DPU

Dr. D. Y. PATIL VIDYAPEETH, PUNE
(Deemed to be University)

Regulations and Syllabus for I – MBBS (Pre - Clinical Subjects)

2014 - 15
(Amended / Revised upto July 2019)

DPU

Dr. D.Y. PATIL VIDYAPEETH, PUNE
(Deemed to be University)
(Re-accredited by NAAC with a CGPA of 3.62 on a four point scale at 'A' Grade)
(An ISO 9001 : 2015 Certified University)

Dr. A. N. Suryakar
Registrar

Ref. No. : DPU/875-VII/2019
Date : 11/09/2019

NOTIFICATION

Whereas in pursuance of the following decisions taken by the Board of Management, it is hereby notified to all concerned that the **"Syllabus for I-M.B.B.S. (Pre-Clinical Subjects) – 2014-15"** is **revised upto July 2019** and hereby published.

- Changes in syllabus for UG and PG in Anatomy, Biochemistry, Community Medicine, vide **Resolution No. BM-07-(iii)-4 dated 28th January, 2014.**
- Updation in UG syllabus of Biochemistry vide **Resolution No. BM-04(i)-15, dated 31st March, 2015.**
- Adoption of **"Double Evaluation System"** for UG Answer Papers **vide Resolution No. BM-07-15 dated 31st March, 2015.**
- Inclusion of one lecture on Physiology of Yoga and two lectures on Sports Physiology in the Physiology subject, **vide Resolution No. BM-26(ii)-15, dated 29th December, 2015.**
- Introduction of Bioethical aspects in various chapters of all subjects vide **Resolution No. BM-26(xi)-15, dated 29th December, 2015.**
- Modifications in I MBBS University Practical Examinations schedule vide **Resolution No. BM-17(i)-16, dated 22nd September, 2016.**
- Inclusion of Curriculum of Bioethics in UG Anatomy, Physiology and Biochemistry subjects **vide Resolution No. BM-17(viii)-16, dated 22nd September, 2016.**
- Introduction of Sectional Anatomy and Sonographic Anatomy, an Integrated approach towards Radiology and Imaging Sciences in first year in the Subject of Anatomy UG curriculum, **vide Resolution No. BM-20(ii)-17, dated 29th July, 2017.**
- Inclusion of Lectures in Aviation and Space Physiology in Physiology subject of the first year MBBS curriculum vide **Resolution No. BM-20(iii)-17, dated 29th July, 2017.**
- Inclusion of theory lectures in cross sectional and ultrasound anatomy in the syllabus of first year of MBBS curriculum vide **Resolution No.BM-38(i)-17, dated 27th December, 2017.**
- Introduction of one of the questions as MCQ test in continues assessment examinations in Pre-Clinical subjects vide **Resolution No.BM-38(ii)-17, dated 27th December, 2017.**
- To replace spotting in Anatomy practical examination of UG examinations by clinical work stations like objective structured practical examination **vide Resolution No. BM-38(iii)-17, dated 27th December, 2017.**
- Introduction of surface anatomy on mummified bodies along with living anatomy in Anatomy practical examinations **vide Resolution No. BM-38(v)-17, dated 27th December, 2017.**
- Inclusion of a lecture on study and practice of Yoga on 2nd and 4th Saturday of every month for First Year MBBS students, **vide Resolution No. BM-38(vi)-17, dated 27th December, 2017.**

Dr.D.Y.PATIL VIDYAPEETH PIMPRI, PUNE-18.

Sant Tukaram Nagar, Pimpri, Pune - 411018, Maharashtra (India)
Tel. : +91-20-27805000, 27805001 ▪ Fax : +91-20-27420010 ▪ Email : info@dpu.edu.in

DPU

- Changes in the syllabus of Ist year MBBS practical examinations of Biochemistry subject **vide Resolution No. BM-35(i)-18, dated 12th October, 2018.**
- Implementation of competency based curriculum for first year MBBS students as per guidelines of MCI **vide Resolution No.BM-10(i)-19, dated 12th April, 2019.**
- Interdisciplinary subjects of M.B.B.S, M.D./M.S. and Super-specialty (D.M./M.Ch.) Programs under the Faculty of Medicine **vide Resolution No. BM-10(viii) dated 12th April, 2019.**
- University Practical Examination Patten as per Competency Based Medical Education (**CBME**) curriculum of MCI vide Resolution **No. BM-27(i)-19, dated 30th July, 2019.**
- Graduate Attributes, Programme Outcomes (POs), Course Outcomes (Cos) outcome analysis of POs and COs and mapping with objectives for all courses of UG and PG Programmes of Pre-Clinical and Medicine Subjects under the Faculty of Medicine **vide Resolution No. BM-27(x)-19 dated 30th July, 2019.**
- Interdisciplinary subjects of M.B.B.S, M.D./M.S. and Super-specialty (D.M./M.Ch.) Programs under the Faculty of Medicine **vide Resolution No. BM-27(xi) dated 30th July, 2019.**

The **Syllabus for I-M.B.B.S. (Pre-Clinical Subjects) – 2014-15 Revised upto July 2019** will be useful to all the concerned. This will come into force with immediate effect.

Dr. D. Y. PATIL VIDYAPEETH PIMPRI, PUNE-18. Deemed to be University

(Dr. A. N. Suryakar)
Registrar

Copy to:

1. PS to Chancellor for kind information of Hon'ble Chancellor, Dr. D. Y. Patil Vidyapeeth, Pune.
2. PS to Vice Chancellor for kind information of Hon'ble Vice Chancellor, Dr. D. Y. Patil Vidyapeeth, Pune.
3. The Dean, Dr. D. Y. Patil Medical College Hospital & Research Centre, Pimpri, Pune
4. The Controller of Examinations, Dr. D. Y. Patil Vidyapeeth, Pune.
5. Director (IQAC), Dr. D. Y. Patil Vidyapeeth, Pune.
6. Web Master for uploading on Website.

REGULATIONS AND SYLLABUS FOR M.B.B.S. DEGREE COURSE

1. SHORT TITLE AND COMMENCEMENT

These regulations may be called "The Regulations for the Bachelor of Medicine and Bachelor of Surgery Degree Course of Dr. D. Y. Patil Vidyapeeth, Pune (Deemed to be University)

These regulations shall come into force from the academic year 1997 - 1998 and amendments notified by MCI from time to time.

2. ELIGIBILITY FOR ADMISSION TO M.B.B.S

DEGREE COURSE QUALIFICATION FOR ADMISSION:

No candidate shall be allowed to be admitted to the first year Bachelor of Medicine and Bachelor of Surgery (MBBS) Course until:

He/She has completed the age of 17 years on or before 31st December of the year of admission to the MBBS course.

He / She has passed qualifying examination as under :-

(a) The higher secondary examination or the Indian School Certificate Examination which is equivalent to 10+2 Higher Secondary Examination after a period of 12 years study, the last two years of study comprising of **Physics, Chemistry, Biology / Bio-technology** and Mathematics or any other elective subjects with English at a level not less than core course of English as prescribed by the National Council of Educational Research and Training after the introduction of the 10+2+3 years educational structure as recommended by the National Committee of education;

Note: Where the course content is not as prescribed for 10+2 education structure of the National Committee, the candidates will have to undergo a period of one year pre-professional training before admission to the Medical colleges;
Or

(b) The intermediate examination in science of an Indian University / Board or other recognised examining body with **Physics, Chemistry and Biology / Bio-technology** which shall include a practical test in these subjects and also English as a compulsory subject;

Or

(c) The pre-professional/pre-medical examination with Physics, Chemistry and Biology/Bio-technology, after passing either the higher secondary school examination, or the pre-university or an equivalent Examination. The pre-professional/pre-medical examination shall include a practical test in **Physics, Chemistry and Biology / Bio-technology** and also English as a compulsory subject;
Or

(d) The first year of the three years degree course of a recognized university, with Physics, Chemistry and Biology including a practical test in these subjects provided the examination is a "University Examination" and candidate has passed 10+2 with English at a level not less than a core course;
Or

(e) B.Sc examination of an Indian University, provided that he/she has passed the B.Sc examination with not less than two of the following subjects Physics, Chemistry, Biology (Botany, Zoology) and further that he/she has passed the earlier qualifying examination with the following subjects - Physics, Chemistry, Biology and English.
Or

(f) Any other examination which, in scope and standard is found to be equivalent to the intermediate science examination of an Indian University/Board, taking **Physics, Chemistry and Biology/Bio-technology** including practical test in each of these subjects and English.

3. PROCEDURE FOR SELECTION TO MBBS COURSE

1] There shall be a uniform entrance examination to all medical educational institutions at the undergraduate level namely 'National Eligibility-cum-Entrance Test for admission to MBBS course in each academic year and shall be conducted under overall supervision of the Ministry of Health & Family Welfare, Government of India.

2] The "designated authority" to conduct the 'National Eligibility-Cum-Entrance Test' shall be the Central Board of Secondary Education or any other body/organization so designated by the Ministry of Health & Family Welfare, Government of India, in consultation with the Medical Council of India.

3] The language and manner of conducting the 'National Eligibility-Cum-Entrance Test' shall be determined by the "designated authority" in consultation with the Medical Council of India and the Ministry of Health and Family Welfare, Government of India.

4] In order to be eligible for admission to MBBS Course for a academic year, it shall be necessary for a candidate to obtain minimum of marks at 50th percentile in 'National Eligibility-cum-Entrance Test to MBBS course' held for the said academic year. However, in respect of candidates belonging to Scheduled Castes, Scheduled Tribes, Other Backward Classes, the minimum marks shall be at 40th percentile. In respect of candidates with benchmark disabilities specified under the Rights of Persons with Disabilities Act, 2016, in terms of Clause 4(3) above, the minimum marks shall be at 45th percentile. The percentile shall be determined on the basis of highest marks secured in the All-India common merit list for admission in 'National Eligibility-cum-Entrance Test for admission to MBBS course.

Provided when sufficient number of candidates in the respective categories fail to secure minimum marks as prescribed in National Eligibility-cum-Entrance Test held for any academic year for admission to MBBS Course, the Central Government in consultation with Medical Council of India may at its discretion lower the minimum marks required for admission to MBBS Course for candidates belonging to respective categories and marks so lowered by the Central Government shall be applicable for the said academic year only.

4. REGISTRATION/ Eligibility Certificate

A candidate admitted to the course shall register with this University by remitting the prescribed fees along with the prescribed application form for registration duly filled in, within the stipulated date.

5. DURATION OF THECOURSE

The period of certified study and training for the course of Degree of Bachelor of Medicine and Bachelor of Surgery shall extend over a period of four and half academic years and one year of Compulsory Rotatory Resident Internship before the award of the Degree.

6. CURRICULUM

The curriculum and the syllabus for the course shall be as prescribed from time to time by the appropriate bodies.

COMMENCEMENT OF THECOURSE

The first year MBBS Course shall begin on or before 1st August of every academic year.

7. TRAINING PERIOD AND TIME DISTRIBUTION

(a) Every student shall undergo a period of certified study extending over four and half academic years divided into 9 semesters, (i.e. of 6 months each) from the date of commencement of study for the subjects comprising the medical curriculum to the date of completion of examination and followed by one year Compulsory Rotatory Residential Internship. Each semester will consist of approximately 120 teaching days of 8 hours duration including one hour for lunch.

(b) The period of four and half years is divided into three phases as follows:

- Phase - I (two semesters) consisting of pre-clinical subjects (Anatomy, Physiology, Biochemistry and introduction to Community Medicine including Humanities). Sixty hours are allocated for introduction to Community Medicine including Humanities, and rest of the time shall be and again divided between Anatomy and Physiology (2/3) plus Biochemistry (1/3)combined.

- Phase - II (three semesters) consisting of para-clinical / clinical subjects.

  During this phase teaching of para-clinical and clinical subjects shall be done concurrently.

  The para-clinical subjects shall consist of Pathology, Pharmacology, Microbiology, Forensic Medicine including Toxicology and part of Community Medicine.

  The clinical subjects shall consist of all those detailed below in Phase III.

  Out of the allotted time for para-clinical teaching, approximately equal time be allotted to Pathology, Pharmacology, Microbiology and Forensic Medicine, Community Medicine combined (1/3 for Forensic Medicine and 2/3 for Community Medicine).

- Phase - III (four semesters) Continuation of study of clinical subjects for seven semesters after passing Phase -I

The clinical subjects to be taught during Phase II and III are Medicine and its allied specialities, Surgery and its allied specialities, Obstetrics and Gynaecology and Community Medicine.

The Medicine and its allied specialities training will include General Medicine, Paediatrics, Tuberculosis and Chest, Skin and Sexually Transmitted Diseases, Psychiatry, Radio-diagnosis, Infectious Diseases etc. The Surgery and its allied specialities training will include General Surgery, Orthopaedic Surgery including Physiotherapy and Rehabilitation, Ophthalmology, Oto-rhino-laryngology, Anaesthesia, Dentistry, Radio-therapy etc. The Obstetrics & Gynaecology training will include family medicine, family welfare planning etc.

(c) The first 2 semesters (approximately 240 teaching days) shall be occupied in the Phase I (Pre-clinical) subjects and introduction to a broader understanding of the perspectives of medical education leading to delivery of health care. No student will be permitted to join the Phase II (Para - clinical) group of subjects until he has passed in all the PhaseI.

(d) After passing pre-clinical subjects, Phase II will be devoted to para-clinical and clinical subjects, along with clinical postings. During clinical phase (Phase III) pre-clinical and para-clinical teaching will be integrated into the teaching of clinical subjects where relevant.

(e) Supplementary examination will be conducted as follows:
Supplementary examination may be conducted within 3 months so that the students who pass can join the main batch and the failed students will have to appear in the subsequent year.

8. PHASE DISTRIBUTION AND TRAINING OFEXAMINATIONS:

6 Months	6 Months	6 Months	
1	2		I[st] Professional examination (during 2[nd]semester)
3	4	5	II[nd] Professional examination (during 5[th] semester)
6	7		III[rd] Professional Part I examination (during 7[th] semester)
8	9		III[rd] Professional Part II (Final Professional) (during 9[th] semester)

(a) Passing in I[st] Professional examination is compulsory before proceeding to Phase II training.

(b) A student who fails in the II[nd] Professional examination, shall not be allowed to appear for III[rd] Professional Part I examination unless he/she passes all subjects of II[nd] Professional examination.

(c) Passing in III[rd] Professional (Part I) is compulsory for being eligible for III[rd] Professional (Part II) examination.

During third to ninth semesters, clinical postings of three hours duration daily as specified is suggested for various departments, after introductory course in Clinical Methods in Medicine and Surgery of two weeks each for the whole class.

9. ACADEMICTERMS

First M.B.B.S
Part-I & Part II - 1[st] August to June 15[th]

10. CUT OFFDATES

As decided by the appropriate bodies from time to time.

11. EXAMINATIONDATE

There shall be two sessions of University examinations in an academic year, viz., June and December.

12. WORKING DAYS IN AN ACADEMICYEAR

Each academic year shall consist of not less than 240 working days.

13. ATTENDANCE REQUIRED FOR ADMISSION TO EXAMINATION

(a) No candidate shall be permitted to any one of the parts of MBBS Examinations unless he/she attended the course in the subject for the prescribed period and produces the necessary certificate of study, attendance and progress from the Head of the Institution.

(b) A candidate is required to put in minimum 75% of attendance in a subject for appearing in the examination, inclusive of attendance in non-lectures teaching, i.e. seminars, group discussions, tutorials, demonstrations, practicals, Hospital (Tertiary, Secondary, Primary) postings and bed side clinics, etc.

(c) A candidate lacking in the prescribed attendance and progress in any one subject in theory and practical / clinical in the first appearance shall not be permitted for admission to the university examination in that subject only.

14. MIGRATION/TRANSFER OF CANDIDATES

The Medical Council of India Regulations relating to Migration will be followed by the University as reproduced below:

(1) Migration of students from one medical college to another medical college may be granted on any genuine ground subject to the availability of vacancy in the college where migration is sought and fulfilling the other requirements laid down in the Regulations. Migration would be restricted to 5% of the sanctioned intake of the college during the year. No migration will be permitted on any ground from one medical college to another located within the same city.

(2) Migration of students from one College to another is permissible only if both the colleges are recognized by the Central Government under section 11(2) of the Indian Medical Council Act,1956 and further subject to the condition that it shall not result in increase in the sanctioned intake capacity for the academic year concerned in respect of the receiving medical college.

(3) The applicant candidate shall be eligible to apply for migration only after qualifying in the first professional MBBS examination. Migration during clinical course of study shall not be allowed on any ground.

(4) For the purpose of migration an applicant candidate shall first obtain "No Objection Certificate" from the college where he is studying for the present and the university to which that college is affiliated and also from the college to which the migration is sought and the university to it that college is affiliated. He / She shall submit his application for migration within a period of 1 month of passing (Declaration of result of the 1st Professional MBBS examination) along with the above cited four "No Objection Certificates" to: (a) the Director of Medical Education of the State, if migration is sought from one college to another within the same State **or** (b) the Medical Council of India, if the migration is sought from one college to another located outside the State.

(5) A student who has joined another college on migration shall be eligible to appear in the IInd professional MBBS examination only after attaining the minimum attendance in that college in the subjects, lectures, seminars etc. required for appearing in the examination prescribed under Regulation 12 (1)

Note-1: The State Governments / Universities / Institutions may frame appropriate guidelines for grant of No Objection Certificate or migration, as the case may be, to the students subject to provisions of these regulations.

Note-2: Any request for migration not covered under the provisions of these Regulations shall be referred to the Medical Council of India for consideration on individual merits by the Director (Medical Education) of the State or the Head of Central Government Institution concerned. The decision taken by the Council on such requests shall be final.

Note-3: The College/Institutions shall send intimation to the Medical Council of India about the number of students admitted by them on migration within one month of their joining. It shall be open to the Council to undertake verification of the compliance of the provisions of the regulations governing migration by the Colleges at any point of time."

15. SUBMISSION OF LABORATORY RECORD NOTEBOOKS

At the time of practical/clinical examination, each candidate shall submit to the Examiners his/her laboratory notebooks duly certified by the Head of the Department as a bonafide record of work done by the candidate. The practical record shall be evaluated by the Head of the Department.

The candidate may be permitted by the Examiners to refer to the practical record book during the practical examination in the subject of Biochemistry only. No other material, handwritten, cyclostyled or printed guides is allowed for reference during the practical examinations.

In respect of failed candidates, the marks awarded for records at previous examinations will be carried over for the subsequent examination or the candidates shall have the option to improve his performance by submission of fresh records.

16. INTERNAL ASSESSMENT

1] A minimum of three written and practical examinations shall be conducted in each subject during an academic year and the average marks of three best performances shall be taken into consideration for the award of sessional marks.

2] Day to day records and logbook (including required skill certifications) should be given importance in internal assessment. Internal assessment should be based on skills and competencies. Students must have completed the required certifiable competencies and completed logbook appropriate for each phase of training to be eligible for appearing at the final university examination of that subject.

3] Learner must secure at least 50% marks of total marks (combined in theory / Practical, not less than 40% in theory and practical separately) assigned for internal assessment in a particular subject in order to be eligible for appearing at the final university examination of the subject. Internal assessment marks will not be added to university examination and reflected as a separate head of passing at the summative examination.

4] The results of Internal Assessment should be displayed on notice board within 1-2 weeks of the test. Formulate remedial measures for students who are either not able to score qualifying marks or have missed some assessment due to any reason by forming committee under the Chairmanship of Dean, Dr. D. Y. Patil Medical College, Hospital and Research Center, Pune and three more members.

There shall be one additional examination after third internal assessment (Prelim) examination as per recommendation by institutional grievance committee before the submission of IA marks sheet to University.

17. CLASSIFICATION OF SUCCESSFULCANDIDATES

A successful candidate

i. Who secures not less than 75% in the aggregate marks shall be declared to have secured, **FIRST CLASS WITH DISTINCTION'** provided he/she passes the whole examination in the FIRSTATTEMPT;

ii. Who secures not less than 65% in the aggregate marks and completes the course within the stipulated course period shall be declared to have passed the examinations in the **'FIRSTCLASS'**;

iii. Who secures above 50% marks and completes the course within the stipulated course period shall be declared to have **PASSED** the examinations

18. EXEMPTION FROM RE-EXAMINATION IN ASUBJECT

Where a candidate obtains pass marks in a subject (or) subjects but fails in other subject (s) he / she shall be exempted from reexamination in the subject (s) he / she has passed.

MAPPING OF PROGRAMME OUTCOMES [POs] AND COURSE OUTCOMES [COs] OF MBBS PROGRAMMES

Programme Outcomes	
Programme Name: MBBS	
Programme Code: MB	
Sr.No.	**By the end of the programme, the MBBS Graduate will have /be:**
PO 1	Knowledge and Skills
PO 2	Planning and Problem-solving abilities
PO 3	Communication
PO 4	Research Aptitude
PO 5	Professionalism and Ethics
PO 6	Leadership
PO 7	Societal Responsibilities
PO 8	Environment and Sustainability
PO 9	Lifelong Learner

Course Outcomes and Mapping with Programme Outcomes	
Year I	
Course Code	**Course Title**
MB101	Human Anatomy
MB102	Human Physiology
MB103	Human Biochemistry

Human Anatomy (MB101)		
CO No.	**At the end of the course, the learner should be able to :**	**Mapped Programme Outcomes**
MB101.1	Comprehend normal position and clinically relevant interrelationships and cross-sectional anatomy of various structures of the body	PO1, PO4, PO5, PO7, PO9
MB101.2	Identify the microscopic structure and correlate elementary ultra-structure of various organs and tissues and understand various functions as a prerequisite to altered state in disease process	PO1, PO4, PO5, PO9
MB101.3	Comprehend basic structure and connections of central nervous system to analyze the integrative and regulatory functions of organs and system Shall be able to locate the site of gross lesions in central nervous system according to deficits encountered	PO1, PO4, PO5, PO9
MB101.4	Demonstrate knowledge of principles and sequential development of organ system. Recognize critical stages of effect of teratogens and genetic mutations	PO1, PO4, PO5
MB101.5	Identify and locate all the structures of the body and mark topographically in a subject / cadaver	PO1, PO4, PO5, PO9
MB101.6	Identify organs and tissues under microscope	PO1, PO5
MB101.7	Understand principles of karyotyping and genetic mutations in major developmental anomalies	PO1, PO9
MB101.8	Identify the structures on X-ray, CT and MR images Understand anatomical basis for safe conduct of common clinical procedures	PO1,
MB101.09	Develop respect to the human cadaver, empathy towards diseased and sense of gratification for the voluntary body donors and their families	PO1, PO5, PO6, PO7, PO8, PO9

HUMAN ANATOMY

HUMAN ANATOMY

GOAL :

The broad 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 so also basic knowledge of genetics to provide a basis for understanding the clinical correlation of organs or structures involved and the anatomical embryological and genetic basis for the disease presentations

1.1 OBJECTIVES :

1.2.1 Knowledge : At the end of the course student shallbe 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 pre- requisite 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 shall 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 systems, recognize the critical stages of development and the effects of common teratogens , genetic mutations and environmental hazards. He/ she shall be able to explain the developmental basis of the major variations and abnormalities and genetic basis of different inherited conditions. explain the developmental basis of the major variations and abnormalities and genetic basis of different inherited condition.

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

I) Identify and locate all the structures of the body and mark the topography of the surface anatomy.

II) Identify the organs and tissues under the microscope.

III) Understand the principles of Karyotyping, genetic mutation and identify the gross congenital anomalies.

IV) Understand principles of newer imaging techniques and interpretation of CT scan, sonogram etc.

V) Understand clinical basis of some common clinical procedures i.e. intramuscular and intravenous injection, lumbar puncture and kidney biopsy, liver biopsy etc.

1.2.3 Integration:

From the integrated teaching with other basic sciences, student shall be able to comprehend the functions of the organs and systems in the body, with their structures so as to understand the correlation and interpret the anatomical basis of disease process.

1.2 Detailed study of Human anatomy is given under following heads.

A. General anatomy

B. Regional Anatomy

I. Upper Limb
II. Lower Limb
III. Abdomen with pelvis and perineum
IV. Thorax
V. Head, Face, Neck
VI. Spinal cord and Brian

C. Micro-Anatomy
I. General Histology
II. Systemic Histology

D. Developmental anatomy
I. General Embryology
II. Systemic Embryology

E. Genetics

F. Radiological Anatomy, USG, CT, MRI

G. Surface Anatomy

H. Internal assessment and University Exam pattern, Theory and Practical Books recommended.

DETAIL SYLLABUS OF HUMAN ANATOMY

A. GENERAL ANATOMY

I DESCRIPTIVE TERMS :

Terms used for describing the position of the body, Anatomical planes, commonly used terms in Gross Anatomy, Terms used in Embryology, terms related to limbs, for hollow organs, for solid organs to indicate the side, for describing muscle, for describing movements.

II CONNECTIVE TISSUE :

i. Loose areolar tissue – definition function, sites where present.

ii. Dense connective tissue- regular and irregular types. Definition, functions and sites where present

iii. Ligaments, types and function, applied anatomy

iv. Retinacula and Aponeuroses,

v. Cartilage– Definition, Types, Structure, Distribution, Nutrition, histogenesis, growth of Cartilage, Cartilage Grafts,

vi. Bone – Definition Nutrition and Morphological classification, distribution and functions of bone. Appendicular and Axial skeleton. Diaphysis, Metaphysis, Epiphysis, Types of epiphyses Primary centres, Law of ossification. Mechanical properties of bones. Effect of hormones on bony growth, Wolff's law, Surface topology of articular surfaces, Spin, Swing, shunt movements.

III GENERAL ARTHROLOGY :

i. Classification, Synarthrosis Amphiarthrosis, Diarthrosis Fibrous-Sutures, Syndesmosis, Gomphosis Cartilagenous - Primary, Secondary Synovial – Axis of movement, structure of typical synovial joints.Classification of synovial joints, according to the shape axes of movements and morphology Simple, Compound, Complex joints, Blood supply and nerve supply. Factors limiting range of movement,

   Kinesiologically: Sellar, Ovoid, Joint position: Loose-packed, Close-packed , Kinesiology, Body lever system.

ii. BURSA, Structure, Functions, Types:
   Adventitious bursae - Housemaid's knee, Clergyman's knee, Student's elbow, Weaver's bottom, Porter's shoulder, Bursitis.

IV. GENERAL MYOLOGY :

Definition, types: Origin, insertion, Morphological classification Actions of muscles, nerve supply Functional classification, Prime movers, Fixators, Antagonists, Synergists, Number and diameter of fibres, Range of contraction, Active insufficiency, Passive insufficiency.

V. INTEGUMENT :

a) Skin – Introduction:

Types: Thick and Thin hairy skin, functions, innervation Surface area. Structure: Epidermis, Dermis, Clinical correlation, significance of Langer's lines, Tension lines, flexure lines, Appendages, Special sensory organs Skin grafts,

b) Superficial Fascia

Distribution of fat, functions

c) Deep Fascia

Features, Modifications, Functions

VI. GENERAL ANGIOLOGY :

i. Arteries- Muscular, Elastic; Arterioles; Capillaries. Sinusoids. Veins- Anatomosis: End arteries; Vasa vasorum, nerve supply of blood vessels, Ischaemia, Infarct Collateral circulation, Functional end arteries, Arteriosclerosis.

ii. Lymphatic system Lymph vessels, Central lymphoid tissue, Peripheral lymphoid organs, Circulating lymphocytes - T and B lymphocytes, functions. Tissue transplantation – role of lymphoid tissue.

VII. GENERAL NEUROLOGY :

Structure of nervous tissue, Neurons: Synapses : Structural types, functional types Classification of neurons - According to polarity and According to relative lengths of axons and dendrites. Neuroglia: Nerves – Cranial – Spinal, structure of typical spinal nerve Autonomic nervous system: Sympathetic ganglia, postganglionic fibres Sympathetic: Parasympathetic: Cranial outflow, sacral outflow.

B. REGIONAL ANATOMY

I. UPPER LIMB

REGIONS: Mammary gland, Axilla, Cubital fossa, Arm, Forearam, fascial spaces of the hand, relations and functional importance of individual structures, Dupuytren's contracture. Hand as a functional unit-grips, Nerve injury, carpal tunnel syndrome, Clavipectoral fascia; Salient features about carpals;

ARTHOLOGY: Shoulder girdle; Shoulder joint; Elbow: Radioulnar joints: Wrist; Carpometacarpal joint of thumb; Bones taking part Classification of joints, Movements with muscles causing movements, midcarpal joint, metacarpophalangeal joints, Interphalangeal joints Fall on the outstretched hand

Axilla: Collaterals Lymph nodes (breast) axillary sheath cervico-axillary canal, Abscess drainage, Palm: comparative anatomy (thumb, pamarisbrevis), position of rest and of function, fascial spaces: Surgical significance.

OSTEOLOGY: Identification; anatomical postion; Parts of bones of upper limb, Joints formed; Development; identification of individual carpals in an articulated hand, muscle and ligament attachments.

Clavicle: Line of weight transmission, commonest site of fracture Humerus: fractures-Colles fracture, Smith's fracture Carpals, Metacarpals, Phalanges: Carpal tunnel syndrome, fracture scaphoid Surgical approaches, Subluxation of head of radius, carrying angle

MYOLOGY :
Muscles of upper limb, attachment, Nerve supply, Actions Applied aspects: Volkmann's ischaemic contracture Quadrangular and triangular spaces, triange of auscultation

ANGIOLOGY :
Axillary, Brachial, Raidal, Ulnar Arteries, veins, lymphatics Commencement, Termination, Main area of distribution and drainage, Anastomosis - Applied aspects, artery : Damage to vessels, Raynaud's disease, Veins: thromobosis, Lymphatics: Lymphangitis (red streaks), lymphadenitis.

NEUROLOGY :

A. Nerves in details

Axillary, median, ulnar, musculocutaneous, radial Origin, course, distribution, Root value, Applied anatomy.

B. Plexus : Brachial

Applied aspects: nerve injuries at various sites - Tendon reflexes- Winging of scapula, Erb's palsy, Klumpke's palsy, Crutch palsy, Saturday night palsy, ulnar paradox.

II. LOWER LIMB

REGION: boundaries, major contents; Gluteal region femoral triangle; Adductor canal, compartments of thigh, leg; Popliteal fossa, sole Arches of foot, gluteal IM injections, Femoral hernia Blood supply of head of femur; Fracture neck of femur, mechanics of movements of joints; hip and knee, trendelenberg's test; Knee jont; derangement, injuries to cruciate ligaments, menisci; (tear-bucket handle type); Ankle: Sprain
Mechanism of venous return, varicose veins. Applied aspects of Adductor canal, Popliteal aneurysms.

OSTEOLOGY: Indentification, regional bones, anatomical position ; parts, joints formed , for tarsals – ide ntification of individual tarsals in an articulated foot and separately.

Applied aspects: Bony specialization for bipeds, walking and transmission of weight, Fracture, femoral torsion, neck shaft angle, bone grafts

ARTHROLOGY: Hip, knee, ankle, subtalar, Tibiofibular.
Hip joint: dislocation, congentital, traumatic, surgical approaches of joints (anatomical basis) : traumatic effusion, bursitis.

MYOLOGY:Attachments, nerve supply, actions of Muscles of lower limb, Calf pump, antigravity muscles.

ANGIOLOGY:
Artery: femoral, Profunda femoris, popliteal, dorsalis pedis, plantar arteries, commencement, termination, main area of supply, course, relations and applied

Veins: Venous drainage of lower limb, long and short Saphenous veins, Communication and valves. Varicose veins.

Lymphatics : Inguinal and Popliteal group of lymph nodes
Intermittent claudication, clinical significance of anastomosis : around knee, venous thrombosis.

NEUROLOGY

a. Plexus: Lumbar and sacral, Location, Formation, Distribution

b. Nerves : Root value of sciatic, femoral, Obturator, tibial, common peroneal nerves; Origin, course, distribution; sciatica, foot drop sciatica.

III. ABDOMEN

1. ANTERIOR ABDOMINAL WALL

Rectus sheath, quadrants and regions, Testes, epididymis, spermatic cord, scrotum Surgical incisions of abdomen, types of inguinal herniae Peritoneum, Omentum, Omental Bursa, Epiploic Foramen, Testes: Morphology, blood supply, lymphatic drainage

SPERMATIC CORD

Definition, beginning, end, course and contents, coverings, Applied.

2. ABDOMINAL ORGANS

Morphology, relations Blood supply, lymphatics, nerve supply and applied anatomy of following organs- Stomach, Spleen, Liver; Biliary Apparatus, Pancreas, Small Intestine, Large Intestine, Caecum and Vermiform Appendix, Kidneys, Ureters, Suprarenal Glands.

Peptic ulcer, Splenic circulation, splenic vascular segments, liver biopsy, Support of liver, Gall stones, duct system of pancreas, Surgical approach to kidney, stones (Renal), Ureter, Sites of constrictions, Hydronephrosis, pheochromocytomaGastroscopy, Achlorhydria, Splenectomy, Liver transplant, Pancreatitis, diabetes, renal transplant, Stones in Ureter, Cushing's disease.

3. PELVIC VISCERA:

Morphology, relations, Blood supplynerve supply and applied anatomy ofurinary bladder and urethra, uterus, ovaries and uterine tubes, prostate, rectum and anal canal, urogenital diaphragm (ugd) Supports, micturition, stones in bladder, Ovarian cyst, enlargement, complications, fistula, Fissure, piles Cystoscopy, Tubectomy, Hysterectomy, cancer, supports of rectum.

4. **PERINEUM**
   Ischiorectal fossa, pudendal canal, perineal spaces Urogenital diaphragm, Testis, Vasdeferences male urethra, penis, perineal pouches, Ischiorectal hernia, extra vasation of urine Vasectomy

5. **MYOLOGY**
   Anterior abdominal wall, Rectus sheath, Psoas major, Quadratuslumborum, Thoracoabdomoinal diaphragm, pelvic diaphragm, Thoracolumbar fascia, perineal spaces and muscles Psoas abscess

6. **OSTEOLOGY**
   Pelvis, Lumbar vertebrae, Sacrum, curvatures of vertebral column
   Pelvis - types
   Various diameters, identification of different lumbar vertebrae, anatomical basis of disc prolapse, nerve compression Sacralization, Lumbarization.

7. **ARTHOLOGY**
   Movements of lumbar vertebrae, lumbosacral, sacroiliac, sacrococcgeal joints.

8. **ANGIOLOGY**
   Origin, course, termination, relations, branches and Applied anatomy of Portal vein Portosystemic communications in detail.
   Development Inferior Vena cava, Abdominal aorta, Internal iliac artery

9. **NEUROLOGY, LUMBAR PLEXUS, SACRAL PLEXUS**

IV. THORAX

1. **THORACIC WALL, THORACIC INLET**
   Boundaries and contents
   Thoracic Outlet, Boundaries and contents, muscles, Typical and Atypical intercostal space, Movements of respiration.

2. **MEDIASTINUM**
   Divisions and major contents Mediastinitis, Mediastinoscopy
   Superior and Posterior Mediastina. List of Structures Boundaries and contents:Superior mediastinal syndrome, Course, relations and branches of aorta, area of drainage Coarctation of aorta, aneurysm, developmental anomalies.

3. PLEURA

Pleural reflections, recesses, innervation importance of recessespleural effusion

LUNGS

Gross description including lobes, fissures and broncho pulmonary segments relations, blood supply, nerve supply Postural drainage, surgical importance, of bronchopulmonary segments, foreign body inhalation

4. PERICARDIUM AND HEART

Divisions of pericardium and sinuses referred pain
Pericardial effusion

HEART

Anatomical position, location, surfaces and borders, interior of all chambers, conducting system of heart; vessels of heart
Relations, nerve supply - patent foramen ovale, IV septum, over-riding aorta,referred pain, functional end arteries - coronaries PDA, Fallot's tetralogy, etc.

5. OSTEOLOGY

Identification and parts of Vertebrae, Ribs – Sternum, Vertebral column and curvatures of vertebral columns. Identification of T1, T9, T10, T11, T12, vertebrae and atypical ribs - 1, 2, 11, 12. relations, attachments, ossification Fracture ribs, flail chest, compression fracture of vertebra.

V) HEAD-FACE NECK

1. REGIONS AND ORGANS, FASCIAE OF THE NECK TRIANGLES OF NECK DEEP FASCIA OF NECK

Spaces and spread of infections, axillary sheath**,** Relations of contents, Damage to accessory nerve, sialogram, approach to Submandibular gland, bidigital palpation of submandibular gland**,** Dangerous area of face, squint surgical neck incisions, external jugular vein-air embolism, LN biopsy, JVP, pulse, Frey's syndrome.

GLANDS

Thyroid, Parathyroid, Parotid, Submandibular, sublingual, Pituitary Morphology, capsule, relations, nerve supply, blood supply, Applied anatomy and Face Muscles, nerve supply - blood supply.

Scalp, Palate, Tongue, Larynx, Pharynx, Orbit, Infratemporal Fossa, Eyeball, Styloid Apparatus, Nasal Cavity, PTerygopalatine Fossa, Ear- Internal Ear, Middle, Ear, External Ear, Meninges.

2. OSTEOLOGY

Identification, anatomical position, parts, foramina in the skull, structures passing through them, normabasalis, verticalis, frontalis, lateralis, occipitalis and interior of cranial cavity. Identification and side determination of separate bones.

Foetal skull; Mandible: Age changes Fontanellae, Dental formula

Fractures of the skull, Age of dentition, cervical rib, disc herniation

3. ARTHROLOGY

TM JOINT, Joints between cervical vertebrae Dislocation

4. MYOLOGY

Sternomastoid, Digastric, Mylohyoid, Hyoglossus, Suprahyoid, Infrahyoid muscles, Muscles of facial expression, mastication, larynx, pharynx, tongue, palate and Extra-ocular muscles Relations, development, Nerve supply, actions Facial nerve palsy nerve injuries.

5. ANGIOLOGY ARTERIES

Origin, parts, course, relations, branches of: Subclavian, Internal carotid, External carotid, Vertebral, Lingual, Superior thyroid, Facial, Maxillary Superficial temporal Sub-branches, distributions Subclavian steal syndrome, Subclavian-axillary anastomosis.

VEINS

External and internal Jugular veins, venous drainage of face.

VENOUS SINUSES

Names, locations, drainage, classification Emissary Veins, Cavernous Sinus, Lymphatic Drainage of Head Face Neck

6. NEUROLOGY

Cranial nerves, Nuclei, course, relations, branches, distribution,reflex pathways and applied anatomy, PLEXUS: Cervical, Brachial, Parasympathetic Ganglia, Cervical Sympathetic Chain.

VI) NEUROANATOMY

1. SPINAL CORD

Gross features: Extent (child / adult), enlargements, conusmedullaris, filumterminale, spinal meninges Tracts Ascending and Descending Spinal segments, vertebral correlation, significance of enlargements, nuclei of grey matter at upper and lower cervical, mid-thoracic, Lumbar and sacral levels Clinical correlation of lesions anomalies, lamination, syringomyelia, PID, tumours, TB, trauma, dislocation, myelography Transverse sections at the cervical, Thoracic, Lumbar and Sacral levels.

2. MEDULLA OBLONGATA

Gross features: Motor decussation: Sensory decussation:Inferior olivary nucleus Cranial nerve nuclei, Tuber cinereum, pontobulbar body, Order of neurons, Details of nuclei and organization of white matter medullary syndromes-Bulbar palsy, increased ICT, Arnold-Chiari syndrome, malformations.Cross sections of Medulla at the level of motor decussation, sensory decussation, inferior olivary muscles.

3. PONS

Cross sections at the level of:
Facial colliculus, Trigeminal nucleus

General features: Peduncles, Floor of the fourth ventricle Relations, Tumours, pontinehaemorrhage

4. CEREBELLUM

Gross features: Divisions, Lobes, relations, internal structure – connections of, cerebellar cortex and intracerebellar nuclei, white matter, Cerebellar Peduncles classification, Purkinje neuron, dysfunction, dysequilibrium, ataxia, hypotonia Nuclei: Names of nuclei and important connections Peduncles : Important tracts in the peduncles.
Functions : Of archicerebellum, paleocerebellum and neocerebellum

5. MIDBRAIN

General features : relations, contents of interpeduncular cistern, connections of red nucleus. Weber's syndrome, Benedikt's syndrome
T.S. at inferior colliculus, TS at superior colliculus

6. CEREBRUM

Cortex, White Matter, Basal Nuclei, Limbic Lobe

Surfaces, borders, major sulci, gyri, poles, lobes, major functional areas, interior - gray and white matter

Gray - cortex - granular / agranular, striate, Basal nuclei - names, White matter - classification with examples; Internal capsule and corpus callosum, Components of limbic lobe Handedness, Connections of limbic lobe

7. DIENCEPHALON

Dorsal thalamus Epithalamus Metathalamus Hypothalamus Subthalamus Boundaries, parts, relations (gross), cavity, major nuclei, gross connections

8. VENTRICULAR SYSTEM Lateral, IIIrd, IVth ventricles

Parts, boundaries, foramina, correlation with parts of brain Choroid fissure, recesses, Queckenstedt's test Hydrocephalus, VV shunt

9. BLOOD SUPPLY OF BRAIN

Circle of Willis, arteries, veins blood brain barrier, Hemiplegia

End arteries, CSF formation , subarachnoid space,

10. MENINGES

Cerebral and spinal meninges, folds of dura, contents of subarachnoid spaces, arachnoid villi and granulations, direction of flow of CSF, lumbar puncture Cisterns, Definition, terminology, cisterna magna cisternal puncture, Queckensted's test, vertebral venous plexus, choroid plexus. Extracerebral and intracerebral communication, CSF block, Epidural space.

C) MICROANATOMY

I) GENERAL HISTOLOGY

1. MICROSCOPE

Light microscope: Parts, magnification, resolution, Basics of Electron microscope Basics of Micro techniques, H and E staining

2. CYTOLOGY

Cell,Cytoplasmandnucleus, Cytomembranes, Unit membrane, Cell organelles. Golgi apparatus, Endoplasmic reticulum, Protein synthesis Mitochondrial DNA, mitochondrial myopathy

Specialisations of cell surface, Sarcoplasmic reticulum of muscle, Primary and secondary lysosomes, residual bodies, Effect of colchicine and anticytotic drugs on spindles preventing mitosis, Endocytosis, exocytosis, movement of microvilli; Cell mitotic activity Lysosomal storage disease

NUCLEUS –

Structure, nuclear envelope, chromatin, Barr body, nucleolus

3. EPITHELIUM

Definition, Classification, Structure of various types and subtypes of epithelia Nutrition, Renewal, Innervation

Metaplasia; Surface modifications, Cilia; Microvilli; Stereocilia; Cell junction and junctional complexes; Glands, Classification; Unicellular and Multicellular; Exocrine, Endocrine, Amphicrine. Exocrine: Simple, Compound; Apocrine, Merocrine, Holocrine, Paracrine; Tubular, alveolar, tubuloalveolar; Serous; Mucous; Mixed

Connective tissue, classification, structure, fibres, ground substance, loose areolar tissue, adipose tissue Glycosaminoglycans

Scurvy, oedema, inflammation

4. BONE AND CARTILAGE

Bone, Compact, Cancellous, Developing bone; ossification, Woven, lamellar bone Cartilage, Classification, types, Perichondrium, functions Growth: Interstitial, Appositional; Bone callus, Osteomalacia, Osteoporosis, Osteoma Chondroma

5. **MUSCLE**
   Skeletal muscle smooth muscle Cardiac muscle Intercalated disc, syncitium; Sarcomere, I and A bands, myofibrils, myofilaments,; Srcoplasmic reticulum Innervation, Red fibres, white fibres
   Hypertrophy, Hyperplasia, Rigor mortis, Myasthenia gravis

6. **NERVOUS TISSUE**
   Neurons, types; Neuroglia, types; Myelinated nerve fibre LS; T.S. Non-myelinated nerve fibre; Peripheral nerve; Nodes of Ranvier; Synapses;

7. **VESSELS**
   Large sized artery Medium sized artery, Arteriole; Capillary, Sinusoid; Medium sized vein; Atherosclerosis, Aneurysm, Infarcts, clotting

   LYMPHOID TISSUE
   T cells, B cells; Mucosa Associated Lymphoid Tissue; Humoral immunity, Cell mediated immunity; Lymph node section; Thymus, Spleen, Tonsil,Appendix
   Blood-thymus barrier, Open and closed circulation in the spleen Organ transplantation, Graft rejection, Autoimmune disease.

II) SYSTEMIC HISTOLOGY
Basic organization, salient features, Identification Structure and function correlation, individual features.

1. **Integumentary system**
   Skin – Types; Epidermis and dermis; various cells, Appendages of skin, Sensory organs of skin
   Renewal of epidermis, Albinism, melanoma, Acne

2. **ALIMENTARY SYSTEM**
   a) **Oral tissues**
      Lip, Tongue, taste buds, Papillae; Tooth, Salivary glands Striated duct, ion transport.

   b) **GI Tract**
      Basic organization - 4 layers; Oesophagus with glands Stomach - Fundus, Chief cells, Parietal cells, intrinsic factor; Stomach – Pylorus. Duodenum Brunner's glands; Small intestine - with Peyer's patch, Appendix, Large intestinePernicious anaemia, ulcer, gastritis, Hirschsprung's disease or megacolon.

c) Glands

Pancreas: Exocrine, islets of Langerhans; Liver, Hepatic lobule, portal lobule; portal acinus; Gall bladder
Liver as an endocrine gland
Diabetes mellitus, Cirrhosis of liver, liver regeneration, Chalones

3. RESPIRATORY SYSTEM

Epiglottis; Trachea, Lung, Bronchus, bronchiole, alveolar duct, sac, alveoli, pulmonary type I and II cells
spirally arranged bronchial smooth muscle
Bronchial asthma, Hyaline membrane disease, Heart failure cells

4. URINARY SYSTEM

Basic organization; Nephron - Parts, podocytes, Collecting system; Kidney - Cortex, Medulla Ureter; Urinary bladder, Spongy Urethra
Juxtaglomerular apparatus

5. MALE REPRODUCTIVE SYSTEM

Basic organization; Gonads, Ducts, Accessory glands; Testis; Epididymis; Vas deferens; Prostate; Penis
Stages of spermatogenesis Immotile sperm

6. FEMALE REPRODUCTIVE SYSTEM

Basic organization; Gonads, ducts, Accessory glands; Ovary - with corpus luteum; Fallopian tube; Uterus; Mammary gland Active, Passive, Placenta, umbilical cord
Stages of maturation of ovarian follicle, Phases of menstruation
Colostrum, IgA, Placenta : Maternal unit, Foetal unit, Umbilical cord*:* Wharton's Jelly

7. ENDOCRINE SYSTEM: PITUITARY; ADENOHYPOPHYSIS; Neurohypophysis; Thyroid; Follicular, parafollicular cells; Parathyroid; Chief cells, oxyphil cells; Adrenal; Pancreas; Testis; Ovary
Hypothalamo-pituitary Portal system Pheochromocytoma

8. NERVOUS SYSTEM

A. Central

Basic organization; Cerebrum; Cerebellum; Spinal cord; Cervical, Thoracic, Lumbar, Sacral,

B. Peripheral

Sensory ganglia; Autonomic ganglia (sympathetic ganglion); Peripheral nerve TS, LS.

SPECIAL SENSES :

1. **Visual:** Three coats of Eyeball Cornea; Sclerocorneal junction; Canal of Schlemmn Lens; Retina; Optic nerve, Eyelid, Keratoplasty, eye donation, glaucoma, retinal detachment

2. **Auditory:**
   Demonstration of Internal ear; Cochlea; Semicircular canals; Vestibule;

3. **Olfactory**
   Demonstration of olfactory mucosa

4. **Gustatory**
   Tongue with taste buds

D) DEVELOPMENTAL ANATOMY

I. GENERAL EMBRYOLOGY

i. **Introduction:** Stages of human development, phylogeny Ontogeny, Viability,
Terms of reference: e.g. Cranial, Rostral, Caudal, Dorsal, Ventral, Lateral, Medial, Median, Planes of section
The law of recapitulation, "Critical period", malformations, USG, Amniocentesis Chorionic Villus Biopsy, Fetoscopy, etc Teratology History of Embryology

ii. **Gametogenesis**: Cell division, Mitosis, Meiosis, Menstrual cycle other reproductive cycles, Spermatogenesis, Oogenesis , Germ cell Transport and Fertilisation, Sperm capacitation, Methods of contraception, Sex determination
Teratogenic influences; Fertility and Sterility, Surrogate motherhood; Social significance of "Sex-ratio",

iii. **Cleavage**, Blastocyst, Cytotrophoblast, Syncytiotrophoblast Implantation: Normal sites, Abnormal sites; Placenta praevia, Extra-embryonic Mesoderm and Coelom; Bilaminar disc - Prochordal plate "abortion"; Decidual reaction, Chorionic Gonadotrop ins - Pregnancy test

iv. Primitive streak Notochord, Trilaminar embryo, Neural tubeand its fate Neural crest cells- their fate, Development of somites, Intra-embryonic coelom, Foetal membranes :Chorionic villi, Amnion, Yolk sac, Allantois Umbilical cord
Congenital malformations, Nucleus pulposus, Sacrococcygeal teratomas, Neural tube defects, Anencephaly
Signs of pregnancy in the first trimester, Role of teratogens, Alphafetoprotein Levels

v. **Folding of the embryo:** Derivatives of germ layers, Thalidomide baby, Estimation of Embryonic Age – Superfoetation and Superfoecundation

vi. **Fetal membranes:** Formation, Functions, fate of: Chorion ;Amnion; Yolk sac; Allantois; Decidua; Umbilical cord; Placenta - Physiological functions;

Foetomaternal circulation, Placental barrier, Twinning: monozygotic, dizygotic Placental hormones, Uterine growth, Parturition, Estimation of fetal age

Types of cord attachments, Chorion villus biopsy and Amniocentesis; Uses of amniotic membranes, Trophoblastic tumours - Rh incompatibility, Haemolytic disease of newborn

II. SYSTEMIC EMBRYOLOGY

i) **Cardiovascular System** - Venous System; Heart - Chambers - Septa - Truncus - Aortic arches, Venous system, Inferior vena cava, Portal vein- Fetal circulation - Changes at birth, ASDs, VSDs, PDA, Fallot's Tetralogy.
Veins, abnormalities, Surgical corrections

ii) **The Respiratory System**: Development of Larynx, Trachea, Bronchi, Lungs; Tracheo-oesophageal Fistula
Malformations
Respiratory Distress Syndrome; Premature births

iii) **The Alimentary System:** Foregut: Oesophagus, Stomach, (Lesser sac); Duodenum - Hepatobiliary apparatus, Pancreas, Spleen, Portal vein; Midgut: Rotation and Fixation, Caecum and Appendix, Meckel's diverticulum; Hindgut : Cloaca; Rectum and Anal Canal
Malformation – Tracheo - oesophageal fistulae; Congenital Hypertrophic Pyloric Stenosis; Atresia; Omphalocele, Hernia; Malformations - Fistulae, Situs inversus; Nonrotation; Mixed rotation of gut.

iv) **The Urogenital System**, Development of Kidneys and Ureters; Cloaca – Urinary Bladder and Urethra; Suprarenal gland; Genital System - Testis and Ovary; Ducts and associated glands; External genital organs, Mesonephric and paramesonephric ducts, Uterine tube, Uterus and vagina
Congenitalmal formations; Ambiguous genitalia and Hermaphroditism;
Remnants and Vestiges of Ducts and Tubules.

v) **Integument:** Development of mammary gland, skin and appendages

vi) Pharyngeal arches, nerves, muscles, cartilage, development of face, palate, Pharyngeal pouches

vii) **Endocrine :** Glands, Adrenal, Thyroid, Parathyroid, Pituitary

viii) **The Nervous System**:
Neural Tube: Spinal Cord and Brain i.e., Forebrain, Midbrain and Hindbrain, Hypophysis cerebri; Neural Crest: Peripheral Nervous System Correlation Spina bifida; Anencephaly, Hydrocephalus, glaucoma; Coloboma iridis Myelination of tracts shortening of spinalcord, Neural Tube Defects.

Organs of The Special Senses - Eye and Ear
Eye- Eye ball, optic nerve, cornea, lens, retina, Retinal detachment;
Ear - Internal ear -; External and middle ear - anomalies of the Ear.

E) GENETICS

i) **Introduction** – Mendelism, Laws Genetic code
Evolution, Eugenics and Polygenic inheritance, Radiation and mutation, Sex chromatin, Population genetics

ii) **Cytogenetics**–
Structure and function of chromosomes, Cell cycle, Cell divisions,

iii) **Molecular genetics** (Normal)
Gene, Genetic code, Structure and types of DNA, Structure of RNA

iv) **Inheritance**: Single gene inheritance, Multifactorial in heritance, Polygenic inheritance, Mitochondrial inheritance, Pedigree charts with symbols Autosomal and sex linked inheritance.

GENETIC BASIS OF VARIATION :
Mutation, Polymorphism, Multiple allelism. Types, Factors influencing mutational load

DEVELOPMENTAL GENETICS :
Chromosomes; Lyon's hypothesis; Hermaphroditism and pseudohermaphroditism; teratogenesis Gonadal dysgenesis, Adrenogenital syndrome Androgen insensitivity Genetic Counselling Pedigree charting.

CHROMOSOMAL BASIS OF DISEASE:
Numerical, Structural abnormalities Down's, Cridu-chat, Turner's, Klinefelter's syndromes Dermatoglyphics, Genetic Counselling.

CONCEPT OF PRENATAL DIAGNOSIS
Maternal Serum Sampling; Fetal USG; Fetal Amniocentesis; Fetal Chorion Villus Sampling (cordocentesis); Foetoscopy Eugenics

F) RADIOLOGICAL ANATOMY

I) INTRODUCTION :

Principles of plain radiograms and CT scan.Identification of gross anatomical features in plain and contrast radiographs. *Identification of gross anatomical features in normal CT scan especially of the Thorax, Abdomen and Head-Face-Neck-Brain regions. Diagnostic procedures. Technical details (e.g. dye) are not necessary.*

I) UPPER LIMB – X-Ray of	**II) LOWER LIMB**
Shoulder region	Hip region
Arm	Thigh
Elbow region	Knee region
Forearm	Leg
Wrist and hand	Ankle region

III) ABDOMEN	**IV) THORAX**
Plain X-ray	Plain X-ray
Ba meal	Ba swallow
Ba meal follow through	Bronchogram
Ba enema	mediastinum
Oral cholecystogram	lung
Intravenous pylogram	Heart
Cystogram	Pleural recesses
Ascending pyelogram	
Abdominal Aortogram	
Hystero-salpingogram	
Myelogram	

V) HEAD-FACE	**VI) NECK**
X-ray skull plain	Plain X-ray cervical region
Carotid angiogram	
Vertebral arteriogram	
Ventriculogram	

CT, MRI OF WHOLE BODY

G)SURFACE ANATOMY

H) SURFACE ANATOMY :

1. UPPER LIMB

(BONY) LANDMARKS (PALPATION OF) :
Clavicle, Spine of scapula, Inferior angle, Coracoid process, Epicondyles of humerus, olecranon process of ulna; Head and styloid processes of radius and ulna, Heads of metacarpals knuckles), Pisiform, Hook of Hammate, scaphoid, Anatomical snuff box.

NERVES : *Mark, Ulnar nerve*
Ulnar nerve thickening in Leprosy

VESSELS *: Mark Axillary artery, Brachial artery, Radialartery*

2. LOWER LIMB

(BONY) LANDMARKS (PALPATION OF): Anterior superior iliac spine, Iliac crest, Tubercle of the iliac crest, Ischial tuberosity, Greater trochanter, Adductor tubercle, Head and neck of fibula, Lateral and medial malleoli, Tibial tuberosity, Subcutaneous surface of tibia, Patella

NERVES :
Mark Sciatic, Tibial, Common peroneal, Femoral, Obturator Thickening of common peroneal nerve in Leprosy

VESSELS :
Mark Femoral, Popliteal, Dorsalis pedis, Posterior tibial anterior tibial

- *Femoral artery*
- *Femoral vein*
- *Femoral nerve*
- *Popliteal artery*
- *Posterior tibial artery*
- *Anterior tibial artery*
- *Dorsalis pedis artery*
- *Great saphenous vein*

3. ***ABDOMEN***

(BONY) LANDMARKS (PALPATION OF) : Anterior superior iliac spine, Pubic Tubercle, iliac crest

OTHERS*:*

Enlarged liver, spleen, kidneys, Abdominal quadrants andregions; Position of superficial and deep inguinal rings; Renal angle; Mc Burney's point;

- *Marking of Plane and Quadrants*
- *Marking of cocaum*
- *Marking of appendix*
- *Marking of Abdominal Aorta*
- *Marking of Kidney*
- *Marking of inguinal ligament*
- *Saphenous opening*
- *Adductor tubercle*
- *Sciatic nerve*
- *Safe area for I. M injection*
- *Head, neck of fibula*
- *All bony prominences*

4. ***THORAX (BONY) LANDMARKS (PALPATION OF) :***

Sternalangle, Counting of rib spaces, locating thoracic spine

OTHERS :

Apex beat, Apices of the lungs, Triangle of auscultation Heart valves **-**

- *Reflections of pleura with tracing*
- *Margins of lings with borders*
- *Margins of pericardium*
- *Borders of heart*
- *Apex of lung*
- *Arch of Aorta*
- *Valve of heart –Tricuspid*
  Bicuspid
  Semilunar

5. HEAD FACE NECK - (BONY) LANDMARKS (PALPATION OF) :

Nasion, Glabella, superciliary arches, Inion, Mastoid process, Suprameatal triangle, Zygoma, Zygomatic arch, Angle of mandible, Head of mandible

OTHERS:

Thyroid gland, Cervical lymph nodes, (Horizontal and vertical), Midline structures in the neck.

c. HEAD FACE NECK

ORGANS: Parotid gland and duct Middle meningeal artery, facial artery Pterion, Bregma, Reid's base line, Suprameatal triangle Thyroid gland, Common carotid artery, External carotid artery, Internal carotid artery, Internal jugular vein, Trachea.

d. ***BRAIN***

Sites of Lateral sulcus, Cental sulcus, Median longitudinal fissure, Superior sagittal sinus, Sigmoid sinus, transverse sinus.

Topics Anatomy with radiology and Imaging in integrated teaching:

Sr. No	***Topic***	***Faculty***	***Hrs.***	***Session***
1	*Introduction to imaging modalities*	*Radiology*	*1*	*Theory*
2	*Introduction to cross sectional anatomy*	*Anatomy*	*1*	*Theory*
3	*Sectional anatomy of upper limb*	*Anatomy*	*1*	*Practical*
4	*Sectional anatomy of lower limb*	*Anatomy*	*1*	*Practical*
5	*Imaging of anatomy of extremities*	*Anatomy*	*1*	*Practical*
6	*Sectional anatomy of thorax, abdomen*	*Anatomy*	*1*	*Practical*
7	*Imaging modalities of thorax and abdomen*	*Radiology*	*1*	*Theory*
8	*Introduction to Sono anatomy*	*Radiology*	*1*	*Theory*
9	*Sectional anatomy of Brain*	*Anatomy*	*1*	*Practical*
10	*Sectional Anatomy of neck and face*	*Anatomy*	*1*	*Practical*
11	*Normal USG anatomy of abdomen and pelvis*	*Radiology*	*1*	*Practical*

All these hours will be adjusted in existing teaching hours after rescheduling of lectures and practical sessions.

Following value added sessions to enhance the competency of the MBBS students : -
1. Bioethics - 5 sessions in 1st MBBS

2. Language - During I and II MBBS

Each session will be of one hour duration.

H) UNIVERSITY EXAMINATION PATTERN

I) THEORY EXAMINATION PATTERN (IN ANATOMY)

ANATOMY PAPER 1- Includes gross anatomy, systemic histologyand systemic embryology of the region **above diaphragm**.

ANATOMY PAPER11 - Includes gross anatomy and development of respiratory diaphragm, gross anatomy systemic histology and systemic embryology of the region **belowdiaphragm**. It also includes General histology, General embryology, general anatomy and genetics.

NATURE OF EACH QUESTION PAPER

Subject	Group	Duration	Question Paper	Marks
			Pattern	
Anatomy	50 Marks	2 Hrs. 30 min.	**a) Sec-A(26)**	
			Q.1 One line answer questions Answer any 10 outof 12	10x1=10
			Q.2 Long answer question Answer any 2 out of 3	2x8=16
			b) Sec-B-(24)	
			Q.3 Short answer questions	*8x3=24*
			3. (a) - PBL question-	*1x3=3*
			Compulsory 3.(b) -any 7 out of 9	*7x3=21*
				Total - 50

PRACTICAL	
Practical - 40 Marks	**Marks**
Histology spotting – 10 slides	5
Slide discussion – 1 slide	5
Soft parts above diaphragm	10
Soft parts below diaphragm	10
Living Surface Anatomy and Radiology	10
Total	**40**

VIVA	
Viva - 20 Marks	**Marks**
Osteology - Axial skeleton	10
Appendicular skeleton	05
Embryology models	05
Total	**20**

INTERNAL ASSESSMENT TESTS				
I.	Ist Continuous Assessment Test – 20 marks			
II.	IIndContinuous Assessment Test – 20 marks			
III.	Terminal	**Theory**	**Viva**	**Practical**
	Marks	60	20	40
	Portion – Complete portion for the term			
IV.	IIIrd Continuous Assessment Test – 20 marks			
V.	Prelims	Theory	Viva	Practical
	Marks	100	20	40
	Portion – Whole			

PATTERN OF INTERNAL ASSESSMENT EVALUATION :

Internal assessment -3 continuous assessment tests in addition to Terminal and Preliminary Examinations will be conducted. For calculation of Internal Assessment, marks of 2 best tests out of 3 continuous assessment tests will be considered. Internal Assessment will be as follows:

	Theory	**Viva**	**Practical**
Terminal Examination	60	20	40
Prelims	100	20	40
Continuous			40(2x20)
Assessment Tests			
Journal + Attendance			*20*
Total	**200**		140
Internal Assessment	1/10		1/7
Calculation			
35 % marks of Internal	Assessment	Eligibility for	appearing for

University exam 50% marks of Internal Assessment – Passing