AIIMS, Kalyani

M. D. Medical Anatomy Curriculum

Table of Contents

I. Preamble:

Human Anatomy, is the vocabulary and grammar of Medical Sciences, threading through a Registered Medical Practitioner's career right from Undergraduate (UG) MBBS course throughout Clinical Practice in respective specialties. Therefore, the onus of training this cohort of Medical Teachers and Researchers in this course, is in translating the shades of Anatomical Sciences towards refining Patient Care, thus contributing to the improvement in National health indices.

Towards ensuring uniformity in all aspects of UG Academics in attaining the Competencies in the specialty of Medical Anatomy as a component of Indian Medical Graduate (IMG) attributes, the training and evaluation of the Medical Doctors pursuing Postgraduate (PG) Degree Course, Doctor of Medicine (M. D.) Medical Anatomy, also inculcates a Competencies Based Medical Education (CBME) design to achieve a uniform level of training of M. D. Medical Anatomy PG Students, appropriate 'Competencies' addressing respective 'Domains of Learning'.

Students seeking admission to Post Graduate Degree courses should have passed M.B.B.S. recognized by Medical Council of India or equivalent qualification and should have obtained permanent Registration from the Medical Council of India or any of the State/ Medical council or candidate should register the same within one month from the date of admission, failing which the admission of the candidate shall be cancelled.

The maximum number of students, for training for the award of M. D. Medical Anatomy, shall be determined by the facilities available in the Department in terms of Infrastructure, Faculty, Non-teaching staff and Clinical teaching material.

The student, after undergoing the training in a three years period, should be able to deal effectively with the needs of the medical community and should be competent to handle all problems related to the specialty of Anatomy and recent advances in the subject. The PG student should also acquire skills in teaching anatomy to Medical and Para-medical Students and be able to integrate teaching of Anatomy with other relevant subjects, while being aware of one's limitations.

The purpose of this document is to provide Teachers and Learners illustrative guidelines to achieve defined outcomes through learning and assessment.

II. Goal and Objectives of the M. D. Medical Anatomy Course

GOAL

To produce a globally acceptable and professional Anatomist, with optimal and updated attributes of a Medical Specialist, Teacher and Researcher, well grounded in basics and a lifelong learner.

OBJECTIVES

The three-year course is designed to train a Medical Doctor to become a competent Teacher and Researcher in Medical Anatomy, as applied to Anatomical Basis of Diseases and improving patient care.

At the end of three years of the training course, a post graduate in Anatomy should attain the following attributes through Specific Learning Objectives and Competencies.

Graduate Attributes

A Medical Doctor qualified in M. D. Medical Anatomy is one who:

1. Is aware of contemporary advances and developments in the field of Anatomy.
2. Has acquired the competencies pertaining to the subject of Anatomy that are required to be practiced at all levels of health system.
3. Is able to discharge responsibilities and participate in National Health Education Program.
4. Is oriented and practices the principles of research methodology.
5. Has acquired skills in educating medical and paramedical professionals.
6. Has acquired skills in effectively communicating with the students and colleagues from various medical and paramedical fields.
7. Has acquired skills of integrating Anatomy with other disciplines.
8. Has acquired qualities of a good Teacher in tune with innovations in Teaching Methodologies, Technology Enhanced Learning processes, and in evolving Pedagogical Spaces in the Online and Hybrid environment.
9. Has been able to demonstrate adequate management skills to function as an effective leader of the team engaged in Teaching and Research.
10. Has initiated and continues to acquire skills in Translational and Reverse Translational Anatomy towards improving Patient Care.

A. I. Competencies to be attained:

The following Competencies should be attained by the PG Student during this course:

1. Knowledge of Anatomy:

1.1. Acquire competencies in Gross and Surface Anatomy, Neuroanatomy, Embryology, Genetics, Histology, Radiological Anatomy, Applied Aspects, Clinical Anatomy, and recent advances in the above-mentioned branches of Anatomy.

2. Practical and Procedural skills:

2.1 Acquire mastery in dissection skills, embalming, tissue preparation, staining and museum preparation.

3. Training skill in Research Methodology:

3.1 Acquire skills in teaching, research methodology, epidemiology & basic information technology.

3.2 Acquire knowledge in the basic aspects of Biostatistics and research methodology.

3.3 Has knowledge to plan the protocol of a thesis, carry out review of literature, execution of research project and preparation of report.

3.4 Has ability to use computer applications Microsoft office (Microsoft word, excel, power point), Internet, Searching scientific databases (e.g. PubMed, Medline, Cochrane reviews).

3.5 Acquire skills in paper & poster preparation, writing research papers and Thesis.

3.6 Acquire skills in Translational and Reverse Translational Anatomy

4. Professionalism, Ethics, Attitude and Communication skills:

4.1 Develop honest work ethics and empathetic behavior with students and colleagues.

4.2 Acquire capacity of not letting his/her personal beliefs, prejudices, and limitations come in the way of duty.

4.3 Acquire attitude and communication skills to interact with colleagues, teachers and students.

4.4 Demonstrate leadership quality in leading Students, while inspiring them to take right path in achieving goals of Medical Education.

5. Teaching Anatomy:

5.1 Practicing different methods of Teaching-Learning-Assessments.

5.2 Making presentations of the subject topics and research outputs.

6. Problem Solving:

6.1 Demonstrate the ability to identify applied implications of the knowledge of Anatomy and discuss information relevant to the problem, using consultation, texts, archival literature and electronic media.

6.2 Demonstrate the ability to correlate the clinical conditions to the Anatomical/ Embryological/Hereditary factors.

6.3 Demonstrate the ability to evaluate scientific/clinical information and critically analyze conflicting data and hypothesis.

6.4 Demonstrate application of Translational and Reverse Translational Anatomy towards better patient care.

The specific practice-based competencies, to be attained, are as follows:

1. Gross Anatomy

1.1 Procurement, Embalming and Preservation of human cadavers.

1.2 Preparation of tanks for preserving bodies.

1.3 Dissection of cadaver.

1.4 Window dissection of important regions.

1.5 Preparation of specimens for museum with display of:

a) soft parts

b) models

c) charts

1.6 Preparation and preservation of human bones / skeleton as assigned by the Faculty.

2. Functional Histology and Histochemical methods

2.1 Preparation of common fixatives, embalming fluid, 10% formalin, Bouin's fluid etc.

2.2 Making paraffin blocks and section cutting and mounting.

2.3 Preparation of staining set for H and E staining and staining paraffin sections with the stain.

2.4 Making celloidin, araldite, gelatin blocks and their section cutting.

2.5 Processing hard tissues, decalcification of bones, block making and sectioning, preparation of ground sections of calcified bones.

2.6 Frozen section cutting on freezing microtome and cryostat.

2.7 Honing and Stropping of microtome knives, including sharpening by automatic knife sharpener.

2.8 Histology file in which LM and EM pictures of all the organs and tissues of the body should be drawn and a small description of salient features written.

2.9 Practical classes for staining of glycogen, mucopolysaccharides, alkaline phosphatase acid phosphatase, and calcium.

2.10 Functional Histology aspects

3. Cytogenetics

4.1 Preparation of media, different solutions, stains, etc.,

4.2 Preparation of buccal smear for sex chromatin,

4.3 Human chromosome preparation from peripheral blood and Karyotyping,

4.4 Banding techniques (G and C),

4.5 Making of Pedigree charts for study of patterns of inheritance,

4.6 Chromosomal Analysis,

4.7 Fluorescence In-Situ Hybridization (FISH),

4.7 DNA Isolation from peripheral blood lymphocytes,

4.8 Polymerase Chain Reaction (PCR).

4. Neuroanatomy

5.1 Dissection of brain and spinal cord for teaching and learning purpose.

5.2 Preparation of brain and spinal cord macroscopic and microscopic sections and identification of different parts in them.

5.3 Discussions on clinical problems related to neurological disorders and anatomical explanation for the same.

B. II. Domains of Learning

The detailed Domains of Learning, addressed in the competencies above, are as follows:

a. Cognitive domain

1. Describe gross anatomy of entire body including upper limb, lower limb, thorax, abdomen, pelvis, perineum, head and neck, brain and spinal cord.

2. Explain the normal disposition of gross structure, and their interrelationship in the human body. One should be able to analyze the integrated functions of organs systems and locate the site of gross lesions according to deficits encountered.
3. Describe the process of gametogenesis, fertilization, implantation and placenta formation in early human embryonic development along with its variation and applied anatomy.
4. Demonstrate knowledge about the sequential development of organs and systems along with its clinical anatomy, recognize critical stages of development and effects of common teratogens, genetic mutations and environmental hazards. One should be able to explain developmental basis of variations and congenital anomalies.
5. Explain the principles of light, transmission and scanning, compound, confocal, electron, laser, fluorescent and virtual microscopy.
6. Describe the microscopic structure of various tissues & organs and correlate structure with functions as a prerequisite for understanding the altered state in various disease processes.
7. Demonstrate knowledge about cell and its components, cell cycle, cellular differentiation and proliferation.
8. Describe structure, number, classification, abnormalities and syndromes related to human chromosomes.
9. Describe important procedures in cytogenetics and molecular genetics with its application.
10. Demonstrate knowledge about single gene pattern inheritance, intermediate pattern and multiple alleles, mutations, non-mendelian inheritance, mitochondrial inheritance, genome imprinting and parental disomy.
11. Describe multifactorial pattern of inheritance, teratology, structure gene, molecular screening, cancer genetics and pharmacogenetics.
12. Demonstrate knowledge about reproduction genetics, assisted reproduction, prenatal diagnosis, genetic counseling and ethics in genetics.
13. Explain principles of gene therapy and its applied knowledge.
14. Describe immune system and cell types involved in defense mechanisms of the body. Also explain gross features, cytoarchitecture, functions, development and histogenesis of various primary and secondary lymphoid organs in the body.
15. Demonstrate knowledge about common techniques employed in cellular immunology and histocompatibility testing.
16. Demonstrate knowledge about preliminary molecular diagnostic techniques.
17. Acquire knowledge about principles, processes and application of Cell Culture.

18. Demonstrate applications of knowledge of structure & development of tissue organ system to comprehend deviations from normal.
19. Demonstrate knowledge about recent advances in medical sciences which facilitate comprehension of structure function correlations and applications in clinical problem solving.
20. Explain collection, maintenance and application of stem cells, cryobanking and principles of organ donation from recently dead bodies.
21. Demonstrate knowledge about surface marking of all regions of the body.
22. Able to interpret various radiographs of the body, normal CT scan, ultrasound and MRI.
23. Demonstrate knowledge about different anthropological traits and use of related instruments.
24. Demonstrate knowledge about outline of comparative anatomy of whole body and basic human evolution.
25. Demonstrate knowledge about identification of human bones, determination of sex, age, and height for medico legal application of anatomy.

b. Affective domain

1. Demonstrate self-awareness and personal development in routine conduct. (Self-awareness)
2. Communicate effectively with peers, students and teachers in various teaching-learning-assessment activities. (Communication)
3. Demonstrate
   a. Due respect in handling human body parts & cadavers during dissection. (Ethics & Professionalism)
   b. Humane touch while demonstrating living surface marking in subject/patient. (Ethics & Professionalism)
4. Acquire capacity of not letting his/her personal beliefs, prejudices and limitations come in the way of duty. (Equity and social accountability)
5. Appreciate the issues of equity and social accountability while exposing students to early clinical exposure. (Equity and social accountability)

c. Psychomotor domain:

1. Identify, locate and demonstrate surface marking of clinically important structures in the cadaver and correlate it with living anatomy.
2. Acquire mastery in dissection skills, embalming, tissue preparation, staining and museum preparation.

3. Locate and identify clinically relevant structures in dissected cadavers.
4. Locate and identify cells & tissues under the microscope, using routine and special stains.
5. Identify important structures visualized by imaging techniques, specifically radiographs, Ultrasonography, Computerized Tomography (CT) scans and Magnetic Resonance Imaging (MRI).
6. Demonstrate various movements at the important joints and actions of various groups of muscles in the human body.
7. Demonstrate anatomical basis of common clinical procedures expected to be performed by a basic medical doctor.
8. Acquire mastery in Cytogenetic Techniques.
9. Demonstrate different methods of teaching-learning and make presentations of the subject topics and research outputs.

III. Syllabus

An M. D. Medical Anatomy Postgraduate Student should have attained in-depth knowledge and competencies in the following sub-divisional components of Anatomical Sciences.

Section 1 – Gross Anatomy

Gross Anatomy of entire body including upper limb, lower limb, thorax, abdomen, pelvis, perineum, head and neck, brain and spinal cord.

Section 2 – Developmental Anatomy

1. General embryology: gametogenesis, fertilization, implantation and placenta, early human embryonic development.
2. Systemic embryology: development of organ systems and associated common congenital abnormalities with teratogenesis.
3. Physiological correlations of congenital anomalies.

Section 3 – Microanatomy, Histology and Histochemistry

a. Cell Biology:

i. Cytoplasm – cytoplasmic matrix, cell membrane, cell organelles, cytoskeleton, cell inclusions, cilia and flagella.
ii. Nucleus – nuclear envelope, nuclear matrix, DNA and other components of chromatin, protein synthesis, nucleolus, nuclear changes indicating cell death.
iii. Cell cycle – mitosis, meiosis, cell renewal.
iv. Cellular differentiation and proliferation.

b. Microscopic structure of the body:

i. Principles of light, transmission and scanning, electron, fluorescent, confocal and virtual microscopy.
ii. The systems/organs of body – Cellular organization, light and electron microscopic features, structure - function correlations, and cellular organization.
iii. Functional Histology aspects

c. Histochemistry:

i. Definition, principles and application of Immunohistochemistry.
ii. Definition, principles and application of Enzyme Histochemistry.

Section 4 – Neuroanatomy

1. Brain and its environment.
2. Development of the nervous system.
3. Neuron and Neuroglia.
4. Somatic sensory system.
5. Olfactory and Optic pathways.
6. Cochleovestibular and Gustatory pathways.
7. Motor pathways.
8. Central Autonomic pathways.
9. Hypothalamo-hypophyseal system.
10. Limbic system.
11. Basal ganglia.
12. Reticular system.

13. Cross Sectional anatomy of brain and spinal cord.
14. Applied aspects.

Section 5 – Medical Genetics

1. Human Chromosomes – Structure, number and classification, methods of chromosome preparation, banding patterns.
2. Chromosome abnormalities.
3. Autosomal and Sex chromosomal abnormalities and syndromes.
4. Molecular and Cytogenetics.
5. Single gene pattern inheritance.
6. Intermediate pattern and multiple alleles.
7. Mutations.
8. Non- Mendelian inheritance, Mitochondrial inheritance, Genome imprinting, parental disomy.
9. Multifactorial pattern of inheritance.
10. Teratology.
11. Molecular Screening.
12. Cancer Genetics.
13. Hematological malignancies.
14. Pharmacogenetics.
15. Reproduction Genetics – Male and Female Infertility, Abortions.
16. Assisted reproduction.
17. Preimplantation genetics.
18. Prenatal diagnosis.
19. Genetic Counseling and Ethics of Genetics.
20. Principles of Gene therapy and its applied knowledge.

Section 6 – Immunology

1. Immune system and the cell types involved in defense mechanisms of the body.
2. Gross features, cytoarchitecture, functions, development and histogenesis of various primary and secondary lymphoid organs in the body.
3. Biological and clinical significance of the major histocompatibility complex of man including its role in transplantation, disease susceptibility/ resistance and genetic control of the immune response.

4. Common techniques employed in cellular immunology and histocompatibility testing.
5. Molecular hybridization and Polymerase Chain Reaction (PCR) technology in immunology research.
6. Mechanism of antigen presentation, structural and functional relevance of the T cell receptor.
7. Genetic control of the immune response.
8. Molecular basis of susceptibility to disease.

Section 7 – Living and Surface Anatomy

1. Surface marking of all regions of the body.
2. Correlation of internal viscera to surface, for diagnostic and interventional planning.

Section 8 – Radiology and Imaging Sciences

1. Interpretation of normal radiographs of the body including special contrast procedures like barium studies, cholecystography, pyelography, salphingography.
2. Normal Ultrasound, CT scan and MRI correlation of anatomical structures.

Section 9 – Applied Anatomy

1. Clinical correlations of structure and functions of human body.
2. Anatomical basis and explanations for clinical problems.
3. To comprehend deviations from normal and applications of knowledge of Anatomical variations.

Section 10 – Recent Advances

1. Recent advances in medical sciences which facilitate comprehension of structure function correlations and applications in clinical problem solving.
2. Collection, maintenance and application of stem cells and cryobanking.
3. Principles of organ donation from recently dead bodies.

Section 11 – History, Evolution and Comparative Anatomy

1. History of Anatomy education and practices.
2. Basic human evolution and phylogeny.
3. Outline of comparative anatomy of the whole body.

Section 12 – Anthropology

Different anthropological traits, Identification and use of Anthropological instruments.

Section 13 – Forensic Medicine

Identification of human bones from their remains and determination of sex, age, and height, for medico legal application of Anatomy.

Section 14 – Translational Anatomy

1. Comprehension and application of translating Anatomical Sciences to bedside/ patient care.
2. Comprehension and application of reverse Translation, by using patient issues to engineer solutions though better understanding of Anatomy, by Cadaver dissection.
3. Comprehend Principles and Applications of Artificial Intelligence, Machine Learning, Augmented Reality, Virtual Reality and Biomedical Visualization, for conceptual Anatomy in patient care.
4. Explore Interdisciplinary Anatomy applications in Yoga, Fine arts, Martial Arts, Biomechanics, Sports Medicine, Aviation Medicine and Robotics.

Section 15 – Pedagogy

1. Acquiring optimal functioning in effective teaching-learning-assessment processes in Undergraduate Anatomy Academics, as applied to Medical Sciences.
2. Acquiring and comprehending the curricular design and implementation of Anatomy academics, in UG and PG courses.

3. To comprehend and utilize good practices of Medical Education, concepts of Pedagogical Spaces and Authentic Learning Environment, in collaboration with the Faculty Development Programs (FDP) of the institute Medical Education Unit (MEU).

IV. Teaching-Learning-Evaluation Methods

Facilitated learning of core anatomical concepts should be conducted in the form of:

1. Lectures
2. Small group discussion
3. Demonstrations
4. Journal club presentations
5. Seminar presentations
6. Tutorials
7. Computer aided
8. Self-directed

Hands on training should be conducted in the following areas:

1. Dissection skills
2. Histology processing & slide preparation
3. Museum specimen preparation
4. Embalming & preservation techniques
5. Sectioning & display techniques in Neuroanatomy
6. Basic Cytogenetic procedures
7. Foetal dissection & basic Embryology
8. Experimentations involving animal tissues & chicken eggs

Training in teaching and assessment

1. For undergraduate teaching and demonstration.
2. Formulating OSPE.
3. Question paper setting.
4. Preparing teaching modules.
5. Organizational training – planning integrated seminars for undergraduates.

In detail, the students will participate in the following types of sessions.

1. Didactic Lectures

Topics in gross, surface and cross-sectional anatomy, microanatomy, embryology, neuroanatomy, histochemistry, and genetics taught by faculty members.

2. Training in Communication Skills
   Journal club, seminars, symposia, demonstrations, tutorials, lectures and quizzing, with active participation.
3. Hands-on experience
   Techniques in microanatomy, neuroanatomy, gross anatomy, embryology, histochemistry, genetics, microscopy, Embalming and preservation of cadavers
4. Teaching
   Participate in the teaching and training program of undergraduate Medical students and Interns.
5. Integration
   Horizontal and Vertical Integration with other branches of Medicine, through rotation postings, for translational and reverse translational Anatomy.
6. Medical Educational Technology
   Preparation of Audio-Visual aids for teaching, appropriate for offline, online and hybrid learning.
7. Posters /manuscripts for presentation in conferences/workshops and publication in journals.
8. Participation in formulating evaluation methods; setting objective questions, Short Answer Questions, Multiple Choice Questions and Objective Structured Practical Examination (OSPE).
9. Prepare teaching modules.
10. Prepare Museum specimens.
11. Participation in organization of symposia/workshops.
12. Explain and interpret normal radiological anatomy and sectional anatomy of the human body as studied by various imaging techniques.
13. Comprehend and demonstrate surface and living anatomy of the human body.
14. Relate forensic anatomy to the study with medico-legal aspects of bone in particular.
15. Explain the general principles of Anatomy Act and Organ Transplantation Act.
16. Comprehend ethical aspects of biomedical research.
17. Comprehend the basis of disposal of biomedical waste.
18. Log Book
    Every student should maintain a logbook in which a record of the practical exercises completed should be entered. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

19. A postgraduate student of a postgraduate degree course in broad specialties/ super specialties would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/ accepted for publication/ sent for publication during the period of his postgraduate studies so as to make one eligible to appear in the postgraduate degree examination.
20. Actively participate in e-learning activities.

Mandatory parameters for effective conduct of PG Anatomy Academics

1. Faculty: The Department shall have a minimum of three full time faculty members, of whom one shall be a Professor, one Associate Professor and one Assistant. Professor, possessing the prescribed qualification and experience.

   Of these faculty members, only those who possess a total of eight years teaching experience, out of which at least five years teaching experience as Assistant Professor/ Lecturer gained after obtaining Post Graduate degree, shall be recognized as Post Graduate teachers.

   The number of Faculty members required must be in anticipation of number of PG Students intake planned by the Institute.

   Eligibility for being designated Postgraduate Guide:

   A teacher in a Medical College or Institution having a total of 5 years teaching experience as Assistant Professor and above after obtaining post-graduation degree in the concerned broad specialty subject, shall be recognized as Post Graduate Guide in that specialty, provided the Department has been recognized/Permitted for conducting Postgraduate course in that subject.

2. Teacher Student Ratio: The teacher student ratio shall be 1:3 for Professor, 1:3 for Additional Professor, 1:2 for Associate Professor and 1:1 for Assistant Professor, as per the table below.

Teacher: Student Ratio

Designation	1PG/ Year	2PGs/ Year	3PGs/ Year
Professor/ Additional Professor	Never supervised any MD/MS student as recognized PG guide	Supervised 1 MD/MS student per year for at least two years	Five years as Professor + supervised at least two MD/MS student thesis per year for three years as Professor + at least one eligible research publication in the past three years as Professor + The department must be running postgraduate degree course for minimum of ten years.
Associate Professor	Never supervised any MD/MS student as recognized PG guide	Supervised 1 MD/MS student per year for at least two years + At least one eligible research publication in the past two years as Associate Professor + The Associate Professor shall be working as Unit Chief	
Assistant Professor	Meets eligibility criteria for promotion as Associate Professor but not yet promoted to that post and is eligible to be a PG guide.		

3. Infrastructure: Anatomy department should be having the following functioning laboratories, independently, or as a specialty collaborator in a Multi-Disciplinary Research Unit (MDRU).

1. Histology.
2. Neuroanatomy.
3. Cytogenetics.
4. Radiological and Sectional Anatomy.
5. Plastination.
6. Animal experimentation and cell culture.
7. Teratology / Developmental Anatomy.
8. Surgical Anatomy and Skill training – Cadaveric Skill Lab.
9. Immunology and Molecular Biology.
10. Electron Microscopy/ Fluorescence/ Confocal and other forms of advanced microscopy.

Detailed Institutional Requirements with ongoing Undergraduate Course (MBBS)

1. Facilities and space in accordance with the Minimum Requirements for annual M.B.B.S. Admissions Regulations, shall be in place at the time of application for starting the course or increasing seats.
2. In-Patient Facilities: A Broad specialty Department to be recognized for training of Post Graduate students, shall have minimum beds as mentioned in the Minimum Requirements for Annual MBBS admissions Regulations.
3. Out-Patient Facilities: There shall be adequate space and sufficient number of consultation cubicles available in the Out-Patient Department.
4. Out-Patient load must be according to the Minimum Requirements for Annual MBBS Admissions Regulations.
5. Specialty Clinics shall also be available for the training of post- graduate students in the relevant broad and super specialty department where such Postgraduate students will be posted.

V. Three years schedule

The period of training, for the award of Doctor of Medicine (M. D.) Medical Anatomy, will be three (3) completed years, i.e. six (6) completed semesters, including period of examination. An academic semester shall mean six month's training period**.** The Academic calendar shows the broad distribution of the Curriculum.

Sl. No.	Name of the Program	Duration	Period	Remarks
1.	Orientation	1 week	1st week of joining	
2.	Thesis protocol presentation and approval in front of Research Committee		Within 3 months of Registration in the course	To be approved by Ethics Committee
3.	Research Methodology with Evaluation	1 week	During 1st year	
4.	Evidence Based Medicine Module	1 week	During 1st year	
5.	1st Formative Assessment	1 + 1 day	At 6 months (End of 1st semester)	
6.	Research paper writing Workshop	2 days	During 1st year	
7.	2nd Formative Assessment	1T + 1P days	End of 1st year (2nd sem.)	
8.	Mid-term Thesis evaluation	1 day	At 1 ½ year	
9.	3rd Formative Assessment	1T + 1P days	At 1 ½ year (3rd sem.)	
10.	4th Formative Assessment	1T + 1P days	End of 2nd year (4th sem.)	
11.	Paper writing out of Thesis		During 2nd and 3rd year	
12.	Final Thesis submission		6 months before final examination	
13.	5th Formative Assessment	1T + 1P days	2 ½ years (5th sem.)	
14.	Pre-final Assessment	2T + 2P days	2 months before end of 3rd year	
15.	Final MD Examination	4T + 2P days	End of 3rd year (6th Term)	

(T- Theory; P- Practical)

The student will also take part in Institutional, and external, Continuing Professional Development (CPD) programs, to keep abreast with evolving trends in Academic content, modes of delivery, assessment methodologies and application towards patient care.

Note: In addition to the activities planned in the Academic calendar, the following should be a guideline for effective spacing of domains' load.

1. The 1st year MD Student should actively participate, as a trainee and facilitator, in the conduct of the 1st MBBS Anatomy academics.

   The PG Student shall compulsorily enroll and complete the Research Methodology Course conducted online by Indian Council of Medical Research (ICMR)- National Institute of Epidemiology (NIE) through SYAWAM NPTEL portal, within one year of their joining and must clear the exit examination of the course, to be eligible for appearing for the Final examination.

   In the 2nd Term, the PG Student shall compulsorily document those Anatomy Competencies aligned and integrated in the disciplines of Radiodiagnosis, General Surgery and Dermatology, while attaining Objectives specified in the Program list below, in the logbook while reflecting on them to generate Clinical Problem/ Research Statements towards teaching and research.

   The Formative assessments, during and at the end of 1st year, will test acquisition of Undergraduate level learning outcomes by the MD Student.

2. The 2nd year MD Student, during the 3rd and 4th Terms shall compulsorily document those Anatomy Competencies aligned and integrated in the disciplinesbelow, while attaining Objectives specified in the Program list below, in the logbook while reflecting on them to generate Clinical Problem/ Research Statementstowards teaching and research. This is for better Clinical Correlation, Applied Anatomy exchanges and translating Anatomy towards better patient care and community health.
   1. Ophthalmology
   2. Oto-rhino-laryngology
   3. Orthopedics
   4. Obstetrics and Gynecology
   5. Surgical Gastroenterology
   6. Neurology and Neurosurgery
   7. Cardiology and Cardiothoracic Surgery
   8. Urology
   9. Plastic Surgery

10. Pediatric Surgery

(Reciprocal rotation of PG Trainees/ Students/ Residents from such disciplines will facilitate more efficient exchange of applied aspects).

The formative assessments during 2nd year will test areas of Integrated and Applied Anatomy.

General Objectives of Clinical Alignment and Integration

Regional and Systemic Alignment and Integration of Anatomical Sciences with Broad and Super Specialties, as an essential best practice in Postgraduate Anatomy studies, should be implemented for generating actionable points of Research as an effective step in Translating Anatomical Sciences to actual measurable and reproducible patient care parameters of everyday existence, while bringing patient problem statements back to the Anatomy Labs for exploring solutions towards better healthcare outcomes, through reverse translation.

1. To develop integrated approach in teaching-learning-assessment processes.
2. Applying anatomical basis in clinical examination and procedures.
3. To incorporate the learning experience, from Clinical material and exchanges, in conceptual learning and translational research.
4. To realize that Anatomy is the thread and an integral part, of the entire Medical Education and Career, towards better healthcare of the society and nation.

Program of Alignment and Integration

Sl. No.	Specialty	Academic Semester	Objectives to be achieved (at the end of the posting, the student should be able to)
1.	Biostatistics/ Biomedical Research	1st	1. Formulate hypothesis for research. 2. Calculate sample size for any research. 3. Use tools for literature review. 4. Perform basic statistical analysis like mean, standard deviation, chi square, student t test. 5. Draft a project proposal.

2.	Radiodiagnosis, Imaging Sciences and Interventional Radiology	2nd	1. Read a normal x ray of all regions of the human body in all views. 2. Identify normal skeletal features visualized in x-rays of all regions. 3. Enumerate different contrast X- rays; identifying anatomical basis of their interpretation. 4. Read a normal CT & MRI film of all the sections of the human body with identification of anatomical structures. 5. Identify different anatomical structures through ultrasound. 6. Describe different basic radiological techniques
3.	General Surgery	2nd	1. Function as a clinical anatomist with a surgical team during planning of common general surgical procedures involving viscera and bodily regions such as – hernia and anterior abdominal wall, hydrocele, varicose veins, appendix, gall bladder, stomach, rectum, prostate, breast, chest wall, etc. 2. Identify anatomical structures in endoscopic view. 3. Initiate comprehending laparoscopic Anatomy of the body cavities, regions and viscera.
4.	Dermatology	2nd	1. Apply anatomical knowledge in physical exam, surgical procedures (mole removal), evaluation of injury during trauma (e.g. wounds, burns). 2. Comprehend anatomical basis of chronic lesions and carcinogenesis.

5.	Ophthalmology	3rd	1. Apply anatomical knowledge and identify different structures encountered in operative or clinical procedures of the orbit and eyeball. 2. Comprehend anatomical basis of functional alterations or clinical presentations.
6.	Oto-rhino-laryngology	3rd	1. Apply anatomical knowledge and identify different structures encountered in operative or clinical procedures including endoscopy. 2. Comprehend anatomical basis of functional alterations or clinical presentations.
6.	Orthopedics	3rd	1. Apply the knowledge of anatomy in orthopedic setting. 2. Function as a clinical anatomist; ascertain relevance of anatomical basis in routine operative procedures. 3. Comprehend anatomical basis of functional alterations or clinical presentations. 4. Review joint functions and biomechanics.
7.	Obstetrics and Gynecology	3rd	1. Apply Anatomical review of clinical examination, procedures and planning part of operative interventions. 2. Develop inquisitiveness to explore possible justification of developmental defects in babies or gestational tissues.
8.	Anaesthesiology	3rd	1. Comprehend Anatomical basis of airway management. 2. Function as Clinical Anatomist and review Anatomical knowledge of Regional Anaesthesia, including peripheral nerve and Plexus blocks.

Sl. No.	Super Specialty	Academic Term	Objectives to be achieved (at the end of the posting, the student should be able to)
1.	Surgical Gastroenterology	4th	1. Comprehend anatomical basis of surgical procedures. 2. Apply Anatomical review of difficult area explorations involving pelvis and retropubic area. 3. Explore, comprehend and correlate laparoscopic anatomy of the body cavities, regions and viscera.
2.	Neurology and Neurosurgery	4th	1. Comprehend the anatomical basis of neurological disorders. 2. Comprehend the anatomical basis of neuro surgical interventions.
3.	Cardiology and Cardiothoracic Surgery	4th	1. Comprehend the anatomical basis of cardiovascular disorders, and diagnostic procedures. 2. Comprehend the anatomical basis of cardiothoracic and vascular interventions. 3. Comprehend the anatomical basis of microsurgeries.
4.	Urology	4th	1. Comprehend anatomical basis of urological procedures. 2. Apply Anatomical review of difficult area explorations involving pelvis and retropubic area.
5.	Plastic Surgery	4th	1. Apply and comprehend the anatomical basis of plastic surgical principles of skin flap, muscle flap and vascular pedicle-based reconstructions. 2. Comprehend and review Anatomical Correlation of Surgeries for Congenital malformations like cleft lip and palate.

6.	Pediatric Surgery	4th	1. Apply and comprehend the embryological basis of congenital anomaly correction surgeries. 2. Comprehend and review Pediatric Anatomy.

1. The list of diagnostic or interventional procedures, per broad and super specialty, must reflect domain competencies and attributes expected to be optimally attained at the end of the M. D. Medical Anatomy degree course.
2. Exhaustive Annexures A, B, C and D, with the logbook, while listing Competencies in Gross Anatomy, Histology, Embryology and Neuroanatomy respectively, are indicative and shall be open to dynamic review and updates in content and modes of implementation.
3. Participation and completion in Anatomy Competencies integrated with clinical Specialties, must be documented in a dynamic Logbook, and signatures obtained from Head/ Unit Head of concerned Clinical Broad/ Super Specialty and Thesis guide of the student, before submitting to Head of Anatomy Department for final approval of the student's eligibility to appear in the MD final examination.
4. The scope for converting the dynamic Logbook into an E-portfolio should be explored once sufficient and mandatory feedback is obtained from at least three (3) batches of PG students, while generating actionable problem statements from Clinical exchanges, and collaborating in formulation of Entrustable Professional Activities (EPAs) for Clinical Skill Acquirements by PG students of Clinical Specialties. Thus, once in three years, preferably, curriculum updates shall be undertaken.
5. The 3rd year MD Student should engage more in scheduled Undergraduate Teaching- learning-Assessment processes, while completing and submitting Thesis, Log Book and PG Student Performance Appraisal form, and ensure fulfilling essential criteria for appearance in Final MD Examination.

Scheme of Teaching – Learning Activities

Academic Year	Activities
1st	A. Regular Core Anatomy learning 1. Dissection and theory 2. Basic Histology 3. Basic Embryology 4. Basic Neuroanatomy 5. Embalming 6. Comparative anatomy B. Research Methodology Course C. Submission of Thesis topic, with synopsis. D. Participation in internal assessment activities.
2nd	A. Regular Core Anatomy learning 1. Genetics 2. Special staining 3. Molecular Biology and Immunology 4. Anthropology and anthropometry 5. Dissection 6. Imaging anatomy 7. Living and surface anatomy 8. Forensic anatomy B. Aligning and Integrating Anatomy Competencies with Objectives of Clinical Specialties. C. Participation in internal assessment activities.
3rd	A. Regular Core anatomy learning 1. Dissection 2. Special microscopy 3. Applied anatomy B. Completing and submitting thesis. C. Participation in internal assessment activities.

All candidates joining the Post Graduate training program shall work as full-time Junior Residents, with stipend as admissible under rules, during the period of training,

attending not less than 80% (Eighty percent) of the training during each calendar year, and given full time responsibility, assignments and participation in all facets of the educational process.

VI. Assessment

A. Formative Assessment

Formative assessment should be continual and should assess medical knowledge, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

During the three-year training period:

1. A record of all theoretical, practical and experimental work done by the post graduate student and its assessment will be kept and shall be available for examiners at the time of the final practical and viva voce examination.
2. There will be periodical examinations during the course of training. The prefinal theory and practical examination will be conducted by the faculty of the concerned college. During last six months the post graduate student will have weekly assessment tutorials conducted by the faculty and all activities will be evaluated.

Scheme for Continuous (Formative assessment)

Sl. No.	Activity	Particulars
1.	Logbook record (as a record of all academic and research work)	1. For assessment of Anatomical knowledge, procedural skills, professionalism, self-directed learning, research and ability to work as a part of the department. 2. The logbook should be presented during exam. 3. Mention new skill acquired and using it. (Making a model, museum specimen, metaphase spread and karyotype, special staining, molecular techniques, animal experimentation)

2.	Assessment of Continuous learning on day-to-day basis (encompassing all the domains of learning)	1. Seminar presentation (integrated/ departmental) 2. Conference presentation 3. Attending CMEs/ workshop/ training 4. Publication 5. Research methodology training with research Ethics 6. Medical education training 7. Self-directed learning 8. Professionalism 9. Communication skills & Team working skills

Quarterly assessment during the MD training period should be based on a continual evaluation of Student performance in the following activities.

1. Journal based / recent advances in the subdivisions of Anatomy.
2. Journal based/ recent advances in teaching-learning-assessment methodologies.
3. Patient based / Laboratory or Skill based learning.
4. Self-directed learning and teaching.
5. Departmental and Interdepartmental learning activities.
6. External and Outreach Activities / CPDs.

The above activities should be marked on a PG Student Performance Appraisal form, and after completion should be submitted, as a component of Logbook, for appearing in the Final Examination.

The Log Book shall be prepared in collaboration with the integrating disciplines to reflect regular participation, with completion and attainment of intended competencies/ outcomes, and be approved by the competent authority.

Research Methodology Course: MD candidates shall be required to attend the Research Methodology Course, conducted online by Indian Council of Medical Research (ICMR)- National Institute of Epidemiology (NIE) through SYAWAM NPTEL portal, within one year of their joining and must clear the exit examination of the course, to be eligible for appearing for the Final examination.

Additional mandatory courses, as notified from time to time, may also be subject to the same conditions.

Eligibility to appear in Final M.D. Examination:

1. Overall Attendance of $\geq$ 80%.
2. Internal Assessment of $\geq$ 50%

3. Submission of completed thesis with approval signatures.
4. Atleast one poster presentation, one paper presentation at a national/ state conference, one research paper published/ accepted for publishing during the period of post graduate studies.
5. Successful completion of Basic Course in Biomedical Research.
6. Submission of updated Logbook with approval signatures.

PG Student Performance Appraisal Form

Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : From …… to ……

Sl. No.	Particulars	Not Satisfactory 1 2 3	Satisfactory 4 5 6	More than Satisfactory 7 8 9	Remarks
1.	Journal based / recent advances in the subdivisions of specialty				
2.	Journal based/ recent advances in teaching-learning-assessment methodologies				
3.	Patient based / Laboratory or Skill based learning				
4.	Self-directed learning and teaching				
5.	Departmental and interdepartmental learning activities				
6.	External and Outreach Activities / CPDs				
7.	Thesis/ Research work				
8.	Logbook maintenance				

Publications: Yes/ No

Remarks*_____

_____

(*Remarks: Any significant positive or negative attributes of a PG student to be mentioned. For score less than 4 in any category, remedial measures must be suggested, and student revaluated. Individual feedback to postgraduate student is strongly recommended.)

_____ _____ _____

Signature of Assessee Signature of External Examiner/ Observer Signature of HoD

Schedule for Formative Assessment

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover Professionalism and Communication Skills. The Internal Assessment should be conducted in Theory and Practical examination. A total of five (5) Internal Assessments and one (1) Prefinal examination should be conducted.

I. Theory Pattern

Sl. No.	Period	Paper	Marks	To qualify
1.	At the end of 6 months	1 paper	100 marks	>=50%
2.	At the end of 1st year	1 paper	100 marks	>=50%
3.	At the end of 1 ½ years	1 paper	100 marks	>=50%
4.	At the end of 2 years	1 paper	100 marks	>=50%
5.	At the end of 2 ½ years	1 paper	100 marks	>=50%
6.	Prefinal Examination	4 papers of 100 marks each	400 marks	>=50% totally; >=40% in individual papers
Grand Total			900 marks	>=50%

II. Practical Pattern

Sl. No.	Period	Pattern	Marks	To qualify
1.	At the end of 6 months	Practical Exercises	100 marks	>=50%
2.	At the end of 1st year	Practical Exercises + Viva	100 + 100 = 200 marks	>=50% in each
3.	At the end of 1 ½ years	Practical Exercises	100 marks	>=50%
4.	At the end of 2 years	Practical Exercises + Viva	100 + 100 = 200 marks	>=50% in each
5.	At the end of 2 ½ years	Practical Exercises	100 marks	>=50%
6.	Prefinal Examination	Practical Exercises + Viva	300 + 100 = 400 marks	>=50% in each
Grand Total			1100 marks	>=50%

B. Summative Assessment

The post graduate summative examination will consist of three components.

1. Submission of Thesis work
2. Theory Exanimation
3. Practical and Oral Viva Voce Examination

The summative Assessment should be conducted in the following pattern, detailed below.

Sl. No.	Component	Marks
1.	Theory	4 Papers each of 100 Marks = 400 Marks
2.	Practical	Practical 300 + Viva 100 = 400 Marks

Details of Components

1. Thesis

Every PG Student shall carry out work on an assigned research project under the guidance of a recognized Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis/ Dissertation. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the student to techniques of research, critical analysis, acquaintance with the latest advances in medical sciences and the manner of identifying and consulting available literature.

Thesis protocol must be submitted within three months of registration, and maximum extension of two months may be given by approval of competent authority. If any candidate wants to change the thesis protocol, it may be permitted within a year from the date of registration of the candidate. However, if the period exceeds one year, the Dean may permit the same at her/his own discretion on the recommendation of the departmental faculty and chief guide upto a total period of 1½ years. The total period of Junior Residency will, however, remain the same i.e. 3 years.

Thesis should be submitted at least six months before the Theory and Practical examination. This shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A PG student shall be allowed to appear for the Theory and Practical examination only after the satisfactory acceptance of the Thesis by the examiners, and declaration of the same, before the start of final examination.

The maximum extension for submission of thesis granted by the Dean is upto 15 days as a special case provided adequate justification is given by the Head of the Department. No extension after 15 days shall be granted. Thesis submitted beyond this due date would

entail extension of the registration period and a delay in the date of final examination. All postgraduate students are required to forward their thesis through the Head/Acting Head of the Department with a copy of the forwarding letter to Dean. The Head of the Department/Acting Head will forward the thesis immediately to the Academic Section for further processing.

Thesis evaluation should be on the following parameters

Sl. No.	Title	Particulars
1.	Guide	1. Approved PG teacher of the institute. 2. Can have co-guide, if necessary, from related discipline.
3.	Structure	To reflect basics of research methodology, relevant reference of literature and presented as findings of the research, utilizing relevant statistical methodology.
4.	Topic	To be decided with guide and registered with Academic Section/ Exam cell, in stipulated time.
5.	Procedure	1. Short synopsis of the proposed work to be sent to examination section within first academic term to register Topic and Guide.
		2. Ethics committee clearance obtained.
		3. Completed thesis to submit before the commencement of last academic term.
		4. The thesis will be evaluated by minimum three examiners – 2 External and 1 Internal.
		5. In the summative practical examination thesis will be subjected to discussion and marks allotted.

2. Theory Examination

The examinations shall be organized on the basis of 'Grading 'or 'Marking system' to evaluate and certify a PG student's level of knowledge, skill and competence at the end of the training.

The MD final examination shall be held at the end of 3rd academic year, ie., at the end of 6th term. Theory Examination should consist of four papers, covering major aspects.

Paper I: Gross Anatomy including Neuroanatomy, Sectional, Functional and Radiological Anatomy.

Paper II: Microanatomy, Histocytological techniques, Anatomical techniques (Embalming, Museum Specimens, Plastination etc.); Advanced Investigative procedures & Imaging Techniques.

Paper III: Developmental Anatomy, Genetics, Evolutionary & Comparative Anatomy.

Paper IV: Applied/ Clinical Anatomy and recent advances; Translational Anatomy.

Pattern of conduct for each Theory paper

The total marks for each theory paper will be 100 marks.

Type of Questions	Number of Q.	Marks for each Q.	Total Marks
Structured Essay Question	2	15	30
Short Note	5	8	40
Reasoning Out	10	3	30
Total			100

3. Practical and Oral Viva-voce Examination

The Practical Examination should be organized as follows.

1. Dissection on Cadaver.
2. Histology Spotting.
3. Histological techniques.
4. Surface Marking.
5. Radiology.
6. Teaching ability.
7. Thesis presentation.

The Grand Viva-Voce should be organized as follows.

1. Gross Anatomy dissected parts discussion.
2. Neuroanatomy discussion.
3. Embryology Models and Charts, including Teratology.
4. Medical Genetics.
5. Osteology
6. Embalming and Museum Techniques
7. Radiological Imaging

Practical Examination should be conducted over two days to test student's ability to:

1. Dissect and clearly display the anatomical structures with their relations; and to perform gross anatomical techniques like embalming process, preparation of museum specimens, bones, casts and plastination.

Window dissection of any body part allotted should be followed by viva-voce test.

2. Acquire the skill of routine microanatomy of all the structures of body and the common Histocytological techniques including tissue processing, paraffin/ plastic resin blocks preparation, microtomy, slide preparation, routine & special staining, storage of slides, cellular immunology, histocompatibility testing, Barr body/ Sex chromatin testing, Y chromosome testing, etc.

10 stained slides given for identification under light microscope should be followed by viva voce test.

3. Viva-voce test on Gross anatomy including soft & hard parts, surface & living anatomy, radiological anatomy, embryology and genetics.

4. Microteaching/ Demonstration/ Lecture/ Seminar presentation on given short topic after preparation.

5. Present Thesis and methodology used in research projects, thesis preparation and submission, by developing skills in planning, designing and conduct of research studies.

The scheme of organization of Practical examination

Day 1:

a. Gross Anatomy: Dissection and related viva-voce.
b. Histology: Spotting (10 spots) and related viva-voce.
c. Histological Techniques: Paraffin block making, Section cutting. Staining (H and E), Special Staining and related viva-voce.

Day 2

a. Pedagogy: Microteaching of a short topic to assess teaching skills.
b. A short synopsis of the thesis work should be presented by the PG Student.
c. Grand viva including Gross Anatomy, Cross Sectional Anatomy, Radiological Anatomy, Surface Anatomy, Embryology.

Pattern of conduct of Practical Examination

Practical exercises will comprise of 300 marks and Viva-voce of 100 marks.

Day	Session	Practical	Number of Practical x marks	Total Marks
1.	Forenoon	Dissection and related viva voce	1 x 80	80
	Afternoon	Histology slides spotting, drawing and discussion	10 x 3	30
		Histology processing & section cutting	1 x 10	10
		Embedding	1 x 10	10
		Staining	1 x 20	20
		Identifying Slide	1 x 10	10
2.	Forenoon	OSPE#	6 x 5	30
		Neuroanatomy slide discussion	3 x 5	15
		Embryology slide discussion	3 x 5	15
		Pedagogy*	40	40
		Review of Dissertation/ Thesis	30	40
	Afternoon	Viva-voce – on Gross Anatomy, Neuroanatomy, Living Anatomy, Sectional and Radiological Anatomy, and Osteology	5 x 20	100
Grand Total				400

Note:

1. #OSPE:

   Objectively Structured Practical Examination, should have two types of stations.

a. Observation station: Response station will be scored upon performing/ demonstrating a skill set.
b. Response Station: Response station will be scored by checking answers to structured questions given at the station.

2. *Pedagogy:

Duration of this exercise will be of ten minutes, in which 8 minutes is for presentation and 2 minutes is for questioning.

Rubric for marking Pedagogy assessment is as follows.

Sl. No.	Attribute	Marks
1.	Attitude, confidence, appearance, starting and ending the session	10
2.	Using audio visual aids, models, and voice modulation	10
3.	Content Delivery	10
4.	Interaction and answering questions	10
Total		40

Marking, Grading and Declaration of results

1. The Theory and Practical Examination are to be graded as follows:
   A (>80%), B (70-79%), C (60-69%), D (50-59%), E (40-49%), F (<40%).
   Each student should be given formal feedback on his/her weak points in teaching/training programs and how to overcome his/her deficiencies.
2. For declaring pass in the entire Final MD Examination and for award of M. D. Medical Anatomy Degree, the criteria are:
   a. Theory – 400 Marks; Minimum 40% marks in each paper and aggregate of 50%, to be declared pass.
   b. Practical – 400 Marks; Minimum 50% marks, to be declared pass
   c. Minimum 50% marks are required in Theory and Practical separately, to be declared pass in the compete Final M. D. Examination.
3. Those residents who appeared in the MD/MS/MDS examination after the completion of their three years of residency may be permitted to reappear in the examination within 5 years of their submission of thesis. Those residents who do not complete their junior residency will not be permitted to appear in the examination.

C. Examiners

1. No person shall be appointed as an internal examiner in any subject unless s/he has three (3) years' experience, as recognized PG teacher in the concerned subject. For external examiners, s/he should have minimum six (6) years of experience as recognized PG teacher in the concerned subject.
2. There shall be at least four (4) examiners in each subject at an examination out of which at least fifty percent (50%) shall be external examiners/ observers. The external observer, who fulfils the condition laid down in clause 1 above, shall ordinarily be invited from another Institute of National Importance/ another Central/ State University outside the state, provided that in exceptional circumstances examinations may be held with three (2) examiners if two (2) of them are external with the justification of such examination and the result shall be published in such a case with the approval of competent authority.
3. An examiner shall ordinarily be appointed for not more than two consecutive terms.
4. The internal examiner in a subject shall not ordinarily accept external observership for a college from which external observer is appointed in one's subject.
5. There shall be a Chairperson of the Board of paper-setters, who shall be an external observer and shall moderate the question papers.
6. There shall be Co-ordinator appointed by the Institute, who shall supervise and Co-ordinate the examination on behalf of the Institute, with independent authority.
7. The Head of the Department of the Institute shall ordinarily be one of the Internal examiners and second Internal examiner shall rotate after every two years.

Recommended Students Reference Resources

1. The PG Student must keep updated about the latest editions of the resources.
2. The most recent edition, for some of the title below, may not be the best edition in terms of content categorization and volume; the PG Student is advised to refer to the Faculty, for discernment.
3. Preference is to be given to International Editions over South Asian Editions.

A. Books

Gross and Applied Anatomy

1. Standring S, Gray H. Gray's anatomy: The Anatomical Basis of Clinical Practice. 42nd ed. Elsevier; 2021.
2. Basmajian JV, Slonecker CE. Grant's Method of Anatomy: A Clinical Problem Solving Approach. 11th ed. Williams & Wilkins; 1989.
3. Cunningham DJ, Romanes GJ. Cunningham's Textbook of Anatomy. 12th ed. Oxford University Press; 1995.
4. Rosse C, Gaddum-Rosse P, Hollinshead WH. Hollinshead's Textbook of Anatomy. 5th ed. Lippincott-Raven Publishers; 1997.
5. Sinnatamby C. Last's anatomy. 12th ed. Elsevier Health Sciences; 2011.
6. McGregor AL, Decker GAG, Plessis DJD. Lee McGregor's Synopsis of Surgical Anatomy. 12th ed. Varghese Pub. House; 1986.
7. Wineski LE, Snell RS. Snell's Clinical Anatomy by Regions. 10th ed. Wolters Kluwer; 2019.
8. Dalley AF, Agur AMR. Moore's Clinically Oriented Anatomy. 9th ed. Wolters Kluwer; 2022.
9. Datta AK. Essentials of Human Anatomy. 9th ed. (3 Volumes) Current Books International; 2019.

Dissector

1. Koshi R. Cunningham's Manual of Practical Anatomy. (3 volumes) 16th ed. Oxford University Press; 2017.
2. Detton AJ. Grant's Dissector. SAE. Wolters Kluwer India; 2021.
3. Krishnamurti A, Gunasegaran JP. Dissection of the Human Body: Designed for Restructured Medical Curriculum. 1st ed. Jaypee Brothers Medical Publishers (P) Ltd.; 2013.

4. Loukas M, Benninger B, Tubbs SR. Gray's Clinical Photographic Dissector of the Human Body. 2nd ed. Elsevier; 2019.

Gross Anatomy Atlas

1. Agur AMR, Dalley AF. Grant's Atlas of Anatomy. 15th ed. Wolters Kluwer; 2021.
2. Netter FH. Atlas of Human Anatomy. 7th ed. Elsevier Inc; 2019.
3. Drake RL, Vogl AW, Mitchell A, Richardson P, Tibbits R. Gray's Atlas of Anatomy. 3rd ed. Elsevier; 2021.
4. Schünke M, Schulte E, Schumacher U. Thieme Atlas of Anatomy, three volumes Set. 3rd ed. Thieme Medical Publishers; 2020.
5. Paulsen F, Waschke J, Klonisch T, Hombach-Klonisch S, Dalkowski K. Sobotta Atlas of Human Anatomy. 15th ed. Elsevier/Urban & Fischer; 2011.

Embalming & Museum Techniques

1. Tompsett DH. Anatomical Techniques. 2nd ed. E. & S. Livingstone; 1970.
2. Jayavelu T. Embalming. 1st ed. Churchill Livingstone; 1991.
3. Ajmani ML. Embalming: Principles and legal aspects. 2nd ed. Jaypee Brothers Medical; 2019.

Histology Text and Atlas

1. Mescher AL. Junqueira's Basic Histology: Text and Atlas. 16th ed. McGraw Hill Education; 2021.
2. Young B, O'Dowd G, Woodford P. Wheater's Functional Histology: A Text and Colour Atlas. 6th ed. Churchill Livingstone/Elsevier; 2014.
3. Fawcett DW, Bloom W. A Textbook of Histology. 12th ed. Chapman and Hall; 2002.
4. Cormack DH. Ham's Histology. 9th ed. Lippincott; 1987.
5. Gros CWEL. The Tissues of the Body. 6th ed. Clarendon Press; 1975.
6. Ross MH, Pawlina W. Histology: A Text and Atlas: With Correlated Cell and Molecular Biology. 7th ed. Wolters Kluwer; 2016.
7. Eroschenko VP. DiFiore's Atlas of Histology with Functional Correlations. 6th ed. Wolters Kluwer (India); 2017.
8. Kierszenbaum AL, Tres LL. Histology and Cell Biology: An Introduction to Pathology. 5th ed. Elsevier; 2020.

Histology Techniques

1. Clayden EC. Practical Section Cutting and Staining. 3rd ed. J. & A. Churchill Ltd.; 1971.

2. Suvarna SK, Layton C, Bancroft JD. Bancroft's Theory and Practice of Histological Techniques. 7th ed. Churchill Livingstone/Elsevier; 2016.
3. Drury RA, Carleton HM, Wallington EA. Carleton's Histological Technique. 5th ed. Oxford Univ. Pr.; 1980.

Genetics

1. Nussbaum RL, McInnes RR, Willard HF, Hamosh A. Thompson & Thompson Genetics in Medicine. 8th ed. Elsevier; 2016.
2. Mueller RF, Young ID. Emery's Elements of Medical Genetics. 11th ed. Churchill Livingstone; 2004.
3. Mayo O, Fraser GR. Textbook of Human Genetics. 1st ed. Blackwell Scientific Publications; 1975.
4. Zellweger H, Simpson J. Chromosomes of Man. 1st ed. William Heinemann; 1977.

Neuroanatomy

1. Parent A, Carpenter MB. Carpenter's Human Neuroanatomy. 9th ed. Williams &; Wilkins; 1996.
2. Mtui E, Gruener G, Dockery P. Fitzgerald's Clinical Neuroanatomy and Neuroscience. 6th ed. Elsevier; 2021.
3. Kiernan JA, Rajakumar N, Barr ML. Barr's The Human Nervous System: An Anatomical Viewpoint. 10th ed. Wolters Kluwer Lippincott Williams & Wilkins; 2014.
4. Splittgerber R, Snell RS. Snell's Clinical Neuroanatomy. 8th ed. Wolters Kluwer; 2019.
5. Datta AK. Essentials of Human Anatomy: Neuroanatomy. 4th ed. Current Books International; 2012.
6. Singh V. Textbook of Clinical Neuroanatomy. 4th ed. Elsevier; 2021.
7. Bhuiyan PS, Rajgopal L, Shyamkishore K, Singh I. Inderbir Singh's Textbook of Human Neuroanatomy: (Fundamental and Clinical). 10th ed. Jaypee Brothers Medical Publishers (P) LTD; 2018.

Surface and Radiological Anatomy

1. Slaby F, Jacobs ER. Radiographic Anatomy. 1st ed. Harwal Publ.; 1990.
2. Halim A. Surface and Radiological Anatomy. 3rd ed. CBS Pub.; 2011.
3. Möller T B. Pocket Atlas of Sectional Anatomy, Computed Tomography and Magnetic Resonance Imaging, Vols. I, II & III. 3rd ed. Thieme; 2007.
4. Bo WJ. Basic Atlas of Sectional Anatomy: With Correlated Imaging. 4th ed. Saunders Elsevier; 2007.

Embryology

1. Sadler TW. Langman's Medical Embryology. 14th ed. Wolters Kluwer; 2019.
2. Larsen WJ, Sherman L, Potter SS. Human Embryology. 3rd ed. Churchill Livingstone; 2001.
3. Moore KL, N. PTV, Torchia MG. The Developing Human: Clinically Oriented Embryology. 9th ed. Elsevier-Saunders; 2013.
4. Moore KL, N. PTV, Torchia MG. Before we are born: Essentials of Embryology and Birth Defects. 10th ed. Elsevier; 2020.
5. Hamilton WJ, Mossman HW, Boyd JD. Hamilton, Boyd and Mossman's Human Embryology: Prenatal Development of Form and Function. 4th ed. Macmillan Press; 1978.

Evolution, Comparative Anatomy and Anthropometry

1. Kardong KV. Vertebrates: Comparative anatomy, function, evolution. New York, NY: McGraw-Hill Education; 2019.
2. Lukaski HC. Body composition: Health and performance in Exercise and Sport. Boca Raton: CRC Press; 2021.

Biostatistics

1. P.S.S Sunder Rao: An Introduction to Biostatistics a Manual for students in Health Sciences, 3rd ed., Prentice-Hall, 1996.
2. David E. Matthews and Vernon T. Farewell: Using and Understanding Medical Statistics. Karger.

Pedagogy

1. Tejinder Singh, Piyush Gupta, Daljit Singh: Principles of Medical Education: 4th ed. 2013, Jaypee Brothers.

Related Reads

1. Yoval Noah Harari: Sapiens: A Brief History Humankind: Penguin Random House, 2015.
2. Mary Roach: Stiff – The Curious Lives of Human Cadavers, W. W. Norton & Company, 2004.
3. Desmond Morris: The Naked Ape: A Zoologist's Study of the Human Animal: Delta, 1999.

B. Journals

1. Journal of Anatomical Society of India.
2. National Journal of Clinical Anatomy
3. Journal of Anatomy (London).
4. Anatomical Record.
5. Annals of Anatomy.
6. American Journal of Anatomy.
7. Clinical Adjuncts.
8. Anatomical Adjuncts.
9. Cells, Tissues & Organs (Formerly Acta Anatomica).
10. Surgical & Radiological Anatomy.
11. Indian Journal of Human Genetics.
12. International Journal of Anatomy.
13. Journal of Clinical Genetics.
14. Translational Research in Anatomy.

References used in preparation of this document

1. AIIMS, New Delhi, Syllabus for MD/ MS/MDS/MHA
   https://www.aiims.edu/aiims/academic/aiims-syllabus/Syllabus%20-%20md%20ms%20mds%20mha.pdf
2. AIIMS New Delhi, Guidelines for Academic Courses
   https://www.aiims.edu/aiims/academic/aiims-syllabus/Guideline%20aiims%20II%20Edition%202004.pdf
3. INICET Prospectus 2021
   https://www.aiimsexams.ac.in/pdf/Final%20INI-CET%20Prospectus%20Part%20B%20%20Ver-1%20%20July%202021%20session%20for%20AIIMS%20New%20Delhi%20&%207%20other%20AIIMS%20as%20on%2024_04_2021.pdf
4. AIIMS, Nagpur, MD Anatomy Curriculum
   https://aiimsnagpur.edu.in/sites/default/files/inline-files/Anatomy_MD.pdf
5. AIIMS, Raipur, Curriculum for Postgraduate MD/ MS Anatomy
   https://www.aiimsraipur.edu.in/upload/anatomy/PG_Curriculum_(MD_Anatomy)_AIIMS_Raipur.pdf
6. AIIMS Jodhpur, Postgraduate courses
   https://www.aiimsjodhpur.edu.in/aiimsdraft/courses/Syllabus%20of%20Post%20Graduate%20courses%20MD-MS-Mch.pdf
7. JIPMER, Puducherry, MD/ MS Curriculum
   https://www.jipmer.edu.in/sites/default/files/MD-MS-Curriculum.pdf
8. Erstwhile Medical Council of India Postgraduate Medical Education Regulations
   https://www.nmc.org.in/wp-content/uploads/2019/12/Postgraduate-Medical-Education-Regulations-2000.pdf
9. National Medical Commission (NMC) Postgraduate Medical Education Regulations
   https://www.nmc.org.in/MCIRest/open/getDocument?path=/Documents/Public/Portal/LatestNews/Draft%20PGME%20Regulation%20Octoberr%202021.pdf
10. National Medical Commission (NMC) of India PG Curricula
    https://www.nmc.org.in/wp-content/uploads/2019/09/MD-Anatomy.pdf

**********"No such thing as Bad Student, only Bad Teacher" **********