate in the supplied proforma after examination of a sub- ject/data.
- Problem solving exercise based on medicolegal autopsy report.
- Problem solving exercise of a case of poisoning.
- Medicolegal reporting on victim/ accused in sexual assault case in the supplied pro- forma after perusing data &/or photographs.
- Identifying the weapon; analysis of injury and drafting a statement to be given to po- lice.
- Examination and discussion on two articles or poisons of medicolegal importance.

Each exercise is to be completed within 20 minutes, and each carries 6 marks.

Viva voce (Structured) **10 marks**
All examiners will independently conduct viva voce for all candidates appearing on that day.

Work Record
Work record should be submitted on the day of practical examination for scrutiny by the

external examiners.

Textbooks Recommended

Prescribed Books

Forensic Medicine and Toxicology – PC Ignatius Forensic Medicine for Medicos – B Umadethan
Textbook of Forensic Medicine and Toxicology – VV Pillay Modern Medical Toxicology – VV Pillay

Reference books

Taylor's Principles & Practice of Medical Jurisprudence - Keith Simpson Knight's Forensic Pathology – Bernard Knight, Saukko
Principles and Practice of Forensic Medicine – B Umadethan
Comprehensive Medical Toxicology – VV Pillay

PHASE III
Semesters VI, VII, VIII and IX

Course of instruction of clinical subjects are continued in this Phase. After the second professional examination, students can enter the Phase III training . During the semesters VI and VII, the sub- jects Ophthalmology and Otorhinolaryngology are introduced. At the end of semester VII, Uni- versity examinations (Third professional part I) of the subjects Community Medicine, Ophthalmol- ogy and Otorhinolaryngology (ENT) are held. Students who have passed all the subjects of the second professional examination are alone allowed to appear for the third professional part I ex- amination. During semesters VIII and IX more attention is to given to the training in Medicine, Surgery, Obstetrics and Gynaecology (OBG) and Paediatrics. At the end of semester IX third pro- fessional (final) examination isheld.

Total hours of Lectures/Practical/Innovative sessions

Subjects	Lectures	Practical/ Clinical	Innovative Sessions	Total
Ophthalmology	76	240	64	380
Otorhinolaryngology	40	192	48	280
Orthopaedics	36	240	72	348
Pulmonology	8	48	16	72
Dermatology & STD	32	144	18	194
Psychiatry	8	140	16	164
Radiology	8	48	16	72
General Medicine	100	624	204	928
General surgery	100	624	204	928
Anaesthesiology	8	48	16	72
OBG	90	576	190	856
Paediatrics	44	240	88	372
Dentistry	4	48	8	60
Community Medicine	56	120		176

Duration of Clinical Posting

	Weeks	MCI Requirement
General Medicine*	30	26
General Surgery**	26	26
OBG	22	24
Paediatrics	10	10
Community Medicine	12	12
Orthopaedics***	10	10
Pulmonology	2	2
Dermatology	2	6
Psychiatry	4	2
Radiology****	2	2
ENT	8	8
Opthalmology	8	10
Dentistry	2	2
Casualty	2	2

* This posting includes exposure to Laboratory Medicine & Infectious Diseases.
** Includes exposure to dressing and Anesthesia.
*** Includes exposure to Rehabilitation and Physiotherapy.
**** This posting includes training in Radiodiagnosis and Radiotherapy.

OPHTHALMOLOGY (U19MBB301)

Goal

The broad goal of teaching students in ophthalmology is to provide such knowledge and skills to the student that shall enable him/her to practice as a clinical and as a primary eye care physician and also to function effectively as a community health leader to assist in the implementation of National programme for the prevention of blindness and rehabilitation of the visually impaired.

Competencies

The Indian Medical Graduate will get the knowledge and skills necessary to attain the following competencies.

- Elicit a history pertinent to general health and ocular status.
- Diagnose and treat common problems affecting the eye.

Objectives

Knowledge

At the end of the course, the student shall have knowledge of:

- Common problems affecting the eye.
- Principles of management of major ophthalmic emergencies
- Main systemic diseases affecting the eye.
- Effects of local and systemic diseases on patient's vision and the necessary action required to minimise the sequelae of such diseases.
- Adverse drug reactions with special reference to ophthalmic manifestations.
- Magnitude of blindness in India and its main causes.
- National programme for control of blindness and its implementation at various levels.
- Eye care education for prevention of eye problems.
- Role of primary health centre in the organization of eye camps.
- Organisation of primary health care and the functioning of the ophthalmic assis- tant.
- Integration of the national programme for control of blindness with the other na- tional health programmes
- Eye bank organization

Skills

At the end of the course, the student shall be able to:

- Assist in diagnostic procedures such as 1. visual acuity testing, 2. examination of eye, 3. subjective refraction correction of presbyopia , 4. pupillary reflex, 5. con- frontation perimetry, 6. Tear Film staining with flueorescein , 7. Color Vision 8. Direct ophthalmoscopy and conjunctival smear examination and cover test, cor- neal sensations 9. Schiotz tonometry.

Integration

Semester	VI	VII	Total
Hours	24	32	56

The undergraduate training in ophthalmology will provide an integrated approach towards other disciplines especially Neuro sciences, Otorhinolaryngology, General Surgery and Medicine.

Schedule of Lectures

Topic	Hours
Basics Anatomy Physiology including Vit. A Deficiency Embryology	**3 hours**
Optics Elementary optics Refractive error Accommodation, presbyopia	**3 hours**
Conjunctiva Acute conjunctivitis Chronic conjunctivitis (Trachoma, spring catarrah) Degeneration & dry eye Assessment	**3 hours**
Cornea Introduction Microbial Keratitis • Bacterial • Fungal • Interstitial, Acanthamoeba Keratitis • Viral keratitis Corneal degeneration, Dystrophies	**3 hours**

Lens **9 hours**

Anatomy / Physiology
Etiopathogenesis
Senile cataract – stages, symptoms Management
Complication
Congenital cataract
Assessment

Glaucoma

Introduction
Tonometry/ gonioscopy/ perimetry Classification : POAG, PACG
Secondary glaucoma
Therapeutics in glaucoma
Congenital glaucoma
Assessment

Injuries of Eye

Introduction - classification/ concussion, perforation
Management
Chemical burns

Orbit

Introduction –anatomy of orbit Orbital cellulitis
Exophthalmos (Thyroid)

Eyelid

Anatomy
Inflammation
Ptosis
Ectropion, Entropion
Assessment

Lacrimal Apparatus

Introduction (Anatomy)-
Evaluation of watering
Congenital NLD obstruction, Dacryocystitis
Assessment

Sclera & Episclera

Episcleritis, sclerites
Styphaloma

Retina — **4 hours**

Introduction
Diabetic retinopathy
Vascular block & Hypertensive retinopathy
ARMD/ RP
RD/ Tumors
Tumors – Retinoblastoma, malignant melanoma Assessment

Retinal Surgeries including advanced methods

Optic Nerve — 3 hours

Introduction
Pupillary reflexes – abnormalities Papilledema
Optic neuritis
Optic atrophy

Strabismus — **5 hours**

Introduction/ EOM anatomy
Classification
Evaluation of squint Diplopia
Treatment
Assessment

Miscellaneous

Ocular emergencies	**9 hours**
Ocular manifestation of systemic diseases such as syphilis, Leprosy, TB, AIDS, Herpes Sarcoidosis	**2 hour**
Ocular therapeutics	**1 hours**
Eye banking	**1 hour**
Community Ophthalmology	**1 hour**
Newer techniques in Ophthalmology	**3 hour**
Ocular emergencies	**1 hour**
	1 hours

Instruments — **10 hours**

Revision classes by each consultant.

Common topics to be covered for all medical subjects Communication skills including doctor-patient relationships. Intra- and inter- personal relationships.
Caring for the critically sick and dying patient. Medical ethics.
Basics in research methodology and statistics. Information retrieval.
Use of medical library and database.

OTORHINOLARYNGOLOGY (U19MBB302)

Goal

The broad goal of teaching undergraduate students in otorhinolaryngology is that the undergradu- ate students have adequate knowledge and skills for optimally dealing with common disorders and emergencies and principles of rehabilitation of the hearing impaired, and be familiar with the latest equipment and modern trends in ENT.

Competencies

The Indian Medical Graduate will get the knowledge and skills necessary to attain the following competencies.

- Identify differential diagnoses in the patient presenting in ENT OPD by taking a detailed his- tory.
- Perform complete ear, nose, throat examination of the patient presenting in ENT OPD.
- Describe the pathophysiology of common ENT diseases and emergencies.
- Document and interpret the findings after a complete examination.
- Prescribe common investigative procedures, including imaging, and interpret the findings.
- Counsel the patient regarding need for various common surgeries in ENT.
- Perform procedures with assistance.
- Prescribe appropriate and rational medicines for common ENT conditions.
- Identify the cases that need referral.
- Know the management protocol for ENT emergencies.

Objectives

Knowledge

At the end of the course, the student shall be able to:

- Describe the basic pathophysiology of common ENT diseases and emergencies.
- Adopt the rational use of commonly used drugs, keeping in mind their adverse reactions.
- Suggest common investigative procedures and their interpretation.

Skills

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

- Learn use of head mirrors and common ENT OPD instruments.
- Detect and diagnose common ENT problems including the pre malignant, malignant and communicable disorders of the head and neck.
- Manage ENT problems at the first level of care and be able to refer whenever necessary.
- Assist, carry out minor surgical procedures like ear syringing, ear dressing and nasal pack- ing.
- Assist in certain procedures such as tracheostomy, endoscopies and removal of foreign bodies.

Integration

The undergraduate training in ENT will provide an integrated approach towards other disciplines specially neurosciences, ophthalmology and general surgery.

Attitude

To demonstrate proficiency in examining and treating a patient with common ENT problems. To demonstrate the four ethical principles in management of common

Teaching Schedule

Lectures/Practicals/ Innovative Sessions

Semester	VI	VII	Total
Hours	24	48	72

Clinical Posting

Semesters	VI	VII	Total
Weeks	4	4	8

Teaching Hours

Lectures	Practical/Clinical	Innovative sessions	Total
40	192	48	280

Schedule of Lectures

Total Hours **40**

Nose

1. Anatomy of nose (including endoscopic anatomy)
2. Symptomatology and clinical examination of nose
3. Epistaxis
   a. Blood supply of nose.
   b. Causes.
   c. Investigations
   d. Management
4. Rhinitis
   a. Physiology of nose and PNS.
   b. Allergic Rhinitis.
   c. Vasomotor Rhinitis.
   d. Polypi of nose and PN
5. Sinonasal polyposis
6. Nasal Septum
   a. Anatomy of nasal septum.
   b. Types of DNS.
   c. Management.
   d. Complications such as haematoma, septal abscess and perforation.
   e. Choanal Atresia & Management
7. Sinusitis
   a. Anatomy of lateral wall of nose
   b. Acute and chronic sinusitis.
   c. Investigations and management.

8. Tumours of nose and paranasal sinuses
    a. Benign angiofibroma - Inverted Papilloma
    b. Malignant—Clinical features, Principles of management
9. Facio maxillary injuries
a. CSF Rhinorrhea
    b. Le Forte's fractures
    c. Tripod fractures
    d. CSF Otorrhoea
10. Surgeries of nose and PNS
    a. Septoplasty and SMR
    b. FESS
    c. Nasal bone fracture reduction
    d. Caldwell Luc

Throat

11. Anatomy and physiology of pharynx, larynx, Tracheobronchial tree, Oesophagus
12. Symptamatology and clinical examination of throat
13. Tonsils and Adenoids
    a. Anatomy of Waldeyer's Ring
    b. Clinical features of tonsillitis and adenoids /Quincy
    c. Investigations and Management
14. Neck Space Infections
    a. Anatomy of neck spaces
    b. Ludwigs angina
    c. Retropharngeal abscess
    d. Parapharyngeal abscess
15. Hoarseness
    a. Anatomy of larynx
    b. Physiology of phonation
    c. Differential diagnosis of hoarseness of voice
    d. Inflammatory lesions of larynx
    e. Obstructive lesions of larynx
    f. Neurological lesions of larynx
16. Stridor
    a. Causes in children
    b. Causes in adults
    c. Investigations and emergency management
    d. Tracheostomy
17. Malignancies of larynx and hypopharynx
    a. Etiology
    b. Clinical features
    c. Pathology
    d. Investigations
    e. Principles of management
18. Malignancies of Nasopharynx, Oropharynx and oral cavity, submucous fibrosis
    a. Etiology
    b. Clinical features
    c. Pathology

d. Investigations
e. Principles of management

19. Dysphagia-Causes, Investigations and Management
    a. Anatomy of oropharynx and hypopharynx
    b. Causes of dysphagia
    c. Investigations and Management

20. Foreign bodies in aerodigestive tract
    a. Air passage –Nose, Ear
    b. Food passage
    c. Direct Laryngoscopy
    d. Bronchoscopy
    e. Oesophagoscopy

21. Tracheostomy –Indications, procedure and complications

Ear

22. Anatomy of ear
    a. External
    b. Middle
    c. Inner

23. Physiology of ear
    a. Middle ear
    b. Inner ear

24. Symptamatology and clinical examination of ear

25. Otitis externa and media (acute, secretory)

26. Chronic Suppurative Otitis Media (CSOM) (tubo-tympanic type)

27. Chronic Suppurative Otitis Media (CSOM) (attico-antral)

28. Complications of Otitis Media

29. Deafness
    a. Congenital—Investigations and Management
    b. Acquired —Conductive
    c. Secretory otitis media
    d. Otosclerosis
    e. SNHL
    f. Meniere's disease
    g. Acoustic neuroma
    h. Presbyacusis
    i. Ototoxicity

30. Audiometry I
    a. Basic principles of audiometry
    b. PTA
    c. Tympanogram

31. Audiometry II
    a. Hearing assessment in children
    b. Hearing aids and Cochlear implant

32. Vertigo
    a. Causes
    b. Investigations and Management

33.	Trans-sphenoidal Approach in Neurosurgery
36	Keros Classification of Sphenoethmoidal Recess Cochlear Implant
37	Radiology in ENT
38	Instruments in ENT
39-42	Common case presentation (Seminar or Flipped classroom) OSCE discussion
43	

Schedule of Practicals

Four weeks each in the sixth and seventh semesters. The entire batch will be divided into groups of two/three (depending on the number of students) and posted to cubicles. One of these groups will attend the operation theatre by rotation.

8 to 9 am: Clinical methods and case presentation Class
9 to 11: Clinics
11 to 12 noon: Case or Topic presentation (Students should maintain a record book of minimum of ten cases – 2 marks will be awarded for this record book and added to the internal assessment practical marks)

Innovative teaching – Seminars / Group discussions

a. Sensitise students to common ENT problems in the society. Students may be assigned projects in areas like early detection of deafness, rehabilitation of the hearing impaired, noise pollution and its prevention, tobacco and its deleterious effects in the ear, nose and throat, environ- mental pollution and allergies etc.
b. Use of Internet to keep track of latest innovations and as a research tool.

Integrated teaching sessions - vertical and horizontal

	Topic	Department
1.	Anatomy of ear nose and throat	Anatomy
2.	Physiology of hearing and balance, olfaction and phonation	Physiology

Course Outcomes

CO1: Competency to perform complete ear nose, throat examination.

CO2: Knowledge of the pathophysiology of common ENT diseases and emergencies.

CO3: Competency to document and interpret the findings after a complete examination.

CO4: Competency to prescribe common investigative procedures, including imaging, and interpret the findings.

CO5: Competency to counsel the patient regarding need for various common surgeries in ENT.

CO6: Competency to perform procedures with assistance.

CO7: Competency to prescribe appropriate and rational medicines for common ENT conditions.

CO8: Competency to identify the cases that need referral.

CO9: Knowledge of the management protocol for ENT emergencies.

University examination				Internal assessment		
Theory	**Practical**	**Viva voce**	**Total**	**Theory**	**Practical**	**Total**
40	30	10	80	10	10	20

Textbooks/ Reference Books

Recommended Prescribed Books:

1. Short Text Book of ENT - K.K. Ramalingam
2. Text book of Ear, Nose,Throat, Head and Neck Surgery- Clinical and Practical- P.Hazarika
3. Ear, Nose Throat Simplified - Hathiram and Grewal
4. Logan Turners Diseases of the Ear, Nose and Throat

Reference Book:

Scott- Brown's Otolaryngology – 6 volumes

GENERAL MEDICINE (U19MBB303)

Goal :

The broad goal of teaching under graduate students in Medicine is to have knowledge, skills and behavioural attributes to function effectively as the first contact physician.

Competencies

The Indian Medical Graduate will acquire the knowledge and skills necessary to attain the compe- tencies to:

- Establish doctor-patient communication.
- Take an adequate history and interpret the same.
- Analyse symptoms and form differential diagnosis based on history.
- Conduct physical examination with the necessary clinical skills.
- Form provisional/differential diagnosis based on history and physical examination.
- Chose the appropriate basic Laboratory/Radiological investigation.
- Summarize/Conclude case based on all the above.
- Communcate diagnosis/disease information to patient/bystanders.
- Evaluate/Treat/Prevent common illness.
- Impart health education.
- Non communicable disease prevention/treatment.
- Familiarity with commonly used medications and treatment of common illness.
- Documentation.
- Communication/Relationship with seniors and colleagues.
- MLC - Documentation.
- Familiarise with basic medical procedure.

Objectives

Knowledge:

At the end of the course, the student shall be able to:

- Diagnose common clinical disorders with special reference to infectious diseases, nutri- tional disorders, tropical and environmental diseases.
- Propose diagnostic and investigative procedures and ability to interpret them;
- Outline various modes of management including drug therapeutics especially dosage, side effects, toxicity, interactions, indications and contra indications.
- Provide first level management of acute emergencies promptly and efficiently and decide the timing and level of referral, if required.
- Recognise common geriatric disorders and their management.

Skill

At the end of the course, the student shall be able to:

- Develop clinical skills (history taking, art of communication, detailed systematic clinical examination to diagnose various common medical disorders and emergencies;
- Take decision to refer a patient to secondary and / or tertiary level of health care after hav- ing instituted primary care when necessary

- Perform simple routine investigations like haemogram, stool, urine, sputum and biological fluid examinations;
- Assist the common bed side investigative procedures like pleural / peritoneal tap, lumbar puncture, bone marrow aspiration / biopsy and liver biopsy / aspiration

Attitude

- Heal whenever possible but always provide hope, health and happiness.
- Not to make investigation and treatment more difficult than the disease itself.

- Avoid over investigation and over treatment. Do not forget that most, common disorders are self curing.
- The patient is not a mere collection of symptoms / signs / disordered function /damaged organs / disturbed emotions – He is human, fearful / hopeful / seeking relief / health / reassurance.
- To maintain human touch always integrating the traditional with the modern methods of healing.
- Maintain highest standard of ethical practice, character, modest and humble behavior.
- Maintain good relationship with professional colleagues. Avoid criticism of the measures taken by the colleagues. Medical practice is always a team work. There is no place for "EGO".
- Treat the patient as a whole considering, social, economical and family background, and not the organ / system that are abnormal.

.

Integration

With community medicine and physical medicine and rehabilitation to have the knowledge, and be able to manage important current national health programmes, also be able to view the patient in his / her total physical, social and economic milieu.

Integrate with other relevant academic inputs which provide scientific basis of clinical medicine e.g.:- Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology.

Teaching Schedule

Lectures/ Practical/Innovative Sessions

Semester	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**Total**
Hours	24	24	16	48	32	96	64	304

Clinical Posting

Semester	III	V	VI	VIII	IX	Total
Weeks	8	2	4	8	4	26

Teaching Hours

Lecture	Practical/ Clinical	Innovative sessions	Total
100	624	204	928

Schedule of Lectures

Topic	Hours
Foundation of our art	1 hour
Nutrition, Exposure to Chemical and Physical Agents	**11 hours**
Obesity	1 hour
Vitamin deficiency and excess	1 hour
Fluid and electrolyte balance, acidosis, alkalosis	2 hours
Common poisonings	3 hours
Snake bite, insect stings	2 hours
Disturbance of temperature	1 hour
Drowning, electrical injury, radiation hazards	1 hour
Infections	**21 hours**
Enteric fever	1 hour
Cholera, gastroenteritis, food poisoning	1 hour
Influenza, other respiratory viral diseases	1 hour
Rabies	1 hour
Tetanus	1 hour
Herpes simplex, zoster, chicken pox	1 hour
Amoebiasis	2 hours
Helminthic infections and filariasis	2 hours
Malaria	1 hour
Leptospirosis	1 hour
Common fungal infections	1 hour
Common exanthem	2 hours
Tuberculosis	1 hour
Leprosy	1 hour
HIV, AIDS	1 hour
Syphilis	1 hour
Dengue fever	1 hour
Chikungunya	1 hour
Toxoplasmosis	1 hour
Kala Azar	1 hour
Hydatid Disease / Cysticercosis	1 hour
Rickettsial Infections- Scrub typhus	1 hour
Brucellosis/Melioidosis	1 hour
Rare infectious Diseases of the region	1 hour
Haematology	R
Red cell disorders (nutritional deficiency anemias to be emphasised)	e
Bleeding disorders, Disseminated Intravascular Coagulation, Platelet Disorders	s
Leukemias, leukopenia	p
Lymphoma, myeloma	i
Respiratory System	

ratory physiology, respiratory function test	**8 hours**
Upper and lower respiratory tract infection Pneumonia	2 hours
Bronchiectasis, lung abscess	2 hours
Bronchial asthma, tropical eosinophilia COPD, cor pulmonale	2 hours
Respiratory failure	2 hours
	15 hour
Non cardiogenic pulmonary oedema / ARDS	1 hour
	1 hour
	2 hours

Course Outcomes

CO1: Learn Basic Anatomy and Physiological and biochemical changes in the body
CO2: Learn about microbes causing infection in humans and drugs use to treat these
CO3: Pathological changes during infection and the clinical examination of the patient with empa- thy and sympathy
CO4: Use of invasive and non invasive investigations required for the diagnosis
CO5: Streamline the thinking process, use investigations judiciously

Distribution of Marks for Internal Assessment and University Examinations

University Examination					Internal Assessment		
Theory I	**Theory II**	**Practical**	**Viva Voce**	**Total**	**Theory**	**Practical**	**Total**
60	60	100	20	240	30	30	60

University Examination - Scheme

Theory

Each theory paper of 60 marks will be of 3 hours duration.

Every question paper will have two sections carrying equal marks. Cancel the following items from Section A.

1. Match the following - 3 marks.
2. Diagram - 2 marks
3. Write briefly on - 5 Marks

The model questions can be as given below Section A

1. MCQ - 10 Marks (20 Questions × ½ marks each)
2. Short notes on - 10 Marks (5 Questions × 2 marks each)
3. Problem Oriented Essay questions- 10 Marks

(Total-30 Marks)

Section B - Same as Before

1. 10 Short structured question – 10 marks
2. 5 Short notes – 10 marks
3. 1 Problem oriented question – 10 marks

Division of Topics

Paper 1 – chest, dermatology, psychiatry, radiodiagnosis, basic sciences as applied medicine, genetics, immunology, rheumatology, tropical diseases, nutrition, poisoning, toxicology.

Paper 2 – CVS, GIT, nephrology, CNS, endocrinology, heamatology.

Practicals

Long case 1 (including writing of case sheet) – 60 marks Short case 2 (system to be mentioned) – 20 x 2 – 40 marks **Clinical examination**

Clinical examination will be conducted in the hospital wards.

Clinical cases should include common diseases, the student is likely to come across in practice. Rare cases/obscure syndromes, long cases of neurology shall not be kept in the practical examina- tion. Emphasis should be on candidate's capability in eliciting physical signs and their interpreta- tion. Practical examination should be objective and should test skills and ability to interpret the results. OSCE (Objective Structured Clinical Evaluation) should be incorporated in the practical examination. VIVA includes evaluation of management approach in handling of emergencies. Can- didate's skill in interpretation of common investigative data, X – Rays, Identification of specimens, ECG etc. is to be evaluated

Viva voce

Patient management problems, X- Ray, ECG, medicines, instruments, investigation charts.

Four examiners – topics to be divided and all examiners to examine each student. (4 x 5 = 20 marks)

Textbooks Recommended

Prescribed Textbooks

1. Principles and Practice of Medicine – Davidson
2. Text Book of Medicine – Prof. Dr. K. V. Krishnadas
3. Text Book of Medicine – Kumar and Clerk
4. Clinical Examination in Medicine – Macleod
5. Clinical Examination in Medicine – Prof. K.V. Krishnadas
6. Clinical Methods - Hutchison

Reference Books

1. Text Book of Medicine API
2. Text Book of Medicine Harrisons
3. Text Book of Medicine Cecil Loeb
4. Text Book of Medicine Oxford

PSYCHIATRY AND BEHAVIOUR MEDICINE (U19MBB304)

Goal

The broad objective is to groom the medical student into a first contact physician with an aware- ness about and affinity for a holistic humanistic approach and a bio-psycho-social model of clinical medicine, besides an essential working knowledge about mind and its disorders.

Objectives

Knowledge:

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

- Identify the common mental illnesses.
- Aware of the management aspects of common mental illnesses.
- Be able to provide emergency and first level care in psychiatric disorders.
- Take appropriate referral decisions in psychiatric, neuropsychiatric and psychosomatic dis- orders.
- Provide an efficient follow-up for psychiatric patients in maintenance and prophylactic treatment.
- Develop sensitivity to the psychological factors influencing predisposition, onset, course, treatment and management of physical diseases.
- Identify psychiatric disorders like major depression, dysthymia, neurotic disorders and sub- stance abuse disorders that present with physical symptoms and signs.

Skills:

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

- Develop communication skills to put the patient at ease and help in adjusting to illness and accepting treatment.
- Take a proper history and conduct a proper mental status examination and diagnose com- mon psychiatric disorders.
- Impart first level management of psychiatric illnesses in emergencies.
- Make appropriate referral decisions in case of psychiatric disorders, neuro- psychiatric dis- orders and psychosomatic disorders.
- Do follow-up of psychiatric patients in maintenance and prophylactic treatment.
- Able to develop good doctor patient relationship.
- Able to develop good interpersonal relationship and clinical team work with colleagues.

Attitude:

- Be available and willing to communicate with a patient in distress and suffering.
- Recognise the personality, personal anxieties and feelings of the patient and be able to re- spect the patient as a human being.
- Enable the patient to adjust to the pain, distress and disability of the illness and accept the treatment and its outcome with fortitude and optimism.

Integration:

- Integrate with Internal Medicine and specialities, Community Medicine and Physical Medicine to impart a holistic and longitudinal clinical approach.
- Integrate basic biological sciences with basic behaviour sciences like Psychology, Sociology, Medical Anthropology and Medical Ethics.

Clinical Posting

Semester	V	VI	Total
Weeks	2	2	4

Teaching Hours

Lecture	Practical/Clinical	Innovative sessions	Total
8	140	16	164

Schedule of Lectures

Topics	**Hours**
Science of the mind – psychology – sociology	1 hour
Emotions and their influence in health	1 hour
Influence of society and culture in health	1 hour
Importance of study of the mind for the practice of medicine	1 hour
Symptoms and signs of mental illnesses	2 hours
Diagnosis and nosology of mental disorders	1 hour
Organic psychiatric disorders	2 hours
Psychoses	2 hours
Neuroses	1 hour
Personality disorders	1 hour
Alcohol & other substances of abuse	2 hours
Childhood psychiatric disorders	1 hour
Psychiatric disorders of old age	1 hour
Treatment - approaches & principles in psychiatry	2 hours
Psychiatry in India	1 hour
Suicide and social psychiatry	1 hour
Mind, spirituality and medicine	1 hour

Innovative sessions: are mostly meant to cover communication, doctor patient relationship, patient role and doctor role and illness behaviour. For this 12 hrs are allocated in V smester and 12 hrs in VI semester. The innovative sessions will cover aspects of behaviour medicine, which is very vital for the physician. It includes communication in clinical settings, doctor-patient relationship, inter personal relationship and teamwork, breaking bad news, handling patient's complaints. These are better imparted as integrated group learning sessions and role play. 6 Session of 2 hrs in V Semes- ter and 6 Session of 2 hrs in VI Semester are allocated for this.

Integrated teaching: **26 Hours**

With Bio Chemistry : Neuro chemistry of the human behaviour 2

hours With Physiology/Anatomy : Limbic lobe functioning and human behaviour 2

hours With Pharmacology : Psychopharmacology-therapeutics aspects 4

hours With Community Medicine :

Epidemiology of mental disorders

National mental health programme Child and women mental health.

Psycho - social rehabilitation 4 hours

With Forensic Medicine : Mental Health Act' 87 Persons' with disability Act Crime and mental illness

Outline of psychiatric criminology 3 hours

With Internal Medicine : Organic psychiatric disorders

Dementia, delirium, epileptic psychosis etc.

Course Outcomes

CO1: Ability to be the first contact physician for the mentally ill.

CO2: Awareness about and affinity for a holistic humanistic approach and a bio-psycho-social model of clinical medicine.

CO3: An essential working knowledge about mind and its disorders.

CO4: Competency to take appropriate referral decisions in psychiatric, neuropsychiatric and psychosomatic disorders.

CO5: Communication skills to put the patient at ease and help in adjusting illness and accepting treatment.

Assessment

Internal Assessment

Theory:

As there is no University examination in Psychiatry, the performance of the students are evalu- ated by the internal assessment examinations conducted by the department of Internal Medi- cine/Psychiatry. Short notes/short answer questions will be included in the 2 internal exami- nations conducted by department of Medicine. One hour theory examination will be con- ducted by the Psychiatry department during VI or VII Session and marks added to average marks in Medicine. (Theory)

Practical:

A brief clinical examination can be conducted by the department at the end of clinical posting consisting of a short case of psychiatric illness (30 minutes) and an interview /communication session (30 minutes) The marks can be added to Internal Medicine of Medicine department (practical).

University Examination:

Theory:

Two short notes on psychiatry will be included in one of the theory papers in medicine.

Practical:

There will not be any practical/clinical examination in psychiatry

Textbooks Recommended

1. Clinical Examination in Medicine - Prof. K.V.Krishna Das
2. Text Book of Medicine - Prof. K.V.Krishna Das
3. Clinical Psychiatry for undergraduates - A.V.Rao & K.Kuruvilla

Reference Books:

1. Psychological Medicine - Curran & Patridge, Morgan & King
2. Oxford Text Book of Psychiatry
3. Synopsis of Psychiatry

DERMATOLOGY AND SEXUALLY TRANSMITTED DISEASES

(U19MBB305)

Goal

The aim of teaching the undergraduate student in Dermatology, Sexually Transmitted Diseases (STD) and Leprology is to impart such knowledge and skills that may enable him to diagnose and treat common ailments and to refer rare diseases or complications/unusual manifestations of com- mon diseases, to the specialist.

Objectives

Knowledge:

To impart knowledge and skills to the students so that at the end of the postings they can**..**

- Diagnose and treat common ailments of skin
- Correlate skin lesions with possible underlying systemic conditions
- Comprehend the basics of topical therapy.
- Recognize emergency situations/rare cases so as to refer to a specialist for further evalua- tion.
- Diagnose sexually transmitted infections and leprosy and be aware of various National Pro- grammes in leprosy and STDs
- Have a basic comprehension regarding the nuances of cosmetic dermatology and derma- tological surgery.
- Have a basic comprehension of newer equipment and procedures related to modern der- matology- like UV therapy

Skills:

The student shall be able to..

- Interview the patient, elicit relevant and correct information and describe the history in chronological order.
- Conduct clinical exam, elicit & interpret physical findings and diagnose common disorders and emergencies.
- Perform simple, routine investigative and laboratory procedures required for making the bed-side diagnosis especially the examination of scrapings for fungus, preparation of slit smears and staining for AFB for leprosy patients and for STD cases.
- Manage common diseases, recognizing the need for referral for specialized care, in case of inappropriateness of therapeutic response.

Teaching Schedule

Lectures

Semester	VI	VII	Total
Hours	16	16	32

Clinical Posting

Semester	IV	VI	Total
Weeks	2	4	6

Teaching Hours

Lectures	Practicals/Clinical	Innovative sessions	Total
32	144	18	194

Schedule of lectures

Topic **14 hours**

Basics of dermatology - including structure and functions of the skin and dermatological case taking.

Infections - bacterial, fungal, viral, and parasitic.

Eczemas.

Papulosquamous diseases - including psoriasis and lichen planus. Hair and Nail disorders.

Leprosy.

Urticaria and drug reactions. Bullous dermatosis.

Nevi and cutaneous malignancies.

Connective tissue disorders and skin. Topical therapeutics.

STDs and HIV.

Cosmetic dermatology and dermatosurgery.

Procedures like UV Therapy & Newer types of laser procedures for dermatological indica- tions.

Symposia, Seminars **14 hours**

Course Outcomes

CO1: Competency to diagnose and manage common ailments of skin

CO2: Competency to correlate skin lesions with possible underlying systemic conditions.

CO3: Knowledge of the basics of topical therapy.

CO4: Ability to recognize emergency situations/rare cases so as to refer to a specialist for further evaluation.

CO5: Competency to diagnose sexually transmitted infections and leprosy and be aware of various National Programmes in leprosy and STDs

CO6: Knowledge of the nuances of cosmetic dermatology and dermatological surgery.

CO7: Knowledge of newer equipment and procedures related to modern dermatology-like UV therapy

CO8: Competency to interview the patient, elicit relevant and correct information and describe the history in chronological order.

CO9: Competency to perform simple, routine investigative and laboratory procedures required for making the bed-side diagnosis especially the examination of scrapings for fungus, preparation of slit smears and staining for AFB for leprosy patients and for STD cases.

RADIO-DIAGNOSIS & IMAGING (U19MBB306)

Goal

The broad goal of teaching undergraduate medical students in the field of Radio-diagnosis should be aimed at making the students realize the basic need of various radio-diagnostic tools in medical practice. They shall be aware of the techniques required to be undertaken in different situations for the diagnosis of various ailments as well as during prognostic estimations.

Objectives

Knowledge

The student shall be able to:

- Understand basics of x-ray production, its uses and hazards;
- Appreciate and diagnose changes in bones – like fractures, infections, tumours and meta- bolic bone diseases;
- Identify and diagnose various radiological changes in disease conditions of chest and me- diastinum, skeletal system, gastro intestinal tract, hepatobiliary system and genito urinary (G.U) system.
- Learn about various imaging techniques, including isotopes Computerised Tomography (C.T), Ultrasound, Magnetic Resonance Imaging (M.R.I) and D.S.A.

Skills

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

- Use basic protective techniques during various imaging procedures;
- Interpret common x-ray, radiodiagnostic techniques in various community situations;
- Advise appropriate diagnostic procedures in specialized circumstances to appropriate spe- cialists.

Teaching Schedule

Lecture/Practicals/Innovative Sessions

Semester	**VI**	**Total**
Hours	24hrs	24hrs

Clinical Posting

Semester	**V**	**Total**
Weeks	2 (One week each in Radiology & Radiation Oncology)	2

Teaching Hours

Lectures	**Practicals/ Clinical**	**Innovative sessions**	**Total**
8	48	16	72

*Includes teaching of Radiotherapy.

Schedule of Lectures

Topic **14 hours**

1. Musculo Skeletal – Commonly performed skeletal radiography, various types of fractures/ locations. infections, tumours, metabolic bone disease, joint disease (Infections ,Immunological metabolic condition)

2. Chest – Normal chest, various lung parenchymal pathologies, congenital and acquired cardiac conditions, pheumothorax, pleural effusion, mediasti- nal masses.
3. GI System – Upper GI examination, lesions of oesophagus, stomach and duodenum – small bowel diseases, various colonic pathologies.
4. Hepatobiliary system – Ultrasound examination, contrast studies, CT, MRI.
5. Genitourinary system – Plain film, ultrasound examination, contrast studies, IVU, MCU, ure- throgram and CT and emergencies.
6. Central nervous system–Radiological manifestations of infarcts, haemorrhage, tumours and in- flammations in brain and spine and emergencies.
7. Interventional Radiology – Common IR procedures and their role in clinical practice.
8. Women's Imaging - Mammography, Imaging of the foetus and pregnant imaging of gyneco- logic diseases and emergencies.
9. X-ray - its nature, production, hazards and basic safety protocols.

Course Outcome

CO1: Understanding of the basics of x-ray production, its uses and hazards.

CO2: Ability to appreciate and diagnose changes in bones – like fractures, infections, tumours and metabolic bone diseases.

CO3: Competency to identify and diagnose various radiological changes in disease conditions of chest and mediastinum, skeletal system, gastro intestinal tract, hepatobiliary system and genito uri- nary (G.U) system.

CO4: Competency to use basic protective techniques during various imaging procedures;

CO5: Competency to interpret common x-ray, radiodiagnostic techniques in various community situations.

CO6: Competency to advise appropriate diagnostic procedures in specialized circumstances to appropriate specialists.

CO7: Knowledge of various imaging techniques, including isotopes Computerised Tomography (C.T), Ultrasound, Magnetic Resonance Imaging (M.R.I) and D.S.A.

RADIATION THERAPY AND MEDICAL ONCOLOGY (U19MBB307)

Goal

The broad goal of teaching the undergraduate medical students in the field of Radiotherapy is to make the students understand the magnitude of the ever-increasing cancer problem in the country. The students must be made aware about steps required for the prevention and possible cure of this dreaded condition.

Objectives

Knowledge

The student shall be able to:

- To have a basic concept of Radiobiology
- Identify symptoms and signs of various cancers and their steps of investigations and man- agement;
- Explain the effect of radiation therapy on human beings and the basic principles involved in it,
- Know about radio-active isotopes and their physical properties;
- Be aware of the advances made in radiotherapy in cancer management and knowledge of various radio therapeutic equipment while treating a patient;
- Identify various Chemotherapeutic agents used in cancer treatment.

Skills

At the completion of the training programme, the student shall be able to:

- Take a detailed clinical history of the case suspected of having a malignant disease;
- Assist various specialists in administration of anticancer drugs and in application and use of various radio therapeutic equipment, while treating a patient.

Course Outcomes

CO1: Basic knowledge of Radiobiology

CO2: Competency to identify symptoms and signs of various cancers and knowledge of the steps of investigations and management.

CO3: Knowledge of the effect of radiation therapy on human beings and the basic principles in volved.

CO4: Knowledge of radio-active isotopes and their physical properties.

CO5: Awareness about the advances made in radiotherapy in cancer management and knowledge of various radio therapeutic equipment while treating a patient.

CO6: Knowledge of various Chemotherapeutic agents used in cancer treatment.

CO7: Competency to take a detailed clinical history of the case suspected of having a malignant disease;

CO8: Competency to assist various specialists in administration of anticancer drugs and in application and use of various radio therapeutic equipment, while treating a patient.

Schedule of Lectures

Topics **10 hours**

Cancer epidemiology and possible etiological factors, screening for cancer Principles of cancer chemotherapy – chemotherapeutic agents,
Targeted therapy
Hormone treatment in cancer
Radiation Oncology – radioactive sources – teletherapy –brachytherapy
Methods of radiotherapy – recent advances
Diagnosis and treatment of common malignancies
Oncological emergencies

Reference Books

1. Liebel & Philips Text book of Radiation Oncology
2. Perez & Brady Text book of Radiation Oncology
3. Text book of Oncology – Devitta
4. Mannual of clinical oncology - Dennis. A.Casceita
5. Washington Manual of Oncology
6. Student- BMJ Journal
7. AJCC staging Manual (2012)
8. Radiobiology for the Radiologist (first seven chapters)- Eric J Hall

PULMONOLOGY (U19MBB308)

Goal

The aim of teaching the undergraduate in tuberculosis and chest diseases is to impart such knowl- edge and skills that may enable him/her to diagnose and manage common ailments affecting the chest with the special emphasis on management and prevention of tuberculosis and especially Na- tional Tuberculosis Control Programme.

Competencies

Core-Competencies

1. To prepare the clinical history of a patient with respiratory illness, by interacting with the patient, stressing on the points of presenting illness, past illness, personal history, occupa- tional history etc.
2. To familiarize with the clinical examination of a patient with respiratory illness by methods of Inspection, palpation, percussion and auscultation.
3. To take history and examine a patient of pleural effusion systematically to arrive at a diag- nosis and to suggest investigations and treatment.
4. To prepare history and examine a patient with pneumonic consolidation and to suggest investigations and treatment.
5. To take history and examine a patient with pneumothorax and to suggest investigation and treatment.
6. To Prepare history and examine a case of COPD and suggest investigations and manage- ment.
7. To take detailed history and to examine clinically a case of Bronchial asthma and plan in- vestigations and treatment.
8. To prepare history and do clinical examination in a patient with Tuberculosis (pulmonary & extra pulmonary) and plan investigations and treatment with emphasis on Revised Na- tional TB control Program.

Non Core competencies.

1. Reading an X ray Chest and interpretation of X-rays for various common pulmonary dis- eases.
2. Viewing and interpreting Pulmonary function tests. (spirometry)
3. Viewing procedures like pleural aspiration, Intercostal drainage and bronchoscopy.

Objectives

Knowledge

At the end of the course of tuberculosis and chest diseases, the student shall be able to:

- Demonstrate sound knowledge of chest diseases, their clinical manifestations, including emergent situations and of investigative procedures to confirm their diagnosis;
- Demonstrate comprehensive knowledge of various modes of therapy used in treatment of respiratory diseases;
- Describe the mode of action of commonly used drugs, their doses, side-

effects/toxicity, indications and contra-indications and interactions;

- Describe commonly used modes of management including medical and surgical procedures available for treatment of various diseases and to offer a comprehensive plan of manage- ment inclusive of National Tuberculosis Control Programme.

Skills

At the end of the course the student shall be able to;

- Interview the patient, elicit relevant and correct information and describe the history in chronological order;
- Conduct clinical examination, elicit and interpret clinical findings and diagnose common respiratory disorders and emergencies.

Teaching Schedule

Lecture/Practical/Innovative Session:

Semester	VI	Total
Hours	24	24

Clinical Posting:

Semester	IV	Total
Weeks	2	2

Lectures	**Practicals/ Clinical**	**Innovative sessions**	**Total**
8	48	16	72

Course Outcomes

CO1: Competency to prepare the clinical history of a patient with respiratory illness, by interacting with the patient, stressing on the points of presenting illness, past illness, personal history, occupa- tional history etc.

CO2: Familiarity with clinical examination of a patient with respiratory illness by methods of In- spection, palpation, percussion and auscultation.

CO3: Competency to take history, make diagnosis and suggest investigations and treatment in a patient with pleural effusion.

CO4: Competency to take history and examine a patient with pneumonic consolidation and to suggest investigations and treatment.

CO5: Competency to take history and examine a patient with pneumothorax and to suggest investigation and treatment.

CO6: Competency to take history and examine a case of COPD and suggest investigations and management.

CO7: Competency to take detailed history and to examine clinically a case of Bronchial asthma and plan investigations and treatment.

CO8: Competency to prepare history and do clinical examination in a patient with Tuberculosis (pulmonary & extra pulmonary) and plan investigations and treatment with emphasis on Revised National TB control Program.

GENERAL SURGERY (U19MBB309)

Goal

The broad goal of teaching undergraduate students in Surgery is to produce graduates capable of delivering efficient first contact surgical care.

Competencies

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies to.

- Diagnose common surgical conditions both acute and chronic, in adult and children;
- Plan various laboratory tests for surgical conditions and interpret the results;
- Identify and manage patients of haemorrhagic, septicaemic and other types of shock;
- Be able to maintain patent air-way and resuscitate,
    i. a critically injured patient;
    ii. Patient with cardio-respiratory failure; and
    iii. Drowning case;
- Monitor patients of head, chest, spinal and abdominal injuries, both in adult and children;
- Provide primary care for a patient of burns;
- Acquire principles of operative surgery, including pre-operative, operative and post opera- tive care and monitoring;
- Treat open wounds including preventive measures against tetanus and gas gangrene;
- Diagnose neonatal and paediatric surgical emergencies and provide sound primary care be- fore referring the patient to secondary/tertiary centres;
- Identify congenital anomalies and refer them for appropriate management.

Objectives

Knowledge

At the end of the course, the student shall be able to:

- Describe aetiology, pathophysiology, principles of diagnosis and management of common surgical problems including emergencies, in adult and children;
- Define asepsis, disinfection and sterilization and recommend judicious use of antibiotics;
- To impart theoretical knowledge on the diagnosis and management of common surgical problems in our country, both elective and emergency.
- To impart sound practical skills for the management of these problems.
- Describe common malignancies in the country and their management including preven- tion;
- Define indications and methods for fluid and electrolyte replacement therapy including blood transfusion;
- Enumerate different types of anaesthetic agents, their indications, mode of administration, contra indications and side effects
- To effect appropriate transformation in the attitude and behaviour of the learner, so that they can function effectively in society.

Skills

The student shall have observed/assisted/performed the following:

- Incision and drainage of abscess
- Debridement and suturing open wound
- Venesection

- Excision of simple cyst and tumours
- Biopsy of surface malignancy
- Catheterization and nasogastric intubation
- Circumcision
- Meatotomy
    - Vasectomy
    - Diagnostic proctoscopy
    - Hydrocele operation
    - Endotracheal intubation
    - Chest tube insertion

Integration

The undergraduate teaching in surgery shall be integrated at various stages with different pre and para and other clinical departments.

Teaching Schedule

Lectures/Practical/Innovative Sessions

Semester	III	IV	V	VI	VII	VIII	IX	Total
Hours	24	24	16	48	32	96	64	304

Clinical Posting *

Semester	III	V	VI	VIII	IX	Total
Hours	8	2	4	8	4	26

* This includes posting in anaesthesiology and Casualty

Teaching Hours – General Surgery

Lectures	Practical/Clinical	Innovative session	Total
100	624	204	928

The curriculum is primarily intended for the departments of General Surgery, G I Surgery, Urol- ogy, Paediatric surgery, vascular surgery, Plastic surgery, cardiovascular surgery, Radio diagnosis, Anaesthesiology and Facio-Maxillary surgery.

The training programme is divided into three stages.

1. Initial stage (semester III)
2. Intermediate stage (semesters IV to VII)
3. Concluding stage (semesters VIII & IX)

Initial Stage (Semester III)

The primary objective at this stage is to provide certain basic concepts in surgical knowledge along with clinical skills to elicit common physical findings.

Lectures/Integrated

Teaching Topics

Introduction including basic concepts of doctor-patient relationship. History of surgery with em- phasis on the contribution of Indian surgeons. Shock, hemorrhage and transfusion. Fluid and elec- trolyte disturbances. Surgical infections, AIDS and antisepsis. Surgical nutrition. Peripheral arterial disease, venous and lymphatic diseases. Concepts of organ transplantation. Tumors, cysts and ba- sics of oncology. Wounds and wound healing.

First month – one to one and half hours per day – classes emphasizing basic clinical findings All

days for about 2 hours – ward posting and clinical discussion. Operation theatre by rotation to demonstrate basic surgical skills and common procedures – students may be asked to scrub up. Clerk ship – students posted to night duty in wards on their respective admission days of the units into which they are posted.

Self Learning Packages:
Problem – Based Learning
Under the guidance of one faculty member, common problems such as clinical breast examination, abdominal pain, leg ulcers etc. would be allotted to different batches of students. The focus would be on data collection from databases. At the end of their postings, the students will be asked to make a presentation of their findings. They will also

Ethical Aspects of Clinical Examination - Abdominal examination , Breast examination , Per Rectal Examination

be required to submit a detailed report of their study.

Evaluation Strategies:
The initial phase will be evaluated as follows: Log books – include record of patients studied by he learner along with day–to–day activities. MCQ examination on topics covered in theory. OSCEs, short case presentations and oral examinations.

Assessment of presentation of the problem-based learning focusing on communication skills.

Intermediate Stage (Semesters IV to VII)
The basic stress here is to provide concepts in trauma and emergency surgery and also certain sur- gical specialities such as pediatric surgery, anaesthesiology, dental and radio diagnosis.

Lecture/Integrated Teaching Topics
Thyroid and other endocrine diseases Breast diseases. ATLS and trauma management Concepts of minimally invasive including laparosscopic surgery.

Introduction to Natural Orifice Transluminal Endoscopic surgery (NOTES)

Anaesthesiology
Pain and management Concepts of local anaesthesia Regional anaesthesia General anaesthesia Critical care medicine.

Paediatric surgery
CHPS Hirschsprung's disease Anorectal malformations Tracheo-esophageal fistula. Diapharag- matic hernia Neonatal intestinal obstructions Meckel's diveticulum Urological problems in children Tumors in children

Evaluation
Log book maintained by the student. MCQ tests on the theory topics along with short answer questions. OSCEs Evaluation in each speciality/department.

Oral cavity, esophagus, stomach and duodenum Hepato-biliary surgery Pancreas and spleen Her- nias including abdominal wall. Small and large intestines, rectum and anal canal. Day case surgery Auditing in surgery Upper urinary – kidney (congenital anomalies, infections, turmors, stones) Lower Urinary – bladder and ureter and urethra (congenital anomalies, infections, tumors, stones) Testis and scrotum and male external genitalia - male infertility

Neuro surgeory:
Head injuries Spinal injuries Basics of diagnosis and investigation of intracranial lesions Common tumors affecting the CNS Intracranial hemorrhage.

Cardiovascular and Thoracic Surgery
Congential heart disease Coronary artery diseases. Valvular lesions affecting the heart. Chest inju- ries and tumors of the chest wall.

Plastic surgery
Burns -management. Skin grafting and flaps. Oncoplastic procedures Cleft lip and cleft palate
Topic presentation by the students: 1 hour per week; two or three students select a topic.

Operative surgery
Demonstration of procedure in the operation theatre and video demonstrations.

Practical training
Clinical posting in the wards on all days Clerkship on admission days.

Course Outcomes:

CO1: Competency to diagnose common surgical conditions both acute and chronic, in adult and children.
CO2: Competency to plan various laboratory tests for surgical conditions and interpret the results. **CO3:** Ability to identify and manage patients of haemorrhagic, septicaemic and other types of shock.
CO4: Ability to maintain patent air-way and resuscitate, i. a critically injured patient; ii. Patient with cardio-respiratory failure; and iii. Drowning case.
CO5: Competency to monitor patients of head, chest, spinal and abdominal injuries, both in adult and children.
CO6: Competency to provide primary care for a patient of burns;
CO7: Knowledge of principles of operative surgery, including pre-operative, operative and post operative care and monitoring;
CO9: Competency to treat open wounds including preventive measures against tetanus and gas gangrene.
CO10: Competency to diagnose neonatal and paediatric surgical emergencies and provide sound

primary care before referring the patient to secondary/tertiary centres.

Distribution of Marks for Internal Assessment and University Examinations:

University Examination				Internal Assessment			
Theory I	**Theory II**	**Practi-cal**	**Viva voce**	**Total**	**Theory**	**Practi-cal**	**Total**
60	60	100	20	240	30	30	60

University Examination - Scheme

Theory

Two papers– paper I -Section A -Gastrointestinal tract Section B-Orthopaedics Paper II - Sections A & B -General Surgery Except GIT Anaesthesiology, Surgical Anatomy And Recent advances. The questions will be objective type –short answer/short structure/structured essay.

Practical

One long case, three short cases of which two will be Orthopaedics case. Objective Structured Clinical Examination.

Viva voce

Four examiners-all examiners individually examine each student – topics to be divided X-rays/ instruments/specimens/operative surgery/surgical pathology -histopathology slides

Books Recommended

1. Short Practice of Surgery – Bailey and Love
2. Sabiston Textbook of Surgery
3. Operative Surgery -Das
4. Textbook of Operative Surgery – Farquharson.
5. Clinical Surgery – Das.
6. Clinical Methods – Hamilton Bailey
7. Pye's Surgical Handicraft.

ORTHOPAEDICS (U19MBB310)

Goal

The broad goal of teaching undergraduate medical students in the field of Orthopaedics is to make the students understand the basics of fractures and dislocations commonly encountered and the essential treatment needed for emergency management. The common inflammatory and neoplastic diseases occurring in the bones and joints should also be familiarized.

Competencies

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies to.

- Detect sprains and deliver first aid measures for common fractures and sprains and manage uncomplicated fractures of clavicle, Colles's; fracture, phalanx fracture, undisplaced frac- tures, forearm, Jone's fracture.
- Diagnose and manage common bone infections.
- Advise aspects of rehabilitation for polio, cerebral palsy and amputation.

Objectives

Knowledge

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

- Explain the principles of recognition of bone injuries and dislocation;
- Apply suitable methods to detect and manage common infections of bones and joints;
- Identify congenital, skeletal anomalies and their referral for appropriate correction or reha- bilitation;
- Recognize metabolic bone disease as seen in this country;
- Explain aetio genesis, manifestations, diagnosis of neoplasm affecting bones.

Skills

At the end of the course, the student shall be able to:

- Use techniques of splinting, plaster, immobilization etc.
- Identify the indications for amputations.

Application

Be able to perform certain orthopaedic skills, provide sound advice of skeletal and related condi- tions at primary or secondary health care level.

Integration

Integration with Anatomy, Surgery, Pathology, Radiology and Forensic Medicine to be done.

Teaching Schedule

Lectures/Practicals/Innovative Sessions

Semester	VI	VII	VIII	IX	Total
Hours	24	16	36	32	108

Clinical Postings*

Semester	IV	VII	IX	Total
Weeks	4	4	2	10

* Includes Posting in Physical Medicine & Rehabilitation for 1 week

Teaching Hours

Lecture	Practical/ clinical	Innovative session	Total
36	240	72	348

Schedule of Lectures

Topic	**Hours**
Traumatology	**17**
1. Definition of a fracture and types of fracture and general principles of management	1
2. Complications of fracture – open fractures and pathological fracture, external fixation	1
3. Fracture clavicle, fracture neck of humerus and shoulder dislocation	1
4. Fracture humerus shaft and supra condylar fracture/condylar fracture	1
5. Elbow dislocation and forearm fracture	1
6. Monteggia fracture and gallezi fracture	1
7. Colle's fracture and fracture scaphoid	1
8. Tendon injuries and hand injuries	1
9. Fracture spine and traumatic paraplegia	1
10. Fracture pelvis and hip fracture – fracture neck of femur	1
11. Hip dislocation and fracture shaft of femur	1
12. Condylar fracture femur and tibia	1
13. Meniscus tear and fracture patella	1
14. Leg fracture	1
15. Ankle injuries – Pott's fracture	1
16. Fracture Calcaneum and fracture Tallus	1
17. Growth Plate Injury	1
18. Supracondylar fracture humerus in children	1
Cold Orthopaedics	**15**
1. C.T.E.V. and flat Foot	1
2. C.D.H.	1
3. Torticollis, congenital pseudoarthrosis of Ttbia and arthrogryposis multiplex congenital	1
4. Osteomyelitis	1
5. Septic arthritis	1
6. Tuberculosis – spine , hip, knee, elbow, wrist and other sites	1
7. AVN Head Femur	1
8. Introduction to Ilizarov/arthroscopy/arthroplasty	2
9. Perthe's and SCFE	1
10. Rickets and osteomalacia	1
11. Rheumatoid arthritis and ankylosing spondylitis	1
12. IVDP and Kyphosis	1
13. Scoliosis and spondylolisthesis	1
14. Bone tumour, osteochondroma, simple bone cyst	1
15. ABC, enchodroma, GCT,Ewing's Tumour	1
16. Osteosarcoma, multiple myeloma, metastatic bone diseases and chondrosarcoma	2
17. Osteogenesis, imperfecta nerve injuries – radial/ulnar/median nerves Sciatic/brachial plexus, osteoarthritis of hip and knee.	2

Seminars/Symposia

Symposium with clinical cases – Trauma

1. CTEV2.
2. C.D.H.

3. T.B. Spine
4. T.B. Hip
5. Perthe's
6. Slipped capital femoral epiphysis
7. Back pain
8. Bone tumours (benign)
9. Bone tumours (malignant)
10. Cubitus Varus/Valgus
11. Genu Varus/Valgus

Schedule of Practicals/Clinical Posting

1. Nerve injuries
2. Osteomyelitis
3. Metabolic bone disease
4. Symposium on physical medicine and rehabilitation
5. Supracondylar fractures of humerus
6. Ankylosis
7. Compartmental syndrome and VIC
8. Fat embolism syndrome
9. Traction, splints, POP
10. Orthopedics Implant and Instruments

Course Outcomes

CO1: Competency to detect sprains and deliver first aid measures for common fractures and sprains and manage uncomplicated fractures of clavicle, Colles's; fracture, phalanx fracture, undis- placed fractures, forearm, Jone's fracture.
CO2: Competency to diagnose and manage common bone infections.
CO3: Competency to give advise aspects of rehabilitation for polio, cerebral palsy and amputation.
CO4: Orientation in basic principles of community based rehabilitation of people with disabilities.

Textbooks Recommended

1. Graham Apley – System of Orthopaedics
2. Fractures and Joint Injuries – Watson Jones
3. Orthopaedics – Samuel F Turek
4. Merer's Orthopaedic Surgery
5. Outline of Fractures – Adam's
6. Outline of Orthopaedic Surgery
7. Clinical Surgery – Das-Chapter on Orthopaedics
8. Crawford Adam's – Operative Techniques (Orthopaedics)

Reference Book

1. Campbell's Operative Orthopaedics

PHYSICAL MEDICINE AND REHABILITATION (U19MBB311)

Schedule of Lectures/Innovative Sessions

1. Introduction to Physical Medicine and Rehabilitation
2. Concepts of impairment, disability, handicap and the rehabilitation team.
3. Principles of physio therapy-various physical modalities and therapeutic exercises.
4. Principles of occupational therapy its application in rehabilitation medicine.
5. Principles of prosthetics and orthotics and rehabilitation aids-their application in rehabilitation medicine.
6. Broad principles of Neurological, Orthopaedic, Musculoskeletal, Paediatric, Cardiac and Pul- monary rehabilitation.
7. Principles of Pain management.
8. Basic principles of disability evaluation for certification purposes.
9. To get exposed to the potentials of socio-vocational rehabilitation of the disabled.
10. Persons with Disability Act 1995.
11. To get oriented to basic principles of community based rehabilitation of people with disabili- ties.

Textbook Recommended

1. Physical Medicine and Rehabilitation-Randall and Braddom

ANAESTHESIOLOGY (U19MBB312)

Objectives

The student should be able to:

- Identify the various types of surgical anaesthesia
- Identify and detect the common possible complications of anaesthesia and treat/prevent them if possible.
- Identify the basic components of critical care.
- The situations where the principles of critical care can be adapted to general management of the very sick patient even with limited resources.
- Identify the possible deleterious effects, especially long term adverse consequences, of critical care and methods of prevention, early detection and effective treatment.
- Diagnose cardiac and respiratory arrests effectively and institute treatment without delay.
- Identify the principles of prolonged life support.
- Point out those aspects of pathophysiology of pain that are of practical relevance to manage- ment of pain.
- Enumerate the major modalities of management of acute and chronic pains.
- Enumerate the components of the WHO 3 step analgesic ladder.
- Identify the barriers to effective pain management including opio phobia and fear of side effects of analgesics.
- Identify the means of overcoming the barriers.
- Define palliative care, supportive care and long term care.
- Identify the principles of symptom control.
- Identify the common social, emotional and spiritual problems of patients with life threatening diseases and their management.
- Describe the principles of management of the dying patient.

Schedule of Lectures

Lecture/Practical/Innovative Session

Semester	Hours	Total
VI	72	72

Teaching Hours

Lectures	Practicals	Innovative Sessions	Total
8	48	16	72

Module A: Clinical Anaesthesia: 3 hours

Lecture : Introduction to Anaesthesiology and clinical anaesthesia Lecture : Types of anaesthesia

Lecture : Complications of anaesthesia, their prevention, early detection and management.

Module B: Critical care:2 hours

Lecture: What is critical care?

Group work followed by discussion: How can the principles of critical care can be adapted to gen- eral management of the very sick patient even with limited resources? Group work followed by discussion**:** Possible deleterious effects, especially long term adverse consequences, of critical care and methods of prevention, early detection and effective treatment.

Module C: **Resuscitation: 10 hours**

Lecture: Principles of resuscitation and the emergency management of a patient with sudden loss of consciousness: basic life support; management of the upper airway.

Group discussion: Basic life support continued: Breathing and circulation. Practical work in three groups: Airway management, breathing and circulation.

Practical work in three groups: Airway management, breathing and circulation - continued Group discussion: ACLS: Drugs

Group discussion: ACLS – continued

Group work followed by discussion: Resuscitation in trauma Lecture: Introduction to shock

Group work followed by discussion: Management of hypovolemic shock Evaluation, discussion and feedback.

Module D: **Pain and Palliative care – 8 hours** Lecture: Introduction to pain relief and palliative care Lecture: Pathophysiology and assessment of pain

Role play followed by discussion: Assessment of pain (emphasizing on patient centered care Group discussion: The WHO analgesic ladder

Group work followed by discussion: Management of chronic pain (using hypothetical case histories

Group work followed by discussion: Principles of management of symptoms of other than pain. Role play followed by discussion: Emotional problems and psychosocial

support in incurable ill- ness
Group discussion: How can the principles of palliative care be integrated into routine medical practice?

1. Brain Death
2. Organ donation
3. End of life

New Innovative Methods

1. Ultrasound guided vascular access
2. Ultrasound guided regional nerve block

Course Outcomes:

CO1: Knowledge of the various types of surgical anaesthesia

CO2: Knowledge of the common possible complications of anaesthesia and the skill to treat/ prevent them if possible.

CO3: Knowledge of the basic components of critical care.

CO4: Knowledge of the principles of prolonged life support.

CO5: Understanding of management of acute and chronic pains with understanding of the components of the WHO 3 step analgesic ladder**.**

CO6: Understanind of palliative care, supportive care and long term care.

CO7: Knowledge of the principles of management of the dying patient.

Assessment

There will be a pre test and post test for each module. The post test will be followed by evaluation of each session by the students.

OBSTETRICS & GYNAECOLOGY (INCLUDING FAMILY WELFARE PLANNING) – (U19MBB313)

Goal

The broad goal of teaching undergraduate students in Obstetrics and Gynaecology is that they shall acquire understanding of anatomy, physiology and patho physiology of the reproductive system and gain the ability to optimally manage common conditions affecting it.

Competencies

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies to.

- Examine a pregnant woman; recognize high risk pregnancies and make appropriate refer- rals.
- Conduct a normal delivery, recognise complication and provide postnatal care.
- Resuscitate the newborn and recognise congenital anomalies.
- Advise a couple on the use of various available contraceptive devices and assist in insertion and removal of intra-uterine contraceptive devices.
- Perform pelvic examination, diagnose and manage common gynaecological problems in- cluding early detection of genital malignancies.
- Interpretation of data of investigations like biochemical, histopathological, radiological, ul- trasound etc.

Objectives

Knowledge

At the end of the course, the student shall be able to:

- Outline the anatomy, physiology, and pathophysiology of the reproductive system and the common conditions affecting it.
- Detect normal pregnancy, labour, puerperium and manage the problems he/she is likely to encounter therein.
- List the leading causes of maternal and perinatal morbidity and mortality.
- Understand the principles of contraception and various techniques employed, methods of medical termination of pregnancy, sterilization and their complication.
- Identify the use, abuse and side effects of drugs in pregnancy, peri-menopausal and post – menopausal periods.
- Describe the national programme of maternal and child health and family welfare and their implementation at various levels.
- Identify common gynaecological diseases and describe principles of their management..
- State the indications, techniques and complications of surgeries like caesarian section, Ab- dominal hysterectomy, vaginal hysterectomy and other surgeries for prolapse, laparoscopic surgeries, manual vacuum aspiration syringe for Medical Termination of Pregnancy (MTP).

Skills

At the end of the course, the student shall be able to.

- Make a vaginal cytology smear, perform a postcoital test and wet vaginal smear examina- tion for Trichomonas vaginalis, moniliasis and gram stain for gonorrhoea.

Attitude

The students should be considerate and compassionate to the patients. They should be able to mingle with the patients freely and should be able to go deep into their problems. They should not only study the physical ailments but also the mental problems which would have been the cause for many of the physical ailments. Should develop service mentality in students.

Integration

The student shall be able to integrate clinical skills with other discipline and bring about coordination of family welfare programmes for the national goal of population control.

General Guidelines for Training

1. Attendance of a maternity hospital or the maternity wards of a general hospital including (i) antenatal care (ii) the management of the puerperium and (iii) a minimum period of 5 months in –patient training including family welfare planning.
2. Of this period of clinical instruction, not less than one month shall be spent as a resident pupil in a maternity ward of a general hospital.
3. During this period, the student shall conduct at least 10 cases of labour under adequate super- vision and assist in 10 other cases.
4. A certificate showing the number of cases of labour attended by the student in the maternity hospital and/or patient homes respectively, shall be signed by a responsible medical officer in the staff of the hospital and shall state.
5. That the student has been present during the course of labour and personally conducted each case, making the necessary abdominal and other examination under the supervision of the cer- tifying officer describe his official position.
6. That satisfactory written histories of the cases conducted including wherever possible antena- tal and postnatal observations, were presented by the student and initialed by the supervising officer.

Lectures/Practical/Innovative Sessions

Semester	VI	VII	VIII	Total
Hours	48	32	120	200

Clinical Posting

Semesters	IV *	VI	VII	VIII	IX	Total
Weeks	8	4	4	4	4	22

* 8 Including 2 weeks Radiology

Teaching Hours

Lectures	**Practicals/Clinicals**	**Innovative Sessions**	**Total**
90	530	110	640

Schedule of Lectures

Topic	**Hours**
Obstetrics	**49 hours**
Applied anatomy:	
Pelvis, foetus in normal pregnancy, foetal circulation.	1
Physiology of pregnancy	
Maternal changes-anatomical, physiological and endocrinological	1
Diagnosis and differential diagnosis of pregnancy, antenatal care	1
Physiology of labour	
Stage of labour, mechanism of normal labour, conduct of normal labour	1
Physiology of puerperium	
Normal puerperium, care of pureperium	1
New born	
Care	1
Lactation	1
Pathology of pregnancy	
I trimester: hyperemesis, abortion, vesicular mole, Ectopic, antepartum	

haemorrhage, preterm labour, PROM 2
Hypertensive disorders of pregnancy 3
Medical diseases 9
Heart disease, anaemia, diabetes, UTI, hepatitics, TB-chest disease, infections, HIV
Pathology of labour 9
Dystocia malpresentations +malposition, multiple pregnancy +hydramnios, dysfuntional labour dystocia due to abnormalities of maternal soft parts, foetal causes – tumours complicating pregnancy, contracted pelvis,
CPD –obstructed labour.
III stage complications 2
PPH, retained placenta, inversion of uterus, postpartum collapse
injuries to parturient canal –rupture uterus, tears 2
Puerperium
Puerperal infections, CVT, DVT 2
Special Cases 6
Post dated pregnancy, prematurity, IUGR, IUD, foetal surveillance, elderly primi , grand multipara, Rh negative ,post CS pregnancy, gynaecological disorders complicating pregnancy Maternal and perinatal mortality.
Operative obstetrics 3
Caesarean section, episiotomy, destructive operation, manual removal of Placenta.
Neonatology, congential malformations 1
Drugs in pregnancy –oxytocin, obstetric analgesia 1
Induction of labour 1
USG in obstetrics. 1

Gynaecology & Reproductive Medicine 37
Applied anatomy 1
Development-developmental anomalies 2
Physiology 2
Menstrual disorders –A UB , amenorrhoea 3
Puberty – problems of 1
Menopause – Hormone replacement therapy (HRT) 2
Disease of vulva and vagina 2
PID 2
Endometriosis 1
Infertility 2
Contraception 3
Diseases of uterus 3
Diseases of cervix 2
Diseases of ovary 2
Hormones, hormone replacement therapy 2
Radiation chemotherapy, preventive gynaecology 3
Adolescent problems 1
Endoscopy (laparoscopy , hysteroscopy, culdoscopy) 1

Family Planning 4
MTP
Sterilization

Schedule of Practicals

Total Hours 530. Ward work - in the out patient department, operation theatre and labour room. Every day

8 –9 am	- Symposium & Group discussion
9 -10.30 am	- Case demonstration
10.30 am - 12.00 noon	- Clinical discussion

Two days per week is devoted for live operative surgery demonstration and discussion. Students have to maintain separate clinical record books and a minimum of twenty cases are to be recorded.

Clinical Posting in Obstetrics

Student will learn history taking, diagnosis and differential diagnosis of normal pregnancy, physical changes in pregnancy, presentation, position, lie etc., normal labour -stages and mechanism (demonstration of normal labour in the labour room), puerperium with stress on lactation, BFHI, common ailments of pregnancy like hyperemesis and UTI. Unit posting will include combined classes on Pathology of pregnancy, complications of pregnancy-APH, HTD, abnormal presenta- tion, medical complications, PPROM, PTL, FGR, III stage complication and abnormal puer- perium.

Clinical Posting in Gynaecology

Student will learn history taking, examination of a case, common symptoms, applied anatomy of genital organs, physiology of menstruation and ovulation, early complications of pregnancy, abor- tion, ectopic gestation and vesicular mole, fibroid, ovarian tumour, prolapse, endometriosis, malig- nancies of genital tract and abnormal uterine bleeding. Students will be exposed to operative proce- dures and diagnostic procedures like ultrasound and endoscopy.

Internment

Students will have to conduct at least 10 normal deliveries. They have to assist 10 normal and ab- normal labour, apart from attending all emergencies. During this period there will be classes on palpation (Review), mechanism of labour, manikin demonstration, obstetric operations and emer- gencies. The students have to maintain a record of internment activities.

CardioTocoGram(CTG) monitoring and Partogram charting

Topics for Symposia and Seminars

Gynaecology

Physiology of menstruation, Abnormal vaginal discharge, Infertility, Contraception-I Contracep- tion-II, MTP, Disorders of menstruation, Prolapse, Fibroid uterus Preinvasive & invasive lesions of cervix, Carcinoma endometrium, Ovarian tumour (benign), Malignant ovarian tumours, Adeno- myosis + endometriosis, Endoscopy in gynaecology, P.I.D, Minor operations, Major operations, Hormones in gynaecology.

Obstetrics

Physiological changes during pregnancy diagnosis of pregnancy & differential diagnosis Antenatal Case, Physiology and stages of labour, Mechanism of labour, Puerperium hypertensive disorders of pregnancy, Heart disease & pregnancy, Diabetes and pregnancy, Fe deficiency anaemia, Rh incom- patibility, Antepartum haemorrhage, Abortion, Ectopic pregnancy, Multiple pregnancy III stage complication, USS in pregnancy, Fetal monitoring, Trophoblastic disease.

Topics for Project

Obstetrics

Impact of caesarian section in subsequent deliveries, Epidemiology & outcome of PIH Perinatal problem – term babies (a) High risk (b) Low risk, Perinatal outcome in preterm babies,1st Trimes- ter complication in pregnanc, Heart disease in pregnancy, IUGR in obstetrics, Gestational & overt diabetes in pregnancy, Bleeding diathesis complicating pregnancy, Foetal monitoring in labour, An- tenatal fetal surveillance, Fetal malformation diagnosis& management prostaglandin in cervical rip- ening-effectiveness, Maternal morbidity in hypertensive pregnancy, Fetal outcome in PIH, Inci- dence & outcome in ectopic gestation, Antepartum haemorrhage evaluation.

Gynaecology

Incidence, clinical presentation & management of AUB, Evaluation of post menopausal bleeding, Etiology & management of infertility, Fibroid uterus in perimenopausal age group, Ovarian malig- nancy, PAP smear – effectiveness in screening epithelial neoplasia, Surgical management of fibroid uterus Endoscopy for pelvic factor in infertility, Uterine prolapse, Adolescent gynaecological prob- lems.

Family Planning

Contraceptive methods – obstetrics temporary & permanent, Medical termination of pregnancy-1st Trimesters, C_UT as Intrauterine contraceptive, Medical method of early abortion, Techniques of 2nd trimester abortion.

Integrated Teaching Sessions (Vertical/Horizontal)

	Topic	Departments
1.	Lymphatic drainage of female genital tract Anatomy in relation to pelvic malignancy	
2.	Embyrology of genital tract and developmental Anatomy Anomalies with clinical relevance	
3.	Mechanism of coagulation and its impact on Physiology Obstetric problems like PIH, abruptio placenta Amniotic fluid embolism	
4.	Physiology of menstruation in relation to DUB	Physiology
	Carbohydrate metabolism in normal and gestational Biochemistry diabetes and its impact in pregnancy	
5.	Uterotonic drugs	Pharmacology
	Hormones in gynecology Safety of drugs in pregnancy	
6.	Imaging techniques in obstetrics & gynaecology	Perinatology
7.	Cytopathology in genital tract malignancies	Pathology
8.	Significant microbes in O&G	Microbiology
9.	Social obstetrics	Community medicine
10.	Medico legal aspects in O&G	Forensic Medicine
11.	Liver disorders in pregnancy Other-Medical Disorders in pregnancy	Internal Medicine

Course Outcomes:

CO1: Competency to examine a pregnant woman; recognize high risk pregnancies and make appropriate referrals.

CO2: The ability to optimally manage common conditions affecting the female reproductive system.

CO3: Competency to conduct a normal delivery, recognise complication and provide postnatal care.

CO4: Competency to resuscitate the newborn and recognise congenital anomalies.

CO5: Competency to advise a couple on the use of various available contraceptive devices and assist in insertion and removal of intra-uterine contraceptive devices.

CO6: Competency to perform pelvic examination, diagnose and manage common gynaecological problems including early detection of genital malignancies.

CO7: Competency to interpret results of investigations like biochemical, histopathological, radiological, ultrasound etc.

Distribution of Marks for Internal Assessment and University Examinations

University examination				Internal assessment			
Theory I	Theory II	Practical	Viva voce	Total	Theory	Practical	Total
40	40	50	30*	160	20	20	40

*Out of 30 marks, 10 marks is allotted for the record of delivery cases

Weekly evaluation of the candidates will be done by one of the faculty on every Saturday and grad- ing will be done as follows:

Textbooks Recommended - Prescribed Books

1. Text book of Obstetrics by Sheela Balakrishnan.
2. Clinical Obstetrics by Mudaliar
3. Holland and Brews – Manual of Obstetrics
4. Clinical Gynaecology by A Bhasker Rao & N N Roy Chowdary.
5. Text book of Gynaecology by Wilfred Shaw
6. Antenatal Clinics by Browne
7. Principles of Gynaecology by TNA Jeffcoat.
8. Handbook on Obstetrics, Ganaecology for Viva, by Dr. Radhamony

PAEDIATRICS AND NEONATOLOGY (U19MBB314)

Goal

The broad goal of teaching undergraduate students in pediatrics is to acquire adequate knowledge and appropriate skills for optimally dealing with major health problems of children to ensure their optimal growth and development.

Competencies

The Indian Medical Graduate will acquire the knowledge, skills and attitude necessary to attain the following competencies to.

- Assess the growth and sexual maturity of a child including adolescent.
- Prescribe and administer immunization.
- Manage malnutrition
- Manage anaphylaxis.
- Mange a child with disability.
- Manage meningeal irritation.
- Manage seizure in a child.
- Diagnose and manage dehydration
- Manage aspiration.
- Perform Heimlich Maneuver.
- Keep the child in a knee chest position in a case with intense cyanosis.
- Give chest compression in case of bradycardia.
- Use Ryles tube in a child with gastric distention.
- Accompany as a member of the transport team.
- Communicate with the relatives with empathy and sympathy.
- Use computers and other digital tools in patient management.
- Do scientific studies.

Objectives

Knowledge

At the end of the course, the student shall be able to:

- Describe the normal growth and development during fetal life, neonatal period, childhood and adolescence and outline deviations thereof.
- Describe the common pediatric disorders and emergencies in terms of epidemiology, etiopathogenesis, clinical manifestations diagnosis rational therapy and rehabilitation.
- State age related requirements of calories, nutrients, fluids, drugs etc., in health and disease.
- Describe preventive strategies for common infectious disorders, malnutrition, genetic and- metabolic disorders, poisoning ,accidents and child abuse.
- Outline national programmes relating to child health including immunization programmes.

Skills

At the end of the course, the student shall be able to.

- Take a detailed pediatric history, conduct an appropriate physical examination of children including neonates, take anthropometric measurements, measure temperature orally and rectally, take BP measurement in all four limbs, make clinical diagnosis, conduct common bedside investigative procedures, operate a multi para monitor, use a pulse oximeter, inter- pret laboratory investigations' results, interpret

paediatric early warning system (PEWS) chart and plan and institute therapy.

- Resuscitation of newborns at birth, use of AMBU bag, prepare ORS, perform tuberculin test, administer vaccines**,** perform venesection, provide nasogastric feeding. IV canulation and intra osseous administration of fluids if IV cannula fails.
- Conduct diagnostic procedures like, lumbar puncture, liver and renal biopsy, bone marrow aspiration and supra pubic aspiration, sub dural, pleural and ascitic tap.
- Distinguish between normal newborn baby from those requiring special care and institute early care to all new born babies including preterm and low birth weight babies, provide guidance and counseling in breast feeding.
    - Provide ambulatory care to all sick children, identify indications for specialized / inpatient care/timely referral of those who require hospitalization.
    - Incision and drainage, dressing of burns, administration of oxygen and adrenaline injection.

Integration

The training in pediatrics should prepare the student to deliver preventive promotive, curative and rehabilitative services for care of children both in community and rehabilitative services for care of children both in community and hospital as a part of a team in an integrated form with other disci- ples, e.g.. Anatomy, Physiology, Forensic Medicine, Community Medicine, Physical Medicine and Rehabilitation.

Teaching Schedule
Lectures/Innovative Sessions

Semesters	VI	VII	VIII	IX	Total
Hours	24	16	60	32	132

Clinical Postings/Innovative Sessions

Semesters	VI	VIII	IX	Total
Weeks	4	4	2	10

Teaching Hours

Lecture	**Practical /Clinical**	**Innovative Session ***	**Total**
44	240	88	372

*Project work, seminars, structured discussion, integrated teaching, formative evaluation, revision

CO1: Competency to assess the growth and sexual maturity of a child including adolescent.
CO2: Competency to prescribe and administer immunization.
CO3: Competency to manage malnutrition.
CO4: Competency to manage anaphylaxis
CO5: Competency to manage a child with disability. **CO6:** Competency to manage meningeal irritaiton. **CO7:** Competency to manage seizure in a child.
CO8: Compentency to diagnose and manage dehydration.
CO9: Competency to manage aspiration and perform Heimlich Maneuver.
CO10: Competency to accompany as a member of the transport team.
CO11: Competency to communicate with the relatives with empathy and sympathy.
CO12: Competency to give chest compression in case of bradycardia.

Distribution of Marks for Internal Assessment & University Examinations

University Examination				Internal assessment		
Theory	Viva	Practical	Total	Theory	Practical	Total
40	10	30	80	10	10	20

Internal Assessment

Separate muster roll is kept for lecture and practical classes. The student is assessed through out the period of training under the following headings:

1. Clinical presentation- Grade: A-75%-Excellent, B-60% -Good, C-50%-Satisfactory, D-30%
   -Unsatisfactory.

Concerned faculty member is responsible to record it and finally its mark will be added to internal assessment, along with each semester examination (10 marks added to clinical exam. of each se- mester during V & VIII) A record is kept by the Head of the department.

2. Clinical Records. Students are allotted to faculty members, and each student should write 10 cases during their posting and submit to the concerned faculty member. Cases should be written as follows:

   5^{th} Semester 6
   8^{th} Semester 3
   9^{th} Semester 1

Case record should include, history, clinical findings, diagnosis, differential diagnosis, follow up and a brief discussion of the disease process. 10 marks are awarded to the case record and is counted for the FINAL SESSIONAL EXAMINATION.

Clinical Examination: Candidate is evaluated at the end of each posting**.**

Recommended Textbooks

1. IAP Text book of Paediatrics A. Parthasarathy
2. Text book of Pediatrics O.P. Ghai
3. Care of the New born M. Singh

CLINICAL EPIDEMIOLOGY & RESEARCH METHODOLOGY
(U19MBB315)- Elective

Objectives of the Course

- To introduce the basic concepts in research methodology
- To enable students to interpret research findings
- To facilitate critical reading- identify good and bad research studies
- To enable them to conduct research projects
- To facilitate preparation of research proposals

TOPICS

	Topics	Hours
1	Introduction to medical research	1
2	Study designs – observational studies, analytical studies	1
3	Fundamentals of clinical trials	1
4	Ethical principles in clinical research	1
5	Diagnostic test evaluation (interpretation of sensitivity, specificity, positive and negative predictive values)	1
6	Basics of statistics in research Hypothesis testing, P value, power, type I and II errors, confidence interval Sampling, validity, reliability, bias, confounding Measures of disease frequency Types of variables, data entry, presenting and sum- marizing data Analysis : dealing with continuous and categorical variables	3
7	Group exercise : writing research proposal	2
8	Group exercise : questionnaire designing	1
9	Group Exercise : Critical reading of research articles– application in evidence based medicine	2
	TOTAL	**13**

Course Outcomes:

CO1: Understanding of the basic concepts in research methodology.

CO2: Ability to interpret research findings.

CO3: Ability to critically read and identify good and bad research studies.

CO4: Ability to conduct research projects

CO5: Ability to prepare research proposals.

Teaching Schedule
Semester VII **Time :1-2 pm**

Textbooks for Reference

1. Clinical Epidemiology: The Essentials by Robert Fletcher and Suzanne Fletcher. Lippincott Williams and Wilkins. 4th Edition. 2005.
2. User's Guide to the Medical Literature: A manual for evidence-based clinical practice edited by Gordon Guyatt, Drummond Rennie, Maureen Mead and Deborah Cook. McGraw Hill Medi- cal. 2008. (web based).
3. Basic Epidemiology by R Bonita, R Beaglehole, T Kjellstrom WHO 2006
4. Medical statistics – Principles and methods by KR Sundaram S N Dwivedi & V Sreenivasan: BI Publications, New Delhi 2009.
5. Statistics for epidemiology by Nicholas P Jewell, Chapman & Hill (CRC), 2004.
6. Principles of Medical Statistics by Alvan R Feinstein CRC press, 2002.

TEACHING SCHEDULE

Total Number of Teaching Hours in Different Semesters (Includes Lectures, Practicals, Innovative Sessions & Clinical Postings)

Subjects	I	II	III	IV	V	VI	VII	VIII	IX	Total
Anatomy	390	260	-	-	-	-	-	-	-	650
Physiology	264	232	-	-	-	-	-	-	-	496
Biochemistry	160	136	-	-	-	-	-	-	-	296
Pathology	-	-	96	144	64	-	-	-	-	304
Microbiology	-	-	96	96	48	-	-	-	-	240
Pharmacology	-	-	120	120	80	-	-	-	-	320
Forensic Medicine	-	-	24	48	32	-	-	-	-	104
Community Medicine	60	-	24	116	16	116	124	-	-	456
Ophthalmology	-	-	-	-	-	190	190	-	-	380
Otorhino-laryngology	-	-	-	-	-	120	160	-	-	280
General Medicine	-	-	216	24	64	144	32	288	160	928
Psychiatry	-	-	-	-	82	82	-	-	-	164
Dermatology & STD	-	-	-	48	-	112	16	-	-	194
Radiology	-	-	-	-	-	72	-	-	-	72
Pulmonology	-	-	-	-	-	72	-	-	-	72
General Surgery	-	-	216	24	64	144	32	288	160	928
Orthopaedics	-	-	-	96	-	24	112	36	80	348
Anaesthesiology	-	-	-	-	-	72	-	-	-	72
Obstetrics & Gynaecology	-	-	96	-	48	144	128	344	96	856
Paediatrics	-	-	-	-	-	120	16	156	80	372
Dentistry	--	-	-	-	-	60	-	-	-	60

DISTRIBUTION OF LECTURES, PRACTICALS, INNOVATIVE SESSIONS & CLINICAL POSTINGS

Subjects	**Lectures**	**Practical/Clinical/Innovative Sessions**		**Total**
Anatomy	258	392		650
Physiology	160	320		480
Biochemistry	80	160		240
		Practical/Clinical	**Innovative Sessions**	
Pathology	100	100	104	304
Microbiology	80	80	80	240
Pharmacology	106	128	86	320
Forensic Medicine	34	20	50	104
Community Medicine	150	306		456
Ophthalmology	76	240	64	380
Otorhinolaryn-gology	40	192	48	280
General Medicine	100	624	204	928
Psychiatry	8	96	16	72
Dermatology & STD	32	144	18	194
Radiology	8	48	16	72
Pulmonology	8	48	16	72
General Surgery	100	624	204	928
Orthopaedics	36	240	72	348
Anaesthesiology	8	48	16	72
Obstetrics & Gynaecology	90	576	190	856
Paediatrics	44	240	88	372
Dentistry	4	48	8	60