



KHAJA BANDANAWAZ

UNIVERSITY

EDUCATING HUMANITY

(A Religious Minority University)

(University established by an Act No.18 of Karnataka State Legislature)

**FOUNDATION COURSE, &
CONCISE LEARNING MODULE FOR MBBS STUDENTS**

First Professional Year

Session 2019-20

**FACULTY OF MEDICINE
KHAJA BANDANAWAZ UNIVERSITY, KALABURAGI.**

FACULTY OF MEDICINE
KHAJA BANDANAWAZ UNIVERSITY, KALABURAGI, KARNATAKA.

FOUNDATION COURSE

Time Table 1st week

Time	Day 1	Day2	Day3	Day4	Day5	Day6
9.0-10 Hrs	Welcome session conducted by Dean Faculty of Medicine Parents and students Interaction with Teachers	Visit to the Different Departments Anatomy Physiology & Biochemistry	AETCOM Module 1.1 Part 1	AETCOM Module 1.1 Part 2	AETCOM Module 1.1 Part 3	Visit to KBNIMS Hospital Interaction with HODs of different department
10-11 Hrs						
11-12 Hrs						
13-14 Hrs	LUNCH					
14-15 Hrs	Discussion on the Institutes rules and regulation, timing to be followed and briefing the students on their role & responsibilities as a learner., Grievance redress mechanism	Visit to the Departments of Pathology, Pharmacology, Microbiology Forensic Medicine, Community Medicine & Library	Foundation Module F101	Foundation Module F102	Foundation Module F102	Visit to a Primary Health Centre In batches
15-16 Hrs						
16-17 Hrs						

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KHAJA BANDANAWAZ UNIVERSITY, KALABURAGI, KARNATAKA.

FOUNDATION COURSE
Time Table 2nd Week

Time	Day 1	Day2	Day3	Day4	Day5	Day6
9.0-10 Hrs	Foundation Module 103 Basic Computers and Information science	Foundation Module 103 Basic Computers and Information science	Foundation Module 103 Basic Computers and Information science	Foundation Module 103 Basic Computers and Information science	Foundation Module103 Basic Computers and Information science	Visit to District Health Centre
10-11 Hrs						
11-12 Hrs						
13-14 Hrs	LUNCH					
14-15 Hrs	Foundation Module 104 Communication and Soft Skill	Foundation Module 104 Communication and Soft Skill	Foundation Module 104 Communication and Soft Skill	Foundation Module 104 Communication and Soft Skill	Foundation Module 104 Communication and Soft Skill	Bio safety & Personal Hygiene
15-16 Hrs						
16-17 Hrs						

FACULTY OF MEDICINE
KHAJA BANDANAWAZ UNIVERSITY, KALABURAGI, KARNATAKA.

FOUNDATION COURSE
Time Table 3rd Week

Time	Day 1	Day2	Day3	Day4	Day5	Day6
9.0-10 Hrs	Spoken Kanada*	Spoken Kanada	Spoken Kanada	Spoken Kanada	Spoken Kanada	Spoken Kanada
10-11 Hrs						
11-12 Hrs						
13-14 Hrs	LUNCH					
14-15 Hrs	**Choice Based module	Choice Based module	Choice Based module	AETICOM Module 1.5	AETICOM Module 1.5	AETICOM module 1.5
15-16 Hrs						
16-17 Hrs						

*For those students who do not know to communicate in Kanada.
Students fluent in Kanada can opt for English communication or any other Choice based module

FACULTY OF MEDICINE
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FOUNDATION COURSE
Time Table 4th. Week

Time	Day 1	Day2	Day3	Day4	Day5	Day6
9.0-10 Hrs	First Aid Module-1	Firs Aid Module-2	Firs Aid Module-3	Firs Aid Module-4	Firs Aid Module-5	First Aid Module-6
10-11 Hrs						
11-12 Hrs .						
13-14 Hrs	LUNCH					
14-15 Hrs	First Aid Module-1	First Aid Module-2	First Aid Module-3	First Aid Module-4	Firs Aid Module-5	Firs Aid Module-6
15-16 Hrs						
16-17 Hrs						

*For those students who do not know to communicate in Kannada.
Kannada students can opt for English communication

FACULTY OF MEDICINE
KHAJA BANDANAWAZ UNIVERSITY, KALABURAGI, KARNATAKA.

Time table for First MBBS students (2019-20 batch)
with effect from august 2019

	9.00 TO 10.00	10 TO 11	11 TO 01 PM		1.00 TO 2.00	2.00 PM TO 3.00 PM	3.00PM TO 5.00 PM
Monday	Physiology (Lecture)	Anatomy (Lecture)	Anatomy (Dissection)		L U N C H	Biochemistry SDL	Practical Anatomy /A Batch(1-33) Physiology/ B Batch(34-66) Biochemistry/ C Batch(67-100)
Tuesday	Physiology (Lecture)	Biochemistry (Lecture)	Anatomy (Dissection)			Anatomy SDL	
Wednesday	Biochemistry (Lecture)	Anatomy (Lecture)	Anatomy (Dissection)			Physiology SDL	
Thursday	Anatomy (Lecture)	Physiology (Lecture)	Anatomy (Dissection)			INTEGRATED Class / AETCOM MODULE/SEMINAR/FIELD VISITS	
Friday	Anatomy (Lecture)	Anatomy (Lecture)	11 – 12 Anatomy Dissection / SGT / Tutorials	12 – 01 Anatomy (SDL)		Physiology SGT/ Tutorials	Anatomy/Physiology/Biochemistry SGT/Tutorials
Saturday	Biochemistry (Lecture)	Physiology (Lecture)	Community Medicine	Biochemistry SGT/Tutorials		Community Medicine SGT/Tutorial	Sports
Last Saturday of Month (2-5 PM) Sports							

SDL-Self Directed learning, SGT – Small Group teaching

TRIMESTER WISE DISTRIBUTION OF CURRICULUM CONTENT

(IN MODULAR FORMET)

Semester	Trimesters	Subject wise MODULAR distribution					INTEGRATED CLASS
		Anatomy Modules**	Physiology Modules	Biochemistry	Community Medicine	AETCOM	
1 st . Semester	1 st Trimester (September, October, November 2019).	i. AN:1 Anatomical Terminology & General Anatomy ii. AN 2: General Histology iii. AN:3 General Embryology	i. PY1 : Introduction to Physiology ii. PY2: Blood iii. PY3: Nerve muscle Physiology	i. BI.1: Cell Biology. ii. BI.2: Biomolecules. iii. BI.3: Enzymes. iv. BI.4. Ph/Buffer, Physiological, Buffer System V. B1. 5: Metabolism General Concepts, characteristics of pathways.	CM 1 History of Medicine, Public Health, Preventive & Social Medicine Community Medicine. CM2: Concept of Health& Disease. iii. CM3: Determinants of Health iv. CM4: Natural History of Disease & Levels of Prevention.	I.M1.1. What does it mean to be a doctor.? ii.M1.2: What does it mean to be a patient?	Cell Biology Anatomy Physiology Biochemistry(L) Pathology
	2 nd Trimester December,(2019) January February (2020)	i. AN4: Upper Limb ii. AN5: Lower Limb. iii. AN6 Thorax	i. PY4: Cardiovascular System. ii. PY5: Respiratory System. iii. PY6 Environmental Physiology.	i. BI 6: Carbohydrate Metabolism. iii. BI 7. Amino Acid Metabolism. iii. BI 8. Lipid Metabolism IV. BI 9 Regulation & interrelationship of Metabolic Pathways.	i. CM5 Measurements in Health. ii. CM6 Social determinants of Health.	i. M1.5: The cadaver as our First teacher. ii. M1.4: The Foundation of Communication	Mechanism of the joint Movement (Kinesiology) Orthopedics Anatomy Radio-diagnosis, Physiotherapy
2 nd . Semester	3 rd Trimester March, April, May (2020)	i. AN7: Abdomen ii. AN8: Pelvis & Perineum. iii. AN9: Genetics	i. PY7: Gastro Intestinal System. ii. PY8 Renal System. iii. PY9 Reproductive System.	i. BI 10: :Food Assimilation & Nutrition. ii. BI 11: Environmental Biochemistry/ Cancer & Cancer Marker.. iii. BI 12: Hormones	i. Human Life Cycle ii. Psychological development including learning. iii. Social development	i. M1.3: The doctor Patient Relationship.	Coronary Artery Disease. Biochemistry Medicine Anatomy Physiology
	4 th . Semester June July August (2020)	i. AN10. Head & Neck. ii. AN11: Nero Anatomy	i. PY10. Endocrine System. ii. PY11. Neuro Physiology. iii. PY12: Special senses	i. BI 13: Molecular Biology ii. BI 14: Immunology	I. Attitude development and methods to change		

NOTE: Early Clinical Exposure will be achieved by the brief introduction of the module by a clinician on its clinical relevance.

**** In the Regional Anatomy modules: It has three sections: Development, Gross structure, Micro Anatomy & Radiological Anatomy.**

FOUNDATION COURSE MBBS

FACULTY OF MEDICINE KHAJA BANDANAWAZ UNIVERSITY, KALABURAGI, KARNATAKA.

MBBS F-101: Concept of Health & Disease: the course makes one understand the concept of health & disease, the paradigm of Natural History of Disease and levels of prevention and use it as a tool to gather evidence based knowledge of the health and disease condition and its management.

- I. Definition of Health, Determinants of Health & Measurements in Health.
- II. Epidemiological Triad.
- III. Natural History of Disease.
- IV. Levels of Prevention.
- V. Health care services & delivery

MBBS F-102: Introduction to National Healthcare Delivery System in India: The course provides the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world. Topics to be covered under the subject are as follows:

1. Introduction to healthcare delivery system
 - 1.1. Healthcare delivery system in India at primary, secondary and tertiary care
 - 1.2. Community participation in healthcare delivery system
 - 1.3. Health system in developed countries.
 - 1.4. Private Sector
 - 1.5. National Health Mission
 - 1.6. National Health Policy
 - 1.7. Issues in Health Care Delivery System in India
2. National Health Programme- Background objectives, action plan, targets, operations, achievements and constraints in various National Health Programme.
3. Introduction to AYUSH system of medicine
 - 3.1. Introduction to Ayurveda.
 - 3.2. Yoga and Naturopathy
 - 3.3. Unani
 - 3.4. Siddha
 - 3.5. Homeopathy
 - 3.6. Need for integration of various system of medicine

MBBS.F103. Basic computers and information science: The students will be able to appreciate the role of computer technology. The course focuses on computer organization,

computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation. Topics to be covered under the subject are as follows:

1. Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
2. Input output devices: Input devices (keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).
3. Processor and memory: The Central Processing Unit (CPU), main memory.
4. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.
5. Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).
6. Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.
7. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
8. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
9. Introduction of Operating System: introduction, operating system concepts, types of operating system
10. Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
11. Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
12. Application of Computers in clinical settings.

Suggested Readings:

1. Information technology by Anshuman Sharma (Lakhanpal Publisher)
2. Computer Fundamentals (ConceptsSystems and applications) by P. K. Sinha (University of Tokyo, Japan) BPB Publications

MBBS F104: Communication and soft skills: The students will be able to appreciate communication skills as these are important to everyone - they are how we give and receive information and convey our ideas and opinions with those around us.

A: Topics taught in this module include:

1. Basic Language Skills: Grammar and Usage.
 - I. Business Communication Skills. With focus on speaking - Conversations, discussions, dialogues, short presentations, pronunciation.
 - II. Teaching the different methods of writing like letters, E-mails, report, case study, collecting the patient data etc. Basic compositions, journals, with a focus on paragraph form and organization.
 - III. Basic concepts & principles of good communication
 - IV. Special characteristics of health communication
 - V. Types & process of communication
 - VI. Barriers of communication & how to overcome

B. Soft skills is a term often associated with a person's "EQ" (Emotional Intelligence Quotient), which is the cluster of personality traits that characterize one's relationships with other people. These skills can include social graces, communication abilities, language skills, personal habits, cognitive or emotional empathy, and leadership traits. A person's soft skill EQ is an important part of their individual contribution to the success of an organization. Organizations which deal with customers face-to-face are generally more successful if they train their staff to use these skills. Screening or training for personal habits or traits such as dependability and conscientiousness can yield significant return on investment for an organization. For this reason, soft skills are increasingly sought out by employers in addition to standard qualifications. Topics taught in this module include soft skills with important sub-elements:

- I. Communication Styles
- II. Team work
- III. Leadership Skills
- IV. Effective & Excellent Customer Service
- V. Decision Making & Problem Solving
- VI. Managing Time and Pressures
- VII. Self-Management & Attitude

Suggested readings:

1. Effective Communication and Soft Skills by Nitin Bhatnagar Pearson Education India, 2011
2. Communication N Soft Skills Paperback – 2014 by Niraj Kumar, Chetan Srivastava .

MBBS F-104: Medical Terminology, Record keeping (including anatomical terms) This subject introduces the elements of medical terminology. Emphasis is placed on building familiarity with medical words through knowledge of roots, prefixes, and suffixes. Topics include: origin, word building, abbreviations and symbols, terminology related to the human anatomy, reading medical orders and reports, and terminology specific to the student 's field of study. Spelling is critical and will be counted when grading tests. The students will be oriented to the role of doctors in healthcare system, scope, purpose, career opportunities in Health services. They will also be introduced to healthcare system and public health in India.

B. Topics to be covered under the subject are as follows: Medical Terminology, Record keeping

- I. Derivation of medical terms.
- II. Define word roots, prefixes, and suffixes.
- III. Conventions for combined morphemes and the formation of plurals.
- IV. Basic medical terms.
- V. Form medical terms utilizing roots, suffixes, prefixes, and combining roots.
- VI. Interpret basic medical abbreviations/symbols.
- VII. Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system.
- VIII. Interpret medical orders/reports.
- IX. Data entry and management on electronic health record system.

MBBS F105 (Module 1-6)

MODULE – 1

INTRODUCTION TO THE FIRST RESPONDER PROGRAMME

Learning Outcomes: At the completion of this module, the student should be able to:

- Understand the healthcare scenario in India
- Understand the duties and responsibilities of an First Responder
- Learn the scope of work for a First Responder
- Recognize the boundary of one's role and responsibility and seek supervision when situations are beyond one's competence and authority
- Understand the art of effective communication with various stakeholders like patients, nurses, etc.
- Understand relevant medico-legal principles
- Learn how to identify rapidly changing situations and adapt accordingly
- Understand the importance of and process for first aid and triage
- Understand his/her role in disaster preparedness and management

CONTENT OF MODULE 1

SRI. No.	TOPICS	DURATION	TYPE OF INSTRUCTION
1	Problem statement	01	Lecture followed by Small group Discussion
2	Scope and responsibilities of a first responder	01	Lecture followed by Small group Discussion
3	Professionalism, ethical, legal issues and well-being of First responder	01	Lecture followed by Small group Discussion
4	Human Body	03	Lecture followed by Small group Discussion & Demonstration

Detail of Topics

1. Introduction to healthcare and hospitals& problem statement

- a. Healthcare delivery system in India at primary, secondary and tertiary care
- b. Community participation in healthcare delivery system
- c. Emergent conditions and magnitude
- d. Why we need First responders
- e. Concept of golden hour
- f. Duties and responsibilities of first responder

2. Professionalism ethical issues and well-being of first responder

- a. Code of conduct, professional accountability and responsibility, misconduct
- b. Ethics in healthcare – Privacy, confidentiality, consent, medico legal aspects
- c. Understanding scope of work and avoiding scope creep
- d. Handling objections
- e. Gather information from observation, experience and reasoning
- f. Identification of rapidly changing situations and adapt accordingly
- g. Planning and organization of work
- h. Scene safety
- i. Dealing with emotional reactions family members and bystanders
- j. Personal protection
 - i. Steps to be taken against airborne and blood-borne pathogens
 - ii. Personal protective equipment necessary for each of the following situations.
- k. Consent
 - i. Definition of consent
 - ii. Methods of obtaining consent
 - iii. Difference between expressed and implied consent
 - iv. Role of consent of minors in providing care
- l. Actions to assist in the preservation of a crime scene
- m. Issues concerning the fundamental components of documentation

3. The Human Body: Enhances the First Responder's knowledge of the human body. A brief overview of body systems, basic anatomy, and physiology will be given in this session Includes:

- a. Anatomy, components and function of:
 - i. Airway &Respiratory system
 - ii. Circulatory system
 - iii. Musculoskeletal system
 - iv. Spine

- b. Physiology of Breathing and circulation

MODULE – 2:

AIRWAY, BREATHING AND CIRCULATION: TRAUMA

Learning Outcomes: At the completion of this module, the student should be able to:

- a. Airway:
 - i. Assessment of airway for its patency: Determine and take necessary action to ensure clear airways.
- b. Management of Airway: Airway Adjuncts and airway manoeuvres
 - i. Airway foreign body
 - ii. Preventing aspiration
- c. Breathing.
 - i. Methods to assess if a patient is breathing
- d. Circulation:
 - i. Evaluate the cardiac status of the patient
 - ii. Stopping haemorrhage- pressure/tourniquets.

CONTENT

SL.NO	TOPICS	DURATION	TYPES OF INSTRUCTION
1	Airway and breathing	03Hrs.	Small group discussion/Demonstration/Mannequins, Role play.
2	Circulation	03Hrs.	Small group discussion/Demonstration/Mannequins, Role play.

Detail of Topics

1. Airway

- i. Signs of inadequate breathing
- ii. Mechanism of injury to opening the airway
- iii. Steps in the head-tilt chin-lift
- iv. Steps in the jaw thrust
- v. Taking out foreign body
- vi. Ensuring patent airway during seizures and vomiting.

2. Ventilation

- i. Of a patient with a mask or barrier device
- ii. Steps in providing mouth-to-mouth and mouth-to-stoma ventilation

3. Circulation

- i. Evaluate the cardiac status of the patient
- ii. Determine the need for and take necessary action to proper circulation
- iii. Steps for control of bleeding: Pressure bandage and tourniquet

4. Clearing a foreign body airway obstruction

Practical approach- Students will have an opportunity to practice the techniques of removing a foreign body airway obstruction.

Equipment required/ teaching strategies for the above content-

- i. Mannequins and dummies
- ii. Videos and presentations
- iii. Role plays

MODULE – 3

BASIC LIFE SUPPORT: CPR

Learning Outcomes: At the completion of this module, the student should be able to:

- a. Perform Cardiopulmonary resuscitation
- b. Perform External chest compressions
- c. Determine the need for additional help.

CONTENT

SL. NO.	TOPIC	DURATION	TYPES OF INSTRUCTION
	CPR	06	Small Group Discussion, Live Demonstration, Mannequin, Role Play

Detail of Topics

1. Circulation

- a. Implications of cardiac arrest
- b. Cardiopulmonary resuscitation (CPR)
 - i. How it works
 - ii. Steps
 - iii. When to stop CPR
- c. Brief overview of AED (only demonstration –no hands on)

2. Practical approach- Students will be given the opportunity to practice CPR skills.

a. Equipment required/ teaching strategies for the above content-

- i. Mannequins and dummies
- ii. Videos and presentations
- iii. Role plays

MODULE – 4

INITIAL MANAGEMENT OF THERMAL INJURY, STABILIZING INJURED EXTREMITY AND WOUND MANAGEMENT

Learning Outcomes: At the completion of this module, the student should be able to:

- a. Evaluate the patients' condition and take appropriate action in case of bleeding or burn injury
- b. Size up the site for medical emergencies, injuries etc. and take appropriate action

SL. NO	TOPICS	DURATION	TYPE OF INSTRUCTION
1	Wound Care & Care of, Thermal Injury.	04	Small Group Discussion, Live Demonstration, Mannequin, Role Play
2	Splinting		

Detail of Topics

1. Bleeding and Soft Tissue Injuries

- a. Difference between arterial and venous bleeding
- b. Stopping external bleeding
- c. Identification of Internal bleeding
- d. Functions of dressings and bandages
- e. How to help a victim of burn injury

2. Injuries to Muscles and Bones

- a. Suspecting bony/spinal injury
- b. Splinting –materials used
- c. Importance of splinting

MODULE – 5

MEDICAL EMERGENCIES

Learning Outcomes: At the completion of this module, the student should be able to:

- a. Identify patient with Angina/Myocardial infarction
- b. Identify stroke
- c. Anaphylactic Shock, Allergy related emergency.
- d. Initial management of animal bites (Dog and snake bites)

SL. NO.	TOPIC	DURATION	TYPE OF INSTRUCTION
1	Common Medical Emergency.	03	Small Group
2	Poisoning, drowning and electrocution, Suffocation	03	Discussion, Live Demonstration, Mannequin, Role Play

Detail of Topics

1. Medical Emergencies-

- a. Identification of the patient steps in providing first aid to a patient with
 - i. A general medical complaint- Seizures
 - ii. Chest pain
 - iii. Shortness of breath
 - iv. Exposure to heat
 - v. Including other medical complaints like allergy, diarrhoea, fainting low blood sugar, stroke.
- b. Drowning
- c. Poisoning

Equipment required/ teaching strategies for the above content-

- a. Mannequins and dummies
- b. Videos and presentations
- c. Role plays

MODULE6

TRANSPORTATION AND DISASTER PREPAREDNESS

Learning Outcomes: At the completion of this module, the student should be able to:

- a. Identify patients' condition and take appropriate action to safely transport the patient

Content

SL. NO	TOPICS	DURATION	TYPES OF INSTRUCTION
	Transportation	04	
	Disaster Preparedness	02	

Detail of Topics

- a. Importance of timely and proper transportation
- b. Importance of spine protection
- c. Preparedness and risk reduction
- d. Incident command and institutional mechanisms.
- e. Triage
- f. Resource management.

Equipment required/ teaching strategies for the above content-

- a. Videos and presentations
- b. Discussions and dialogues
- a. Dummies and mannequins
- b. First aid kit etc.

ANNEXURE-1

EQUIPMENT LIST REQUIRED FOR TRAINING

1. Bed with mattress
2. Patient Side Locker
3. Back Rest
4. Foot Step
5. Cardiac Table
6. Bed Sheet, Blanket, Pillow with Pillow Cover
7. I V Set-up
8. Oxygen Cylinder with Connector, Key, Face Mask and tubing
9. Cupboard
10. Suction Apparatus
11. Thermometer
12. Enamel Basin
13. Rubber Sheet 2 x 2 Mts (2 sets)
14. Draw Sheet
15. Air Cushion
16. Sand Bag
17. Fire Extinguisher 5 KG ABC type
18. Weighing Machine
19. Oral care Set
20. Urinal Set (1 Male + 1 Female)
21. Bed Pan
22. Scissor (3)
23. Nail Cutter (5)
24. Nail Filer (5)
25. Steel Plate (2)
26. Steel Glass (5)
27. Steel Bowl (5)
28. Spoon (10)
29. Steel Jug (5)
30. Bath Tub
31. Measuring Glass
32. Goggles (5)
33. Towel (5)
34. Gown (5)
35. Stop Watch (5)
36. Prosthesis (3)
37. Glasses (3)

38. Mortar and Pestle (2)
39. Ryle's tube
40. Shaving Kit
41. Desktop, Intel Core I3, with 2 GB Ram, 500 GB Hard Disk with accessories
42. T V Monitor 42 Inch LCD TV/ LCD Projector
43. White Board
44. Extension Cord
45. Speakers 40 Watt set of two Printer with Scan and copy function Wi-Fi with economical printing
46. **Full Body Mannequin - Basic**
47. **CPR Mannequin.**
48. **Airway Mannequin (3)**
49. Ambubag with Mask (Adult)
50. AED Trainer with Adult Pad
51. Male Multi Venous IV Arm
52. Advanced Male and Female Catheterization Kit
53. Wound care Model Anatomical
54. Wheel Chair
55. Walker
56. Crutch
57. Malleable Splint set of Large Medium and Small (3)
58. Cervical Collar Set of Large Medium and Small (3)
59. Gloves (disposable) - packet5
60. Gloves (surgical) - packet5
61. Liquid Soap Bottle (4)
62. Mask - packet (2)
63. Shoe Cover - packet (2)
64. Hair Cap - packet (2)
65. Mackintosh (4)
66. Sponge Cloth (4)
67. Registers (attendance 2, record book 2,) Pens, Pencil Erasers, Sharpeners, Marker pens 10 each)
68. Duster (2)
69. Paper (Ream of 500) (2)
70. Cleaning Solution (Colin) (2)
71. Syringe 50 cc/ml (5)
72. Diaper & Sanitary pads (All Sizes) (2)
73. Hot Water Bottle (5)
74. Ice caps (5)
75. Mock kitchen and kitchen facility (5)
76. Foley's catheter (2)
77. Euro bags (2)
78. Suction Catheter (2)
79. Ryle's tube (2)

REFERENCES:

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2. Medexpress Companies, Emergency Medical Responder, Course Syllabus. Available at:
<http://www.medexpresscompanies.com/uploads/EMRCourseSyllabusSchedule.pdf>. Last visited on Dec 23, 2016.

3. United States Department of Transportation National Highway Traffic Safety Administration First Responder: National Standard Curriculum. Available on -https://www.ems.gov/pdf/education/First-Responder/FR_1995.pdf. Last visited on Dec 23, 2016.
4. First Responder EMS Curriculum for Training Centres in Eurasia: Instructor Manual, American International Health Alliance, July 2002. Available on- <http://www.aiha.com/wp-content/uploads/2015/07/FirstResponderInstructEN.pdf>. Last visited on Dec 23, 2016.
5. Shankar PS: First Aid (Prathama Chikitse, (Kanada) Bengaluru, Sapna Book, 2017.

CONCISE LEARNING MODULE FOR MBBS STUDENTS

First Professional Year

Session 2019-20

FACULTY OF MEDICINE KHAJA BANDANAWAZ UNIVERSITY

The Learning modules are prepared by the subject experts and scrutinized by the members of the curriculum committee of Faculty of Medicine and approved by the board of studies of the Khaja Bandanawaz University, Kalaburagi. The contents embodied in the document is based on the document “Competency based Undergraduate Curriculum for MBBS students” hosted by the Medical Council of India in its website.

The detailed modules for each topic of each subject are modeled as per the AETCOM module of Medical Council of India. Each subject has several modules with three component Knowledge, Skill & Attitude and described in the format Topic/ type of Competencies/Domain/level/Teaching learning method to be used/ Assessment Methods/ Integration if any. The time distribution is also mentioned for each item in the module. In the Anatomy modules there are four component, Macro Anatomy, Micro-Anatomy, and Radiological Anatomy and Clinical Anatomy. We have also introduced in the 1st. Anatomy module General Anatomy which aims to introduce the general structural plan of human body composite of different important system to the learners the general structural plan of human body and its component system so that students can understand the regional anatomy and function effectively and efficiently. Similarly in Physiology and Biochemistry, modules Clinical aspect is included. Each of the modules will be introduced by a clinician emphasizing the clinical relevance of learning the topic and acquiring the knowledge and skill. The integration of the topics is designed as per the paradigm of Natural History of Disease.

The document is prepared by the Curriculum Committee of the Faculty of Medicine. Please acknowledge the incorporation of any part of the published document

LEARNING MODULE FOR ANATOMY 1ST MBBS

Number of Modules: 12

Number of hours: 675 Hrs.

- i. Lectures: 158.
- ii. Tutorials/Integrated Learning/Practical:477 Hrs
- iii. Self Directed Learning: 40 Hrs.

ANATOMY

Goal of the teaching of undergraduate students in Anatomy aims at providing comprehensive knowledge of the gross and microscopic structure and development of human body to provide a basis for understanding the clinical correlation of organs or structures involved and the anatomical basis for the disease presentations.

Objectives:

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

- I. Comprehend the normal disposition, clinically relevant interrelationships, functional and cross sectional anatomy of the various structures in the body.
- II. Identify the microscopic structure and correlate elementary ultra-structure of various organs and tissues and correlate the structure with the functions as a prerequisite for understanding the altered state in various disease processes.
- III. Comprehend the basic structure and connections of the central nervous system to analyse the integrative and regulative functions of the organs and systems. He/She should be able to locate the site of gross lesions according to the deficits encountered.
- IV. Demonstrate knowledge of the basic principles and sequential development of the organs and
- V. systems; recognize the critical stages of development and the effects of common teratogens, genetic mutations and environmental hazards. He/She should be able to explain the developmental basis of the major variations and abnormalities.

Skills:

- I. Identify and locate all the structures of the body and mark the topography of the living anatomy.
- II. Identify the organs and tissues under the microscope.

- III. Understand the principles of karyotyping and identify the gross congenital anomalies.
- IV. Understand Principles of X-Ray and interpret the X ray images of normal human structures
- V. Understand principles of newer imaging techniques and interpretation of Computerized Tomography (CT) Scan, Sonogram of normal individual.
- VI. Understand clinical basis of some common clinical procedures i.e., intramuscular & intravenous injection, lumbar puncture and kidney biopsy etc.

Integration:

- I. From the integrated teaching of other basic sciences, student should be able to comprehend the regulation and integration of the functions of the organs and systems in the body and thus interpret the anatomical basis of disease process.

Detailed Curriculum of Anatomy for the 1st. Professional MBBS Course

Module: MBBS AN1:

A. Introduction to Anatomy, Anatomical Terminology & General Anatomy of Human Body: (anatomical position, planes, tissues and movements) In order to communicate effectively with colleagues, and understand the description of the anatomical structures and its relations to other structures of the body, the undergraduate must understand and able to use accepted anatomical terms, language so that he is capable of describing the normal structure of the body.

At the end of the course the medical graduate should be able to:

- I. Define and demonstrate the following terms relative to the anatomical position: medial, lateral, proximal, distal, superior, inferior, deep, superficial, palmar, plantar, anterior/ ventral, posterior/dorsal, rostral, caudal.
- II. Describe the following anatomical planes: axial/transverse/ horizontal, sagittal, and coronal.
- III. Define and demonstrate the terms used to describe the movements of the limbs and vertebral column: flexion, extension, lateral flexion, pronation, supination, abduction, adduction, medial and lateral rotation, inversion, eversion, plantar flexion, dorsiflexion, protraction, retraction and circumduction.
- IV. Define the terms somatic and visceral when used to describe parts and systems (e.g. Somatic and visceral motor systems) of the body.

Module: MBBS AN 2

General Anatomy

1. General Anatomy of Skin and Fascia:

- I. Types of Skin,
- II. Dermatomes,
- III. Superficial fascia & Deep fascia,
- IV. Regional variation in fat distribution and function of superficial fascia and deep fascia.

2. General Anatomy of Muscular System

- I. Classification and identification of the muscles of the body: main attachments, nerve supply and action(s), microscopic anatomy of muscles and the nerve terminations.
- II. Details of attachments of the muscles; ultra structural features of muscle; mechanism of the movement caused by the muscle/muscles and various forces exerted by them and their detailed action(s).

3. Osteology

- I. Names of the bones of the body and their position; classification of the bones with examples; general features of the bone and normal development; microscopic anatomy of bone; general pattern of blood supply; ossification of the bones of the limbs for age determination. X-rays of bones.
- II. Process of repair of bone.

4. Vertebral Column: The knowledge about vertebral column is necessary as it forms the basis for the understanding of common spinal pathologies e.g. back pain, prolapsed of an inter vertebral disc, injuries to the spinal cord, nerve, and whiplash injuries and their consequences for the remainder of the body. In order to perform a basic neurological examination of the limbs and trunk, the student should have a working knowledge of dermatomes and peripheral nerve distributions, the function of major muscle groups and their innervations. It is also necessary for the safe performance of procedures such as lumbar puncture, regional and epidural anesthesia. As such the medical students should be able to: Recognize characteristics feature of vertebrae from the five regions of the vertebral column; Understand how the spine as a whole moves and how its normal curvature develops and is stabilized. And Interpret relevant clinical images to distinguish deviation from the normal. Understand the organization of contents of the vertebral canal i.e. the meninges, spinal cord, spinal nerve roots, spinal nerves and their particular relationships to the vertebral and inter-vertebral joints.

Specific Objective: At the end of the course: A medical graduate should be able to:

- I. Describe the main anatomical features of a typical vertebra. Identify the atlas, axis, typical cervical, thoracic, lumbar vertebra and sacrum and recognize their characteristic features.
 - II. Describe the structures, regions, and functions of the vertebral column. Describe the range of movement of the entire vertebral column and its individual regions. Explain what makes spinal injuries stable and unstable.
 - III. Describe the inter vertebral facet joints and inter vertebral discs. Explain the role of the discs in weight bearing by the vertebral column and give examples of common disc lesions and how they may impinge upon spinal nerve roots and/or spinal cord.
 - IV. Describe the anatomy of spinal nerve (e.g. as exemplified by a thoracic spinal nerve, including its origin from dorsal and ventral spinal roots, its main motor and cutaneous branches and any autonomic component.
 - V. Identify the principal muscle groups and ligaments of the vertebral column and surface features in order to be able to perform an examination of the back, discuss their functional role in stability and movement of the vertebral column and describe the anatomical basis of back pain.
 - VI. Describe the anatomical relationships of the meninges to the spinal cord and dorsal and ventral nerve roots, particularly in relation to root compression and the placement of epidural and spinal injections. Describe the anatomy of lumbar puncture.
5. **Arthrology:** Definition and classification of joints, general features of different types of joints; detailed study of major joints of the limbs and movements performed at various joints in the body.
6. **General Anatomy of Lymphatic System:** Components and its macro anatomy.
7. **General Anatomy of Cardiovascular System**
- I. Components of **cardiovascular system**; Heart/ Blood vessels.
 - II. Structure of Heart.
 - III. Structure of Circulatory system.
8. **General Anatomy of Nervous System:**
- I. Components of Human nervous system,
 - II. General plan of nervous system – central peripheral and autonomic nervous system.
 - III. Types of neurons & function

Module: MBBS AN3:

GENERAL HISTOLOGY

1 Cell: detailed structure of cell and its components and their functional mechanisms. **Four types of primary tissues**

- I. **Epithelium:** Microscopic characteristics, types, functions, distribution, basal lamina, cell junctions, specialization of the cell surface and their structural details and functions; metaplasia.
- II. **Connective Tissue:** Cells, fibers and their structural features and functions. Intercellular substances, amorphous ground substance, types of connective tissue (loose areolar tissue, dense connective tissue) and their distribution. *Specialized connective tissue:* different types of cartilages and their functions and distribution. *Bone:* Cells, bone matrix, structural features of compact and cancellous bone, their distribution and functions, ossification, blood supply of a long bone.
- III. **Muscle :** General features, detailed structure of : skeletal muscle, and molecular mechanisms of contraction, innervations of skeletal muscle, neuromuscular junction, morphological and histo-chemical basis of classification into type I and type II muscle fibers and their significance, structural and functional characteristics of cardiac and smooth muscle; innervations of cardiac and smooth muscle.
- IV. **Nervous Tissue:** Structural characteristics of a neuron, axon and dendrites. Different types of neurons and their specific structural and functional features and distribution. Axonal transport, synapse, morphological and functional characteristics of different types of synapses.
- V. **Neuroglia:** Types, structure and functions, blood brain barrier. Brief cyto-architecture of the central nervous system, regeneration in CNS with particular emphasis on stem cells. Sensory and autonomic ganglia, peripheral nerves, myelin and myelination, degeneration and regeneration in peripheral nerves.

2. Histology of various organs/organ systems (will be included in the micro anatomy component of the regional Anatomy)

- i. **Exocrine glands:** Characteristics, simple and compound glands; types of secretions, modes of secretion, detailed structural features of a serous secreting cell and mucous secreting cell, serous and mucous acini, duct system, features of salivary glands, exocrine pancreas, sweat and sebaceous glands, mammary gland, bulbourethral gland etc.
- ii. **Circulatory system:** Structural features of heart; conducting and distributing arteries and arterioles; types of capillaries, their structural features and distribution and

microcirculation, detailed structure of endothelium; structural characteristics of large and small veins and venules arterio-venous shunts,lymphatics.

- iii. **Respiratory system:** Structural features of nose, nasopharynx, larynx, trachea, principal bronchi, lung including intrapulmonary bronchi, bronchioles, alveolar ducts, alveoli, blood-air-barrier. Functions of different parts of respiratory system.
- iv. **Skin and nerve-end-organs:** Thick, thin and hairy skin, cell renewal and pigmentation of skin, skin appendages, healing of skin wounds, sensory receptors of skin. Functions of skin.
- v. **Immune System and Lymphoid Organs:** Lymphocytes, their subtypes and functions. Humoral and cell mediated immunity. Thymus, lymph nodes, spleen, tonsils and other mucous associated lymphoid follicles.
- vi. **Digestive System (GIT):** General organization, oral cavity, lip, cheek, tongue, taste buds, associated salivary glands. Layers of tubular digestive tract, esophagus, stomach, small intestine, gastroesophageal junction, gastroduodenal junction, large intestine, anal canal and rectoanal junction. Liver, internal organization of liver, liver lobule, liver acinus, significance of zonation in liver acinus, liver sinusoids, detailed structure of hepatocyte, bile canaliculi, bile ducts, gall bladder, bile duct and pancreas.
- vii. **Endocrine glands :** Thyroid, parathyroid, Islets of Langerhan's gland, adrenal cortex and medulla, their structural details, functional mechanisms, hypophysis cerebri, cell types secretion and their functions, hypophyseal portal circulation, common endocrine disorders
- viii. **Urinary System :** Detailed microscopic structure of kidney, cortex, medulla, pyramids, medullary rays, cortical columns, glomerulus, nephron, glomerular filtration juxtaglomerular apparatus, its structural features and functions, renal interstitium, collecting ducts, renal sinus, minor and major calyces, microcirculation of kidney, histophysiology of the kidney, renal pelvis and ureters, urinary bladder and urethra.
- ix. **Female Reproductive System :** Ovary, ovarian stroma, primary and secondary graafian follicles, functions of various constituents and structural details of graafian follicles, atretic follicles, corpus luteum and its functions, corpus albicans. Oviducts, uterus, arterial supply of uterus, cyclic changes in uterine endometrium, fertilization, vagina, female external genitalia and mammary glands.
- x. **Male Reproductive System :** Testes, spermatogenesis, spermatozoon, cycle of seminiferous epithelium,sertoli cells, interstitial tissue Leydig cells, histophysiology of testes, epididymus, vas deferens, prostate, seminal vesicles, penis.

Module: MBBS AN4

1. General Embryology

- i. **Definition** of embryology; gestation period: definition of gamete sperm, Ovum; gametogenesis, migration of primordial germ cells into gonadal ridge; spermatogenesis; structure of sperm, oogenesis; structure of ovum; growth of ovarian follicles, ovarian and uterine cycles.
- ii. Sperm in the male genital tract; sperm in the female genital tract, activation and capacitation of sperm in the female genital tract.
- iii. **First Week of Development:** Definition and normal site and process of fertilisation, formation of zygote, cleavage division; formation of morula and blastocyst.
- iv. **Second Week of Development:** Differentiation of embryoblast and trophoblast; changes in the embryoblast formation of bilaminar germ disc; changes in the trophoblast; formation of cytotrophoblast, syncytiotrophoblast, amniotic membrane, yolk sac, extra embryonic mesoderm and extra embryonic coelom and connecting stalk; formation of chorion, amniotic cavity, primary yolk sac cavity appearance of prochordal plate. Implantation; formation of decidua, types of implantation and abnormal sites of implantation
- v. **Third Week of Development:** Appearance of primitive streak and primitive node; formation of intraembryonic mesoderm resulting in trilaminar germ disc; gastrulation formation of notochord, buccopharyngeal and cloacal membranes, paraxial, intermediate and lateral plate mesoderm, secondary yolk sac, intraembryonic coelom and allantoic diverticulum; derivatives of ectoderm, mesoderm and endoderm.
- vi. **Fourth To Eighth week of Development (Embryonic period)** Formation of somites, neural tube, cephalocaudal folding, lateral foldings, body form, stomodeum, proctodeum, gut and vitelline duct; subdivisions of gut into foregut, midgut and hindgut.
- vii. **Development from third month to birth (Fetal period)**(g) Maturation of tissues and organs and rapid growth of body.(h) Estimation of age.
- viii. **Placenta: (i)** Formation of placenta and chorionic villi, decidua basalis; features and functions of placenta; placental circulation; abnormalities; placental barrier; placentome, types of placenta.
- ix. **Umbilical Cord:** Formation of umbilical cord; features of umbilical cord.

- x. **Amniotic Cavity:** Amniotic cavity and membrane; amniotic fluid – functions, expansions of amniotic cavity and fusion with chorion; chorion laeve with decidua capsularis; decidua capsularis with parietalis; obliteration of chorionic and uterine cavities; function of fused foetal membranes to dilate cervical canal.
- xi. Abnormalities, obliteration of chorionic and uterine cavities; abnormalities of chorion. (Formation of twins and types of twins. (n) Arrangement of foetal membranes, Conjoined twins.

2. Teratology

- I. Genetically and environmental factors as causative factors for congenital malformations.
- II. Mode of actions of teratogenes and critical periods.

3. Systemic Embryology

- I. Development of the individual organs of digestive system, genital system, urinary system,, respiratory system, cardiovascular system. Nervous system, special sensory organs, endocrine glands and mammary gland.
- II. Developmental abnormalities of individual organs/systems, pathogenesis of the anomalies.
- III. Histogenesis of various organs.
- IV. Development of skeletal system, muscular system and derivatives of coelomic cavities
- V. Development of face and the pharyngeal arches and the associated congenital anomalies.

Module: MBBS AN5:

Upper Limb: General Objective: Medical graduates are to be aware of the sites of common fractures (clavicle, humerus, distal radius and scaphoid and the complication that might result from them and also understand the nature and consequences of common injuries (e.g. shoulder, elbow and finger dislocation). As such the Medical graduate should be able to recognize the major palpable and imaging features of the bones of the upper limb and should be aware of the factors that influence the stability of the shoulder, elbow, wrist and inter-phalangeal joints. In order to perform clinical procedures safely and effectively Medical graduates should be able to demonstrate, the course, key relation and distribution of the neurovascular structures of the upper limb, major pulse points(e.g. sub-clavian, brachial, and radial) position of Major veins. (for venous access). Medical students should know the common sites of peripheral nerve injury and their likely functional effects (brachial plexus lesions, axillary, radial, ulnar, and median nerve lesions). The medical students should be able to explain the anatomical basis of common conditions of the upper limb (rotator cuff injuries, carpal tunnel syndrome) and how infection might spread in the limb. The student should be able to explain the significance of lymphatic distribution in relation to

metastatic spread of Breast cancer and melanoma and, the medical student should also be able to describe the organization of the axillary lymph nodes and lymphatic drainage of the breast. ***At the end of the course a medical graduate should be able to:***

- I. Describe and demonstrate the main anatomical landmarks of the clavicle, scapula, humerus, radius, and ulna. Recognize the bones of the wrist and hand and their relative positions. Identify those bones that are commonly damaged (scaphoid and lunate) and predict functional impairment following such damage.
- II. Describe the close relations of the bones and joints (e.g. bursae, blood vessels, nerves, ligaments, and tendons), which may be injured by fractures or dislocation and predict what the functional effects of such damage might be.
- III. Describe the fascial compartments delimiting the major muscle groups of the upper limb, explain the functional importance and their contents.
- IV. Describe the origin, course and distribution of the major arteries and their branches that supply the shoulder, arm, forearm, in relation to common sites of injury. Explain the importance of anastomoses between branches of these arteries at the shoulder and in upper limb.
- V. Describe the sites at which pulses in the brachial, radial, and ulnar arteries may be located.
- VI. Describe the courses of the main veins of the upper limb, classify and contrast the functions of the deep and superficial veins. Identify the common sites of venous access and describe their key anatomical relations. Explain the relationship between venous and lymphatic drainage channels.

Module: MBBS AN6:

Lower Limb: Medical graduates are to be aware of the sites of common fractures (neck and shaft of femur, tibia and fibula) and the complication that might result from them As such the Medical graduate should be able to recognize the major palpable and imaging features of the bones of lower limb. He should be able to explain the factors that influence the stability of the hip, knee and ankle joints, the common ligamentous injury and able to test ligament integrity. In order to perform clinical procedures safely and effectively graduates graduate should be able to describe the course and distribution of the main neurovascular structures in the lower limb. (to avoid damage to sciatic nerve when making an intramuscular injection and be able to demonstrate major pulse points (e.g. femoral, for arterial blood sampling, popliteal, posterior tibial and dorsalis pedis), the major veins (for venepuncture, venous access by “cut down” and assessment of varicose veins). Student should be able to demonstrate common sites of peripheral nerve injury and the possible functional effects of such damage. (Sciatic and common peroneal nerve at neck of fibula). In order to perform

basic neurological examination of the lower limb the medical students should have a working knowledge of surface anatomy, dermatomes, and peripheral nerve distribution, the function of major muscle groups and their innervations. The medical students should understand the organization of inguinal lymph nodes and how they relate to the lymphatic drainage of the limb, trunk skin and perineum. The students should also be aware of the organization of the deep fascia of the lower limb and its relevance to compartment syndromes, how blood is returned to the heart from the legs and how failure of this mechanism may cause the development of varicosities deep vein thrombosis and embolism. ***Specific Objective: At the end of the course A medical Graduate should be able to:***

- I. Recognize the major features and surface landmarks of the pelvis, femur, tibia, fibula ankle and foot. Demonstrate their palpable and imaging landmarks. Appreciate which bones and joint are vulnerable to damage and what the consequences of such damage could be.
- II. Describe the close relation of these bones and joints (e.g.) bursae, blood vessels, nerves, ligaments and tendons), which may be injured in fractures or dislocations, and predict what the final effects of such damage would be.
- III. Describe the fascial compartments enclosing the major muscle groups and explain the functional importance of these compartments and their contents in relation to compartment syndromes.
- IV. Demonstrate the origin, course and branches of the major arteries that supply the hip gluteal region, thigh, leg ankle and foot. Explain the functional significance of anastomoses between branches of these arteries at the hip and knee. .
- V. Demonstrate the location at which the femoral, popliteal, dorsalis pedis and posterior tibial can be felt.
- VI. Demonstrate the course of the principal veins of the lower limb. Explain the role of perforator vein connection between the superficial and deep veins and the function of the “muscle pump” for venous return to the heart. Describe the sites of venous access that can be used for ‘cut down’ procedures in emergencies.
- VII. Outline the origin of the lumbosacral plexus and formation of its major branches.
- VIII. Describe the origin, course and function of the sciatic, femoral, obturator, common peroneal and tibial nerves, sural and saphenous nerves and summaries the muscles and muscle groups that each supplies as well as sensory distribution.
- IX. Describe the structure and the movements of the hip joint. Summaries the muscles responsible for these movements, their innervations and main attachments.

- X.** Describe the structure responsible for stability of the hip joint and their relative contribution to maintaining the lower limb in different positions.
- XI.** Describe the structures at risk from a fracture of the femoral neck or dislocation of the hip and explain the functional consequences of these injuries.
- XII.** Describe the boundaries of femoral triangle and the anatomical relationship of the femoral nerve, artery, vein, and lymph nodes to each other and to the inguinal ligament, with particular regard to arterial blood sampling and catheter placement.
- XIII.** Describe the anatomy of gluteal (buttock) region and course of the sciatic nerve within it. Explain how to avoid damage to the sciatic nerve when giving intramuscular injections.
- XIV.** Describe the structure and movements of the knee joint. Summarize the muscles responsible for these movements, their innervations and main attachments.
- XV.** Describe the close relations of the knee joint including major bursae and explain which structure may be injured by trauma (including fractures and dislocation) to the knee.
- XVI.** Identify the factors responsible for maintaining the stability of the knee joint. Describe the menisci, ligaments and the locking mechanism close to full extension. Explain the anatomical basis of tests which assess the integrity of the cruciate ligaments.
- XVII.** Describe the boundaries and content of the popliteal fossa.
- XVIII.** Describe the anatomy of ankle joint. Explain the movements of flexion, extension, plantarflexion, dorsiflexion, inversion and eversion. Summarize the muscles responsible for these movements, their innervations and their main attachments.
- XIX.** Describe the factors responsible for stability of ankle joint, specially the lateral ligaments, and explain the anatomical basis of "sprain" injuries.
- XX.** Describe the arches of the foot and the bony, ligamentous and muscular factors that maintain them.
- XXI.** Describe the movements of inversion and eversion at the subtalar joint, the muscle responsible, and their innervations and main attachments.
- XXII.** Describe the anatomical basis (nerve root or peripheral nerve) for loss of movements and reflexes at the knee and ankle resulting from spinal injuries, disc lesions and common peripheral nerve injuries. Describe the dermatomes of the lower limb and perineum used to assess spinal injuries.
- XXIII.** Describe the structures at risk to a fracture of the femoral neck or dislocation of the hip and describe the functional consequences of these conditions.

- XXIV.** Describe the lymphatic drainage of the lower limb and its relationship to tumor spread.
- XXV.** Discuss the structure of the lower limb that be used for auto graft.
- XXVI.** Interpret standard diagnostic images of the lower limb and able to recognize common abnormalities.

Module: MBBS AN7.

Thorax : Medical graduates should be able to recognize the major palpable and imaging features of the chest wall, lungs, heart and mediastinum to explain the anatomical basis of common clinical conditions and procedure.

Module: MBBS AN8

Abdomen: Medical graduates should be familiar with the anatomy of the anterior and posterior abdominal walls and the inguinal region, the extent of the peritoneal cavity and the anatomy and key relationships of the esophagus, stomach, small and large intestines including the appendix, liver, gall bladder pancreas, spleen, kidneys, ureters and adrenal and suprarenal glands. They should understand the arterial supply and venous drainage to the intestine in relation to arterial occlusion, strangulation, intestinal surgery, the portal circulation and the effects of portal hypertension, and the lymphatic drainage and innervations of the abdominal organs in relation to metastatic spread of cancer and abdominal pain. This knowledge forms the basis of understanding of surgical incisions, referred pain from the abdominal viscera (especially the gall bladder and appendix) and how the sub-hepatic and sub-phrenic spaces may be implicated in the spread of infection. They should have a working knowledge of surface anatomy and be able to undertake an examination of the abdomen and of the inguinal canal for hernias. They should be able to interpret standard diagnostic images of the alimentary, pancreato-biliary and urinary tracts. ***At the end of the course a medical Graduate should be able to:***

- I.** Demonstrate the bony and cartilaginous landmarks visible or palpable on abdominal examination.
- II.** Demonstrate the descriptive regions of the abdomen and common incision sites. Demonstrate the surface projections of the abdominal organs.
- III.** Describe the anatomy, innervations and functions of the muscles of the anterior and posterior abdominal walls. Discuss their functional relationship with the diaphragm and roles in posture, ventilation and voiding of abdominal / thoracic contents.
- IV.** In relation to direct and indirect inguinal hernias, demonstrate the anatomy of the attachments of the inguinal ligament; the anatomy of the superficial and deep inguinal rings and how the anterior abdominal wall muscles form the inguinal canal. Describe the contents of the inguinal canal in both males and females.

- V.** Describe the relationship between the femoral canal and the inguinal ligament and the anatomy of femoral hernias.
- VI.** Demonstrate the positions of the liver, pancreas spleen, kidneys, stomach, duodenum, jejunum and ileum of the small intestine, caecum, appendix, ascending, transverse, descending and sigmoid parts of the colon and the rectum.
- VII.** Describe the organisation of the parietal and visceral peritoneum; its lesser and greater sacs, mesenteries and peritoneal 'ligaments'. Explain the significance of the variable attachment of the ascending and descending colon to the posterior abdominal wall.
- VIII.** Summarise the functional anatomy of the small bowel mesentery; its structure, location and vascular, lymphatic and neural content.
- IX.** Explain the nerve supply of the parietal and visceral peritoneum and the role of the visceral peritoneum in referred pain.
- X.** Describe the functional anatomy of the stomach, its position, parts, sphincters, blood and nerve supply and key relations to other abdominal organs.
- XI.** Describe the duodenum, its parts, position, secondary retroperitoneal attachment, blood supply and key relations with other abdominal organs and their significance in relation to peptic ulcer disease.
- XII.** Describe the regions of the small and large intestine, including the anatomy of the appendix. Describe the anatomical variations in the position of the appendix and explain their significance in relation to appendicitis.
- XIII.** Describe the position and form of the pancreas and its relationships to other abdominal organs. Discuss the significance of these relationships in relation to pancreatitis and biliary stone disease.
- XIV.** Describe the position and form of the liver, the lobes of the liver and their key anatomical relations. Explain the peritoneal reflections of the liver and its movement during respiration. Summarise the functional anatomy of the portal vein, the portal venous system and portal-systemic anastomosis and their significance in portal hypertension.
- XV.** Describe the position and form of the gall bladder and biliary tree; their relations in the abdomen and the significance of these relations in relation to gall bladder inflammation and biliary stones.
- XVI.** Describe the position and form of the kidneys and ureters. Demonstrate their relationships to other abdominal and pelvic structures and discuss the significance of these relations in relation to urinary stones.

- XVII.** Describe the relations of the suprarenal (adrenal) glands and their functional anatomy.
- XVIII.** Describe the position (in relation to the ribs) and form of the spleen in relation to its palpation through the abdominal wall and its key anatomical relationships with other abdominal structures. Explain the significance of these relationships in relation to trauma, chronic infections and disorders of the haematopoietic system.
- XIX.** Describe the origins, course and major branches of the abdominal aorta, coeliac axis, superior and inferior mesenteric arteries and their major branches, the renal and gonadal arteries. Explain the significance of the blood supply from the abdominal aorta to the spinal cord in relation to abdominal aneurysm repair. Demonstrate the origins, course and major tributaries of the inferior vena cava.
- XX.** Describe the anatomy of the lymph nodes involved in lymph drainage of abdominal viscera and its significance in relation to spread of malignancy.
- XXI.** Interpret standard diagnostic images of the abdomen and recognize common abnormalities.

Module: MBBS AN9

Pelvis & Perineum: Medical graduates should be familiar with the anatomy and positions of the ureters, bladder, urethra, rectum and anal canal, the structure of the pelvic floor, and the anatomy of continence, the anatomy of the external and internal genitalia in males (scrotum, testis, vas deferens, seminal vesicles, prostate, penis) and females (ovaries, uterine tubes, uterus, cervix, vagina, labia, clitoris). They should be able to describe the peritoneal relationships, and supports of the pelvic viscera to understand ectopic pregnancy, prolapse and suprapubic catheterization. They should understand the arterial supply, venous drainage and the lymphatic drainage and innervations of the pelvic organs in relation to metastatic spread of cancer. Graduates should be able to interpret relevant standard diagnostic images and have sufficient anatomical knowledge to be able to perform rectal and vaginal examinations, urinary catheterization in both males and females, and obtain a cervical smear in females. ***At the end of the course a Medical Graduate should be able to:***

- I.** Describe the skeletal and ligamentous components of the pelvis, the anatomy of the pelvic inlet and outlet and recognize their normal orientation. Explain sex differences in pelvic skeletal anatomy and how these change during development.
- II.** Demonstrate the palpable anatomical landmarks of the iliac, ischial and pubic bones in the living and on the bones and identify them on medical images.
- III.** Demonstrate the points of attachment of the muscles of the abdominal wall and those of levator ani.

- IV.** Describe the functional importance of the pelvic floor musculature, its midline raphé and the structures passing through it in males and females.
- V.** Describe the anatomy of the bladder, its base and ureteric openings. Explain how its position changes with filling and pregnancy and its relationship to the overlying peritoneum.
- VI.** Describe the anatomy of the urethra; explain the anatomy of its different part in males and females in relationship to continence and catheterization.
- VII.** Describe the innervations of the bladder and its sphincters and the mechanism of micturition
- VIII.** Describe the anatomy of the scrotum, testis, epididymis and their normal features on clinical examination. Explain the significance of their arterial supply in relation to torsion, their venous drainage in relation to varicocele and their lymphatic drainage in relation to tumor spread.
- IX.** Describe the structure and course of the spermatic cord and vas deferens.
- X.** Describe the anatomy of the prostate gland, seminal vesicles and their anatomical relations. Describe the normal form of the prostate when examined per rectum and changes in relation to hypertrophy and malignancy.
- XI.** Describe the position and form of the ovary, uterine tubes, uterus, cervix and vagina and their anatomical relationships, including any peritoneal coverings. Describe the changes that occur in the uterus and cervix with pregnancy.
- XII.** Describe the origin, course and relations of the uterine, ovarian and testicular arteries
- XIII.** Describe the origin, course and branches of the pudendal nerves and the sites of nerve block during childbirth.
- XIV.** Describe the innervations and mechanisms involved in erection of cavernous tissue in male and female and emission and ejaculation in the male.
- XV.** Describe the anatomy of the sigmoid colon and rectum and their anatomical relationships including peritoneal. Explain the anatomy of the anal canal, the functional anatomy of the anal sphincters and their role in faecal continence.
- XVI.** Describe the blood supply and venous drainage of the distal bowel; the supply from the superior rectal (inferior mesenteric), middle rectal (internal iliac) and inferior rectal arteries (from pudendal to anal canal only), and portal-systemic venous anastomoses; describe the vascular anal cushions and explain their role in continence.

- XVII.** Describe the anatomy of the ischio-anal fossa and explain its potential involvement in abscesses, anal glands and fissures.
- XVIII.** Describe the structure of the penis, scrotum and its contents, the clitoris and vulva. Describe the arterial supply to and venous drainage from the penis. Explain the anatomy of the perineal membrane and superficial perineal pouch in relation to the accumulation of fluids in the male.
- XIX.** Describe the lymphatic drainage of the pelvis
- XX.** Interpret standard diagnostic images of the pelvis and be able to recognize common abnormalities.

Module : MBBS AN10

Human Genetics

- I.** Cell, cell division, mitosis and meiosis, nucleus, DNA, chromosomes, classification, karyotype, chromosomal aberrations (Klinefelter, Turner and Down's Syndrome) Prenatal diagnosis for congenital abnormalities, sex determination.
- II.** Pedigree chart, pathogenesis of chromosomal aberrations and their effects, recombinant DNA, genetic inheritance, genetic counselling, inborn errors of metabolism.

Module: MBBS AN 11

Head & Neck: Medical graduates should be able to recognize the major palpable and imaging features of the skull and cervical spine in order to be able to interpret relevant medical images. To perform clinical examination of the head and neck graduates should be familiar with the position, key relationships, neurovascular supply, venous and lymphatic drainage of the following major structures: course and distribution of the cranial nerves, ear and pharyngotympanic (Eustachian) tube, eye, eyelids and conjunctivae, nasal cavity and paranasal air sinuses, oral cavity and tongue, tonsils, soft palate, pharynx, salivary glands, larynx and trachea, thyroid and parathyroid glands and the contents of the carotid sheath. To describe the fascia and fascial spaces of the neck in relation to the spread of infection. This knowledge is necessary for understanding conductive and sensorineural deafness, otalgia and the likely sources of referred pain to the ear, facial nerve palsy, epistaxis, quinsy, dysphagia, upper airway obstruction, infantile stridor, sinusitis, vocal cord paralysis and hoarseness, cervical swellings, and salivary gland swellings. The Medical Graduates should have Sufficient anatomical knowledge to be able to manage the airway, insert an endotracheal or nasogastric tube, and perform a tracheostomy and laryngotomy.. A working knowledge of surface anatomy, cranial nerve distribution, the functions of major muscles of the head and neck and their innervations in order to perform a basic neurological examination. ***At the end of the course a Medical Graduate should be able to:***

- I.** Demonstrate the position palpable and imaging landmarks of the major bones of the skull, including the frontal, parietal, occipital, temporal, maxilla, zygoma, mandible, sphenoid, nasal and ethmoid bones. Demonstrate the palpable position of the hyoid bone, thyroid and cricoid cartilages, lateral mass of the atlas and the spine of C7. Demonstrate the major sutural joints and describe the fontanelles of the fetal skull.
- II.** Describe the boundaries, walls and floors of the cranial fossae.
- III.** Identify the external and internal features of the cranial foraminae and list the structures that each transmits.
- IV.** Demonstrate the position of the anterior and posterior triangles of the neck defined by the sternum, clavicle, mandible, mastoid process, trapezius and sternocleidomastoid.
- V.** In the posterior triangle, demonstrate the position of the spinal accessory nerve, the roots and trunks of the brachial plexus, the external jugular vein and subclavian vessels in relation to penetrating neck trauma.
- VI.** In the anterior triangle, demonstrate the position of the common, internal and external carotid arteries, the internal jugular vein and vagus nerve, the trachea, thyroid cartilage, larynx, thyroid and parathyroid glands. Explain their significance in relation to carotid insufficiency, central venous line insertion, emergency airway management and diagnosis of thyroid disease.
- VII.** Describe the location and anatomical relations of the thyroid and parathyroid glands, their blood supply and the significance of the courses of the laryngeal nerves.
- VIII.** Demonstrate the origin, course and major branches of the common, internal and external carotid arteries and locate the carotid pulse.
- IX.** Describe the courses of the accessory, vagus and phrenic nerves in the neck.
- X.** Identify the major structures passing between the neck and the thorax. Describe the courses and important relationships of the subclavian arteries and veins.
- XI.** Describe the anatomy of the scalp, naming its individual layers. Describe the blood supply of the scalp and its significance in laceration injuries.
- XII.** Demonstrate the extra cranial course of the branches of the facial nerve. Summarise the muscles of facial expression supplied by each branch and describe the consequences of injury to each branch.

- XIII.** Describe the intracranial and intrapetrous course of the facial nerve and the relationships of its major branches to the middle ear in relation to damage of the nerve within the facial canal.
- XIV.** Describe the anatomy of the temporomandibular joint. Explain the movements that occur during chewing and describe the muscles involved including their innervations. Explain what occurs in anterior joint dislocation and relocation.
- XV.** Describe the origin, function and major branches of the sensory and motor components of the trigeminal nerve.
- XVI.** Describe the origins and summaries the courses and major branches of the facial and maxillary arteries, including the course and intracranial relations of the middle meningeal artery and its significance in extradural hemorrhage.
- XVII.** Describe the relationship of the termination of the facial vein (draining into the internal jugular vein) and the mandibular branch of the retromandibular vein (supplying facial muscles controlling the angle of the mouth) to the submandibular gland and related upper jugular lymph nodes in relation to exploration of this area.
- XVIII.** Describe the key anatomical relations of the parotid, submandibular and sublingual salivary glands, the course of their ducts into the oral cavity and their autonomic secretomotor innervations. Appreciate the narrow points of the ducts in relation to salivary stone impaction.
- XIX.** Demonstrate the major features and boundaries of the oral cavity and summaries its sensory innervations.
- XX.** Describe the functional anatomy of the tongue, including its motor and sensory innervations and the role of the extrinsic and intrinsic muscles. Explain the deviation of the tongue after hypoglossal nerve injuries.
- XXI.** Describe the anatomical arrangement and functional significance of the lymphoid tissue in the tonsils, pharyngeal, and posterior nasal walls.
- XXII.** Describe the muscles that compose the pharyngeal walls and move the soft palate; summaries their functions and nerve supply. Describe the components of the gag reflex.
- XXIII.** Describe the hyoid bone and cartilages of the larynx. Explain how these structures are linked together by the thyrohyoid, cricothyroid, and quadrangular membranes.
- XXIV.** Describe the intrinsic and extrinsic laryngeal muscles responsible for closing the laryngeal inlet, controlling vocal cord position and tension. Explain how these muscles

function during phonation, laryngeal closure, the cough reflex and regulation of intrathoracic pressure.

- XXV.** Describe the origin, course and functions of the motor and sensory nerve supply of the larynx and the functional consequences of injury to them.
- XXVI.** Describe the stages of swallowing and the functions of the muscles of the jaw, cheek, lips, tongue, soft palate, pharynx, larynx and esophagus during swallowing.
- XXVII.** Describe the location, actions and nerve supply of the intrinsic and extra-ocular muscles and apply this knowledge to explain the consequences of injury to the nerve supply of these muscles.
- XXVIII.** Describe the anatomy of the eyelids, conjunctiva and lachrymal glands. Explain their importance for the maintenance of corneal integrity.
- XXIX.** Describe the functional anatomy of the external auditory meatus, tympanic membrane, ear ossicles and auditory tube, together with their major anatomical relations.
- XXX.** Describe the bones of the nasal cavity and the major features of the lateral wall of the nasal cavity. Describe the major arteries that supply the lateral wall and nasal septum in relation to nosebleeds.
- XXXI.** Name the paranasal sinuses, describe their relationships to the nasal cavities and sites of drainage on its lateral wall and explain their innervations in relation to referred pain.
- XXXII.** Describe the arrangement of the dura mater, and its main reflections within the cranial cavity and their relationship to the major venous sinuses and the brain itself.
- XXXIII.** Describe the arrangement of the venous sinuses of the cranial cavity; explain the entrance of cerebral veins into the superior sagittal sinus in relation to subdural hemorrhage, and how connections between sinuses and extra cranial veins may permit intracranial infection
- XXXIV.** Describe the relationships between the brain and the anterior, middle and posterior cranial fossae.
- XXXV.** Describe the anatomy of the motor and sensory nerves to the head and neck and apply this to a basic neurological assessment of the cranial nerves and upper cervical spinal nerves.
- XXXVI.** Describe the sympathetic innervations of the head and neck and the features and casual lesions in Horner's syndrome.

- XXXVII.** Demonstrate the positions of the external and internal jugular veins and the surface landmarks that are used when inserting a central venous line.
- XXXVIII.** Describe the arrangement of the lymphatic drainage of the head and neck, the major groups of lymph nodes and the potential routes for the spread of infection and malignant disease.
- XXXIX.** Interpret standard diagnostic images of the head and neck and be able to recognize common abnormalities.

Module: MBBS AN12`

Neuro anatomy: A medical graduate should be able to:

- I.** Define the terms rostral and caudal, anterior/ventral and posterior/dorsal in relation to the nervous system.
- II.** Define the terms grey and white matter, fasciculus, tract, commissure, pathway, chiasm, decussation, nucleus, ganglion, and cortex.
- III.** Identify the major divisions of the brain: the cerebral hemispheres, diencephalon (thalamus, hypothalamus and epithalamus), midbrain, pons, medulla oblongata and cerebellum.
- IV.** Identify the major sulci and gyri of the cerebral hemispheres (lateral central and post-calcarine) and summarize the position of the frontal, parietal, occipital and temporal lobes.
- V.** Describe the areas of cerebral cortex sub-serving major special functions; motor (including motor speech); sensory; visual; auditory (including sensory speech); memory and emotion (medial temporal –hippocampus, amygdale); decision making, social behavior (orbito-frontal). Explain the manifestations of related disorders.
- VI.** Summarise the position of the major commissure (corpus callosum) and ascending and descending tracts (internal capsule, cerebral peduncles, pyramids).
- VII.** Describe the blood supply to the brain and explain the functional deficits occurring after 'stroke' involving individual cerebral arteries.
- VIII.** Describe the anatomy of the arachnoid and pia mater and ventricular system. Explain the formation, circulation and drainage cerebrospinal fluid.
- IX.** Describe the origin, courses and functions of the cranial nerves.
- X.** Describe the neural pathways sub-serving the special senses.

- XI. Summarise the structure of the cerebellum, the connections and functions of the principal cerebellar inputs and outputs.
- XII. Summarise the locations, connections and functions of the basal ganglia (caudate, putamen, globus pallidus, subthalamic nucleus and substantia nigra). Explain the manifestations of the related disorders.
- XIII. Summarise the functions and connections of the thalamus.
- XIV. Describe the anatomy and major functions (endocrine, autonomic) of the hypothalamus and pituitary gland. Explain the manifestation of related disorders.
- XV. Describe the principal components of the limbic system, hippocampus, amygdale, prefrontal cortex, nucleus accumbens), the pathways connecting them and their function.
- XVI. Discuss the position and major functions of the ascending aminergic systems (noradrenalin, dopamine, and serotonin) and cholinergic systems.
- XVII. Describe the position within the spinal cord of the dorsal column, anterolateral (spinothalamic) and trigeminothalamic ascending tracts, the spinocerebellar and the corticospinal and extra pyramidal descending tracts. Describe the sites at which synapses occur in these pathways.
- XVIII. Explain the anatomical basis of neurological assessment.
- XIX. Identify the major features of the brain on coronal, horizontal and sagittal sections and standard diagnostic image and be able to recognize common abnormalities.

(Neuroanatomy will be taught along with the department of Physiology)

PRACTICALS:

Learning objectives are given to students before each session. Dissection : is done by students on the cadavers and is being assisted/supervised by a team of teachers. Some prosected specimen/dissection are shown on Ultrascope which is telecasted on TV monitors fitted in dissection Hall. Video tapes of some dissections are also shown on TV after the completion of dissection of the part/ region to recapitulate the details of the part/region dissected. Cross sections of whole body and brain are shown to correlate with MRI. X-rays are shown after dissection of each region. Self assessment MCQs are given at the end of dissection of each region and discussed with teacher in-charge. Handouts are given at the end of completion of part/region to the students to recapitulate and remember the Gross anatomy, Neuro-anatomy, Embryology and Histology. In microanatomy, a preview of the slides is given on TV monitor in small groups to understand the structural details of tissue/structure/organ. In embryology, the serial sections of early chick embryos and pig embryos are demonstrated to understand the

sequence of events involved in development of various systems and to understand the developmental basis of occurrence of various congenital abnormalities. Computer assisted programs for understanding the normal development of organ/systems is also demonstrated. Specimen and models depicting normal development of system are shown. In genetics, the phenotype photographs, karyotypes and pictures of various banding techniques are shown to understand the chromosomal abnormalities and various syndromes. In Neuroanatomy, the stained sections at various levels of brain and spinal cord are shown on slides and computers to localize the cranial nerve nuclei and trace the origin, course and termination of ascending and descending tracts in order to understand the effects produced as a result of lesions. Case studies of neural lesions are discussed to understand the location and level of lesions.. Demonstrations: Mainly the bones of the entire body, few dissected specimen are taught in small groups.

By a combination of the above teaching-Learning tools and modalities the student is able to understand the development, gross and microscopic structure of the organ systems and gain an insight into the structure-function correlation. This combined with the knowledge of applied/clinical anatomy provides an understanding of the anatomical basis of health and disease.

. Gross Anatomy

- I.** Upper Limb: Dissection: Pectoral and scapular, axillary and shoulder region, arm, forearm.
- II.** Prosected parts: Joints, Palm and dorsum of hand.
- III.** Thorax : Dissection: Chest wall, mediastinum, pleura, lungs, heart.
- IV.** Abdomen: Dissection: Anterior abdominal wall and inguinal region, external genitalia.
- V.** Viscera and Posterior Abdominal wall and nerve plexus.
- VI.** Pelvis: Dissection : Pelvic viscera, blood vessels and nerves.
- VII.** Prosected Parts: Perineum including ischio-rectal fossa.
- VIII.** Lower Limb: Dissection: Gluteal region, front and back of thigh popliteal fossa, front back and lateral side of leg and dorsum of foot.
- IX.** Prosected Parts: Sole of the foot and joints.
- X.** Head & Neck: Dissection: Superficial and deep dissection of face and neck, orbit and eye ball.
- XI.** Submandibular region temporal and infratemporal fossa, cranial cavity, naso and oropharyngeal regions.
- XII.** Ear, Larynx and pharynx.

Neuro Anatomy: Gross specimen of full brain, meninges, spinal cord, prosected specimens to demonstrate visual system, auditory and vestibular pathways and major functional areas. Stained

sections of brain and spinal cord at various levels to demonstrate cranial nerve nuclei, ascending and descending tracts, thalamic nuclei and important functional areas.

Demonstrations

- I. Bones of skull and vertebral column
- II. Brain and spinal cord
- III. Cross-sectional anatomy
- IV. Radiological anatomy
- V. CT and MRI scan

Microscopic Anatomy

- I. Routine and special stained slides of all the tissues and organs of body.
- II. Electron micrographs to demonstrate filtration barrier of kidney, alveolar septum, tight junctions of capillaries and such relevant areas.

Developmental Anatomy

- I. Models to demonstrate various stages of early foetus and different organ development.
- II. Slides of ovary and testis to show follicles and stages of maturation of spermatozoa:
- III. Early chick and pig embryos to understand the development of tissues and organs from conception till term.

Genetics

- i. Demonstration of normal karyotype and common abnormal conditions including banding; Pedigree chart, syndromes and their clinical phenotype. Demonstration of various new techniques such as FISH.

Skills

- i. Demonstrate surface markings of important organs.
- ii. Localise important pulsation and the structures against which pressure can be applied in case of bleeding from a particular artery.
- iii. Demonstrate muscle testing and movements at joints.
- iv. Locate sites for : Lumbar puncture, sternal puncture, pericardial tapping, liver biopsy.
- v. Locate veins for venae puncture.
- vi. Locate the site for emergency tracheostomy.
- vii. Locate the subcutaneous positions of large veins.

TEACHING AND LEARNING METHODOLOGY

Departmental Faculty and Staff emphasizes on teaching basic fundamentals of Gross anatomy, Microscopic anatomy and its correlation with function, developmental anatomy and anatomical basis of occurrence of congenital defects, nerve lesions and its anatomical basis and the applied aspects of relevant clinical conditions. All divisions of Anatomy i.e. Gross, Histology, Embryology, Genetics and Neuro-anatomy are taught with the help of didactic lectures on specific topics followed by dissection / practical. The general pattern of teaching methodology followed by all the faculty members and teaching staff in the department are:

1. Lectures.
2. Dissection.
2. Tutorial/ Small Group Teaching (SGT)/ Self Directed Learning (SDL)/ Computer Assisted Learning (CAL), Demonstration- Observation- Assistance- Performance. (DOAP) and Seminars on selected topics, . Practical demonstrations.
4. Audiovisual presentations (e.g. video films) on selected topics.
5. Problem based Learning on selected topics.

LIST OF BOOKS RECOMMENDED

I. Gross Anatomy

1. Cunningham's Manual of Practical Anatomy G.L.Romanes Vols.I, II & III Oxford University Press, 15th edition (1996).
2. Clinical Anatomy for Medical Student, 6th Edition R.S. Snell (2000) Little, Brown & Co.
3. Text book of Human Osteology, Jaypee Brothers, I.B.Singh, Medical Publishers.

II. Histology

1. Histology : A text & atlas, 3rd edition (1995), M.H. Ross, E.& L.J Williams & Wilkins Romell, G.I. Kaye.
2. Atlas of Histology with functional correlation. Di Fiore's. International Edition 9th (2000).
3. Textbook of Human Histology (4th Edition) Inderbir Singh. Jaypee Brother, 2002.

III. Developmental Anatomy

3. Medical Embryology, 8th Edition Williams & Wilkins Jan Langman.

IV. Neuro-anatomy

1. The Human Nervous System : An Anatomical Murray L Barr & Keirman. View Point, 7th Edition, 1998. Harper & Row.
2. Neuro-anatomy : An Illustrated Color Text, AR Crossman and 2nd Edition, 2000 D Neary Churchill Livingstone.

V. 1. Surface and Radiological Anatomy, 1st Edition, A.Halim, 1998, CBS Publishers.

VI. Genetics

1. Thomson and Thomson, Genetics in Medicine, 6th Edition, 2001 Robert L.Nussbaum. W.B.Saunders Company Roderick R.Mc.Innes. Huntington. E.Willard.

LEARNING MODULE FOR PHYSIOLOGY 1ST MBBS

Number of Modules: 12

Number of hours: 495 Hrs.

- i. Lectures: 120.
- ii. Tutorials/Integrated Learning/Practical:350 Hrs
- iii. Self Directed Learning: 25 Hrs.

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

OBJECTIVES

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

1. Explain the normal functioning of all the organ systems of the body and their interactions.
2. Narrate the contribution of each organ system to the maintenance of homeostasis.
3. Elucidate the physiological aspects of normal growth and development.
4. Describe the physiological response and adaptations to environmental stresses.
5. List the physiological principles underlying pathogenesis and treatment of disease.

B. Skills: At the end of the course the student will be able to:

1. Perform experiments designed either primarily for the study of physiological phenomena or for assessment of function.
2. Analyze and interpret experimental/investigative data critically.
3. Distinguish between normal and abnormal data derived as a result of tests which he/she has performed and observed in the laboratory.

C. Integration: At the end of the integrated teaching the students should acquire an integrated knowledge of organ, structure and function and its regulatory mechanism.

Course Content:

Module PY 1:

Introduction to Physiology: 4Hours

- i. Mutual introduction of dramatis personae in the teaching learning process
- ii. Physiology: what and why? Homeostasis: an evolutionary point of view
- iii. Characteristics of control systems
- iv. Looking back & forth
- v. Reading efficiently

Module PY 2:

Nerve–Muscle-8 Hours

- i. Physicochemical properties of cell membrane
- ii. Cell membrane: permeability & transport
- iii. Principles of bioelectricity
- iv. Genesis of resting membrane potential
- v. Action potential
- vi. Properties of nerve-fibers
- vii. Functional anatomy of neuromuscular junction
- viii. Neuromuscular transmission
- ix. Muscle proteins – (Biochemistry)
- x. Excitation – contraction coupling
- xi. Contraction kinetics of skeletal muscles
- xii. Smooth muscle
- xiii. Injury & repair of nerves and muscles
- xiv. Energetic of nerve & muscle
- xv. Work Physiology

Module PY 3

Blood-11 Hours

- i. Functions of plasma proteins
- ii. Principles of hemopoiesis
- iii. Regulation of erythropoiesis
- iv. Destruction of red cells: Jaundice
- v. Anemia
- vi. Regulation of WBC production
- vii. Functions of WBC
- viii. Functions of platelets
- ix. Homeostasis
- x. Blood groups
- xi. Physiological basis of transfusion medicine

Module PY4:

Respiratory System-11 Hours

- I. Introduction to respiratory system
- II. Lung volumes and capacities
- III. Mechanics of respiration – I
- IV. Mechanics of respiration – II
- V. Composition of respired air: pulmonary ventilation
- VI. 6. Exchange of gases in the lungs
- VII. 7. Ventilation – perfusion ratio
- VIII. O₂ carriage, O₂–dissociation curve Therapeutic use of oxygen .
- IX. CO₂ carriage, CO₂–dissociation curve
- X. Neural regulation of respiration
- XI. Chemical regulation of respiration
- XII. Hypoxia, cyanosis and dyspnoea
- XIII. Special features of pulmonary circulation
- XIV. Artificial respiration Artificial respiration

Module PY5

Cardiovascular System:17 Hours

- I. Introduction to CVS
- II. Properties of cardiac muscle
- III. Action potential and spread of impulse in the heart
- IV. E-C coupling in the myocardium
- V. ECG
- VI. Pressure changes in the heart. Cardiac cycle
- VII. Functional basis of heart sounds and murmurs
- VIII. Neural regulation of cardiac activity
- IX. Regulation of heart rate
- X. Intrinsic regulation of heart's action. Cardiac output
- XI. Cardiac output: measurement and regulation
- XII. Nutrition and metabolism of heart
- XIII. Exercise physiology
- XIV. General principles of hemodynamics
- XV. Cardiovascular reflexes
- XVI. Neural control of circulation
- XVII. Special features of cerebral circulation
- XVIII. Special features of circulation in skeletal muscles and skin

Module PY 6

Respiratory System-11 Hours

- I. Neural regulation of respiration
- II. Chemical regulation of respiration
- III. Hypoxia, cyanosis and dyspnoea
- IV. Special features of pulmonary circulation
- V. Artificial respiration Artificial respiration
- VI. Therapeutic use of oxygen .
- VII. Exchange of gases in the lungs
- VIII. Ventilation – perfusion ratio
- IX. O₂ carriage, O₂-dissociation curve
- X. CO₂ carriage, CO₂-dissociation curve
- XI. Composition of respired air: pulmonary ventilation
- XII. Introduction to respiratory system
- XIII. Lung volumes and capacities
- XIV. Mechanics of respiration – I
- XV. Mechanics of respiration – II

Module PY7

Environmental Physiology:8 Hours

- I. Introduction to environmental physiology
- II. Body temperature regulation
- III. Man in cold environment
- IV. Man in hot environment
- V. Hypothermia and its clinical applications
- VI. Physiological responses to high altitude
- VII. Physiological responses to high atmospheric pressure

Module PY 8

Gastrointestinal System:10 Hours

1. Introduction to G.I. Physiology: general organization of G.I. tract
 - II. Mastication and deglutition
 - III. Gastric secretion
 - IV. Regulation of gastric secretion
 - V. Pathophysiology of peptic ulcer
 - VI. Biliary and pancreatic secretions
 - VII. Physiology of colon
 - VIII. Pathophysiology of diarrheal disease

Module PY 9

Reproduction-8 Hours

- I. Introduction to reproductive system
- II. Male reproductive physiology
- III. Female reproductive physiology
- IV. Hypothalamic – pituitary – gonadal axis
- V. Puberty
- VI. Pregnancy
- VII. Parturition and lactation
- VIII. Reproductive ageing

Module PY 10

Kidney: 8 Hours

- I. Renal hemodynamic and glomerular filtration
- II. Renal tubular function – I
- III. Renal tubular function – II
- IV. Regulation of renal function
- V. Physiological basis of renal function tests
- VI. Micturation

Module PY 11

Neurophysiology:20 Hours

a). General

- i. Introduction to neurophysiology I
- ii. Introduction to neurophysiology II
- iii. CSF
- iv. Neuroglial cells
- v. Synaptic transmission
- vi. Properties of synaptic transmission
- vii. Neurotransmitters

b). Sensory system

- i. Coding of sensory information
- ii. Functional organization of ascending sensory pathways
- iii. Thalamus
- iv. Sensory cortex
- v. Perception of sensory stimuli
- vi. Physiology of pain

c). Motor system

- i. Characteristics and properties of reflexes
- ii. Functional organization of motor system – I
- iii. Functional organization of motor system – II
- iv. Brain stem reflexes, stretch reflexes and tendon reflexes
- v. Basal ganglia
- vi. Cerebellum
- vii. Vestibular neck reflexes: maintenance of equilibrium
- viii. Localizing the level of lesion in neurological disease

d). Visceral and motivational system

- i. Autonomic nervous system
- ii. Hypothalamus
- iii. Limbic system and emotions

e). EEG, sleep and higher nervous functions

- i. Electroencephalography
- ii. Sleep and wakefulness
- iii. Learning and memory – I
- iv. Learning and memory – II
- v. Speech

Module PY 12

Special Senses:6 Hours

- i. Functional anatomy of eye
- ii. Functions of retina: photoreception
- iii. Functions of retina: color vision and electro-retinography
- iv. Central mechanisms of vision and visual perception
- v. Functional anatomy of ear: impedance matching
- vi. Organ of Corti: peripheral auditory mechanism
- vii. Auditory pathway
- viii. Central auditory mechanism and auditory perception
- ix. Olfaction
- x. Physiology of taste

Practical

Blood

- i. Preparation and examination of peripheral blood smear and determination of
- ii. Differential leukocyte count
- iii. Determination of total red blood cell count
- iv. Determination of total leukocyte count

- v. Determination of platelet count
- vi. Determination of reticulocyte count
- vii. Determination of eosinophil count
- viii. Determination of osmotic fragility of erythrocytes
- ix. Determination of erythrocyte sedimentation rate, packed cell volume and calculation of the absolute values
- x. Determination of hemoglobin concentration of blood
- xi. Determination of ABO and Rh blood groups
- xii. Determination of bleeding time, clotting time and plasma prothrombin time
- xiii. Examination of bone marrow smears
- xiv. Estimation of blood volume by dye dilution technique

Nerve and Muscle

- i. Study of salient features of electromyography
- ii. Estimation of conduction velocity of human ulnar nerve and calculation of conduction velocity
- iii. Study of phenomenon of human fatigue: (i) Mosso's ergograph , and (ii) Handgrip dynamometer/ ergograph for isometric work
- iv. To measure the mechanical efficiency at different grades of exercise
- v. Study of excitable and contractile properties of a nerve-muscle preparation. Demonstration of (i)effect of sub-threshold, threshold, and supra-threshold stimuli, (ii) Isotonic contraction, (iii) Effect of two or more stimuli, (iv) Isometric contraction, (v) Length-tension relationship
- vi. Demonstration of work performed by skeletal muscle in vitro under (i)After loaded conditions, and (ii) Free loaded conditions
- vii. Demonstration of muscle fatigue and neuromuscular transmission in an amphibian model
- viii. Demonstration of compound action potential in a frog's sciatic nerve
- ix. Determination of strength-duration curve in frog's nerve and muscle

Cardiovascular System

- i. Recording and analysis of 12 lead electrocardiogram and to measure the mean electrical axis of heart
- ii. Determination of the effect of posture on blood pressure
- iv. Determination of physical fitness of a subject using screening tests
- v. Measurement of blood flow in the forearm by venous occlusion plethysmography and to demonstrate the effect of (a) Exercise, (b) Arterial occlusion, and (c) Temperature

- vi. Clinical examination of the human cardiovascular system (CVS)
- vii. Demonstration of the properties of cardiac muscle in the frog
- viii. Study of the factors controlling inotropic and chronotropic functions in isolated per fused frog's heart
- ix. per fused frog's heart
- x. Demonstration of exercise stress test

Respiration

- i. Determination of various lung volumes and lung capacities and calculation of maximum voluntary ventilation (MVV) and forced expiratory volume (FEV) by spirometry.
- ii. Recording of chest movements by a Stethography and to study the effects of Speech, swallowing, coughing, breath-holding and hyperventilation.
- iii. Examination of human respiratory system.
- iv. Measurement of respiratory dead space.

G.I.T. and Metabolism

- i. Determination of resting metabolic rate in human
- ii. Clinical examination of the abdomen
- iii. Study of the movements of isolated segment of mammalian small intestine and the effects of:(i) ions, (ii) neurotransmitters, and (iii) cold in vitro

Reproduction

- i. Changes in vaginal exfoliation cytology and cervical secretion during different phases of reproductive cycles in human and in rat.
- ii. Pregnancy tests.
- iii. Determination of sperm count, motility and morphology in a human Sample.

Environmental physiology

Study of the effects of exposure to hot and cold environment on human Subject.

Neurophysiology

- i. Examination of nervous system including cranial nerves.
- ii. Human electroencephalography: Methods of recording and identification of different types of EEG waves.
- iii. Ingestive behavior and its nervous control.
- iv. To determine the reaction time in a human subject.
- v. Demonstration of non-invasive assessment of autonomic nervous functions.

Special senses

- i. Determination of visual acuity.
- ii. Clinical assessment of colour vision.
- iii. Perimetry: Mapping of visual field.
- iv. Blind spot in the field of vision.
- v. Demonstration of the principles of optics in the eye using a model of eye.
- vi. Demonstration of audiometry.
- vii. Demonstration of vestibulo-ocular reflex (V.O.R.) by caloric stimulation.

Teaching Learning Methodology.

1. Lectures.
2. Tutorial/ Small Group Teaching (SGT)/ Self Directed Learning (SDL)/ Computer Assisted Learning (CAL), Demonstration- Observation- Assistance- Performance. (DOAP); Seminars on selected topics.
3. Practical demonstrations and individual practical.
4. Audiovisual presentations (e.g. video films) on selected topics.
5. Problem based Learning on selected topics.

Text Book Recommended:

1. Understanding Medical Physiology by R.L. Bijlani.
2. Review of Medical Physiology by W.F. Ganong.
3. Textbook of Medical Physiology by A.C. Guyton.

LEARNING MODULE FOR BIOCHEMISTRY 1ST MBBS

Number of Modules: 14

Number of hours: 250 Hrs.

- i. Lectures: 80 Hrs.
- ii. Tutorials/Integrated Learning/Practical:150 Hrs
- iii. Self Directed Learning: 20 Hrs.

BIOCHEMISTRY

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

OBJECTIVES

Knowledge: At the end of the course, the student should be able to demonstrate his knowledge and understanding on the:

- I. Molecular and functional organization of a cell, and sub- cellular components;
- II. Structure, function and interrelationship of bio-molecules and consequences of deviation from normal;
- III. Basic and clinical aspects of enzymology and regulation of enzymatic activity;
- IV. Digestion and assimilation of nutrients and consequences of malnutrition;
- V. Integration of the various aspects of metabolism, and their regulatory pathways;
- VI. Biochemical basis of inherited disorders and their associated sequelae;
- VII. Mechanisms involved in maintenance of body fluid and pH homeostasis;
- VIII. Molecular mechanisms of gene expression and regulation, the principles of genetic engineering and their application in medicine;
- IX. Molecular concepts of body defence and their application in medicine;
- X. Biochemical basis of environmental health hazards; and biochemical basis of cancer and carcinogenesis, principles of metabolism, and detoxication of xenobiotics.
- XI. Principles of various conventional and specialized laboratory investigations and instrumentation analysis and interpretation of a given data; the ability to suggest experiments to support theoretical concepts and clinical diagnosis.

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

- I. make use of conventional techniques/ instruments to perform biochemical analysis relevant to clinical screening and diagnosis Biochemistry
- II. analyze and interpret investigative data
- III. Demonstrate the skills of solving clinical problems and decision making.

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

COURSE CONTENT

Module BI 1

Biological cell

- (a) Architecture, compartmentation, cell membrane structure and functions; structure-function relationships.
- (b) Membrane transport.

Module BI2

Biomolecules

- (a) Function and classification of carbohydrates, lipids, protein and amino acids.
- (b) Stereoisomerism and chemistry of monosaccharide, amino acids, and fatty acids.
- (c) Structural organization and structure-function relationships of proteins. Hemoglobin and myoglobin molecular mechanism of O₂ transport and storage. Molecular basis of sickle cell anemia and thalassemyias.
- (d) Molecular mechanism of muscle contraction.
- (e) Plasma proteins, their functions and clinical significance.

Module BI 3

Enzymes

- (a) Nomenclature, classification,
- (b) Kinetics, mechanism of enzymatic catalysis.
- (c) Factors influencing enzymatic catalyses, enzyme activators and inhibitors.
- (d) Regulation of enzyme activity,
- (e) Clinical Enzymology, isoenzymes.

Module BI 4

Ph, Buffer, physiological buffer systems

- (a) Regulation of blood pH, acidosis, alkalosis,
- (b) Renal functions tests.

Module BI 5

Metabolic pathways,

- a) **general concepts**
- b) **characteristics of metabolic pathways.**

Module BI 6

Carbohydrate metabolism

- (a) Pathways of glucose metabolism: glycolysis
- (b) HMP shunt
- (c) Gluconeogenesis
- (d) Glycogenolysis, glycogenesis
- (e) Galactose and fructose metabolism
- (f) Glycogen storage disease
- (g) Inborn errors of glucose metabolism
- (h) Regulation of glucose metabolism.

Module BI 7

Amino acid metabolism

- (a) General reactions, transamination, its metabolic and diagnostic significance
- (b) Disposal of amino acid nitrogen and detoxication of urea
- (c) Metabolic fate of amino acid carbon skeleton
- (d) Sulphur containing amino acids
- (e) In born errors of branched chain and aromatic amino acids
- (f) Important amino acid derivatives.

Module BI 8

Lipid metabolism

- (a) Biosynthesis and degradation of fatty acids, phospholipids and triacylglycerols
- (b) Biosynthesis of cholesterol, chemistry and metabolism of lipoproteins.
- (c) Hyperlipoproteinemias
- (d) Lipid storage disease.

- (e) Ketone bodies: their synthesis, utilization and conditions leading to ketoacidosis, prostaglandin.
- (f) **TCA cycle** and biological oxidation, prostanooids.

Module BI 9

Regulation of the metabolic pathways

- (a) Carbohydrate, lipid and amino acid metabolism
- (b) Interlinks between these pathways.
- (c) Organ interrelationships in metabolism,
- (d) Blood glucose regulation and its impairment in diabetes mellitus.
- (e) Metabolic adaptation in the fed state, fasting and prolonged starvation.
- (f) Metabolic derangements and adaptations in diabetes mellitus.

Module BI 10

Food assimilation and nutrition

- (a) Digestive enzymes, their action on dietary carbohydrates, fats and proteins.
- (b) Absorption of glucose, amino acids and lipids.
- (c) Gastric, pancreatic and intestinal function tests, liver function tests.
- (d) Functions of dietary ingredients, the macro and micronutrients.
- (e) Fat soluble and water soluble vitamins
- (f) Malnutrition
- (g) Iron metabolism and heme synthesis.

Module BI 11

Environmental biochemistry, cancer and cancer makers

- (a) Xenobiotics, interaction with biomolecules, effects, metabolism, detoxication,
- (b) Biochemical characteristics of cancer
- (c) Environmental pollutants and carcinogenesis

Module BI 12

Hormones

- (a) Molecular basis of hormonal action, signal transduction mechanisms.
- (b) Chemistry, functions and mechanism of action of hormones of the pituitary, thyroid, parathyroid, adrenals, pancreas, and gonads.
- (c) Biosynthesis of steroid hormones their functions and mechanism of action.
- (d) Pineal body
- (e) Endorphins and enkephalins,
- (f) Calcium homeostasis.
- (g) Hormonal interplay in the regulation of metabolism.

Module BI 13

Molecular Biology

- (a) Nucleic acids: DNA and RNA structure
- (b) DNA Replication,
- (c) DNA Transcription
- (d) Post-transcriptional processing.
- (e) Translation of genetic code
- (f) Regulation of gene expression and protein synthesis inhibitors of protein synthesis.
- (g) DNA repair mechanisms,
- (h) Applied aspects of purine and pyrimidine metabolism
- (i) Genetic Engineering: Recombinant DNA technology
- (j) DNA and diagnostics
- (k) DNA repair mechanisms and related disorders
- (l) Telomeres, telomerases
- (m) Inhibitors of DNA replication, apoptosis

Module BI 14.

Immunology

- (a) Reticuloendothelial system, components and functions of the innate and adaptive immunity.
- (b) Role of T and B lymphocytes, antigen presentation
- (c) Induction of immune response
- (d) Cell mediated immune response
- (e) Immunoglobulin structure and functions
- (f) Humoral immune response
- (g) Fate of antigen antibody complex,
- (h) Complement system
- (i) Generation of antibody diversity,
- (j) Hypersensitivities
- (k) Immunoregulation, autoimmunity, tolerance
- (l) HLA, disease association & transplantation
- (m) Immunological techniques, application in medicine (vaccines, immunotherapy, immunoassays and immunodiagnostics).

PRACTICALS

1. Laboratory Instrumentation.
2. Protein fractionation, denaturation, separation of proteins and amino acids.
3. Color reactions of amino acids and proteins.
4. Estimation of blood analytes: glucose, total cholesterol and HDL cholesterol, uric acid, electrolytes, urea.
5. Cerebrospinal fluid analyses.
6. Gastric juice analyses.
7. Urine analyses.
8. Amniotic fluid analyses.
9. Enzymes: amylase, lactate dehydrogenase and alkaline phosphatase
10. Liver function tests
11. Renal function tests.
12. Gel electrophoresis of DNA.

13. Immunodiffusion techniques, RIA and ELISA

14. Case-oriented discussions (enzymes, metabolites, function tests)

Teaching & Learning Methods:

1. Lectures.
2. Tutorial/ Small Group Teaching (SGT)/ Self Directed Learning (SDL)/ Computer Assisted Learning (CAL), Demonstration- Observation- Assistance- Performance. (DOAP); Seminars on selected topics.
3. Practical demonstrations and individual practical.
4. Integrated Class.
5. Audiovisual presentations (e.g. video films) on selected topics.
6. Problem based Learning on selected topics.

TEXT-BOOKS RECOMMENDED

1. Biochemistry Ed. Lubert Stryer. W.H. Freeman and Company, New York.
2. Principles of Biochemistry. Ed. Lehinger, Nelson and Cox. CBS Publishers and distributors.
3. Harper's Biochemistry, Ed. R.K. Murray, D.K. Granner, P.A. Mayes and V.W. Rodwell. Appleton and Lange, Stamford, Connecticut.
4. Textbook of Biochemistry with Clinical Correlations. Ed. Thomas M. Devlin, Wiley-Liss Publishers.
5. Tietz Textbook of Clinical Chemistry. Ed. Burtis and Ashwood. W.B. Saunders Company.
6. Biochemistry. Ed. Donald Voet and Judith G. Voet. John Wiley & Sons, Inc.