सत्यमेव जयते

ALL INDIA INSTITUTE OF MEDICAL SCIENCES, NAGPUR

Plot No – 2, Sector – 20, MIHAN, Nagpur– 441108

Department of Anatomy

10th September 2020

Curriculum: MD Anatomy

Goal: To produce a Globally acceptable, thorough professional and reasonably updated medical specialist in Anatomy.

Objectives: at the end of three years of the training course of MD Anatomy, a post graduate in Anatomy should-

- be a competent anatomy teacher for training undergraduates
- be aware of recent advances in anatomy
- develop a quest for scientific inquiry
- acquire skills in relevant teaching and communication methodologies
- develop integrated and clinically relevant approach in teaching/learning activities
- have the ability to innovate in teaching learning methods
- acquire skills of managing a team work
- be able to provide guidance as subject expert whenever needed
- be able to coordinate body donation and embalming services
- able to discharge social and community duties

Specific learning objectives:

At the end of the post graduate period the student should be able to:

Cognitive domain

- Describe the gross anatomy of entire body
- Integrate the various structures with their function
- Comprehend the structural relations between structures
- Apply the positional relations in clinical scenarios
- Explain different principles of microscopy
- Explain principles staining and microtome
- Describe micro anatomy of all tissues of the human body
- Correlate micro anatomy with its function
- Describe development of human body in general and specific system wise
- Correlate developmental anomalies with stages of normal development
- Describe normal sectional and radiological anatomy of regions of human body
- Describe basic principles of genetics
- Apply principles of genetics in clinical scenarios
- Discuss effects of teratogenic agents
- Explain immunology of human body and its disorders
- Describe brain ,spinal cord structurally and functionally

- Correlate anatomical relations of nervous system with clinical scenarios
- Describe anthropological traits
- Discuss the comparative evolution of human body

Psychomotor Domain

- Dissect the entire human body region wise
- Demonstrate structures and their relations
- Prepare embalming fluid for tank and museum jar
- Embalm a whole human cadaver
- Prepare a museum specimen
- Demonstrate specific structure in window dissection
- Prepare a histology slide under H& E staining
- Identify all tissues of the human body under different microscopy
- Prepare sections of brain and spinal cord
- Prepare embryology slide with chick embryo
- Demonstrate using anthropological instruments
- Identify different anatomical structures through imaging
- Demonstrate teaching learning methods
- Demonstrate research output
- Demonstrate scientific writing skills and presentation skills
- Demonstrate living and surface anatomy in alive human model of a cadaver

Affective domain

- Demonstrate respect in handling human body and cadavers
- Demonstrating humane touch while performing living anatomy
- Acquire ability to keep his personal beliefs, prejudices not coming in way of discharging the duties
- Express empathy towards students
- Demonstrate work ethics and team working ability
- Acquire ability to Communicate with professional attitude

SYLLABUS

A post graduate should have acquired in depth knowledge in the following components of anatomy

Gross anatomy

Entire human body consisting of both limbs, thorax, abdomen, pelvis, perineum, head and neck, brain and spinal cord should be methodically dissected and learnt

Developmental anatomy

- General and systemic developmental anatomy,
- teratogenesis,
- congenital abnormalities associated with human development with its clinical correlation

Histology and histochemistry

- General cell biology

- Principles and working of light, electron, confocal, fluorescent and scanning microscope
- Cellular organisation of tissues of entire body systems , its light microscopic features and molecular features with functional correlation
- Principles of micrometry and staining

Neuroanatomy

- Cells , structure ,connections, pathways and its regulating feedback loops of central and peripheral nervous system with functional ,clinical correlation
- Cross sectional anatomy of brain and spinal cord

Genetics

- Structure, number, classification, abnormal syndromes associated with human chromosomes
- Patterns of inheritance of human genetic diseases
- Reproductive genetics with prenatal diagnosis and counselling
- Principles of gene and its laws of inheritance
- Genetic disorders and gene therapy

Immunology and molecular biology

- Features of immune system of the human body
- Role histocompatibility complex and genetic control of immune response
- Technique involved like PCR and molecular hybridization
- Genetic control of disease and its susceptibility

Recent advances

- Advancements pertaining to anatomical aspects of medical science in the areas of functional aspects of body parts, sectioning and preservation techniques, operative and clinical /procedural interventions, neuroscience, microanatomy, development and imaging.

Surface, living and imaging anatomy

- Prominent bony features and land marks of entire body
- Interpretation of radiographs, CT, MRI, Ultrasound and contrast imaging procedures

Anthropology

- Identification of races and genders with different anthropological traits; anthropometric techniques.

Forensic Medicine

- Study of skeletal remains and medico legal aspects pertaining to Anatomy.

Comparative Anatomy

- Basic outline of evolution and comparative anatomy of human body

Embalming and museum technique

- Methods of human body preservation
- Plastination, soft embalming
- Preserving wet and dry specimens in museum

- Acquiring & Developing models and Part task trainers for conceptual learning

Biomedical waste disposal

- Methods of biomedical waste management methods.

Required mandatory resources

Anatomy department should be having the following functioning laboratories

- Histology
- Neuroanatomy
- Cytogenetics
- Radiological and sectional anatomy Plastination
- Animal experimentation and cell culture
- Teratology /developmental anatomy
- Surgical anatomy skill training
- Immunology and molecular biology
- Electron microscopy/ fluorescence/confocal and other forms of advanced microscopy

TEACHING AND LEARNING METHODS:

Facilitated learning of core anatomical concepts in form of

- Lectures
- small group discussion
- Demonstrations
- Journal club presentations
- Seminar presentations
- Tutorials
- Computer aided
- Self-directed

Hands on training in

- Dissection skills
- Histology processing & slide preparation
- Museum specimen preparation
- Embalming & preservation techiques
- Sectioning & display techniques in Neuroanatomy
- Basic Cytogenetic procedures
- Foetal dissection & basic Embryology
- Experimentations involving animal tissues & chicken eggs

Training in teaching and assessment

- For undergraduate teaching and demonstration
- Formulating OSPE
- Question paper setting
- Preparing teaching modules
- Organizational training – planning integrated seminars for undergraduates

Compulsory Posting

General Objective of Posting:

- To develop integrated approach in learning
- Applying logic of anatomical basis in clinical examination and procedures
- To incorporate the learning experience of postings in conceptual learning and research
- To realise being an integral part of the whole system of Medical Science for the service of mankind

Programme of Posting

Speciality Departments	**Duration**	**Academic term**	**Objectives to be achieved** (At the end of the posting, the resident should be able to ..)
Community Medicine & Biostatistics	30 days	1	• Formulate hypothesis for research • Calculate sample size for any research • Use tools for literature review • Perform basic statistical analysis like mean, standard deviation, chi square ,student t test • Draft a project proposal
Radio-diagnosis	45 days	3	• Read a normal x ray of all regions of the human body in all views • Identify normal skeletal features visualized in x-rays of all regions • Enumerate different contrast X- rays; identifying anatomical basis of their interpretation • Read a normal CT & MRI film of all the sections of the human body with identification of anatomical structures. • Identify different anatomical structures through ultrasound • Describe different basic radiological techniques
Surgery	15 Days	3	• Function as a clinical anatomist with a surgical team during planning of common general surgical procedures involving viscera and bodily regions such as - hernia, hydrocele, varicose veins, appendix, gall bladder, stomach, rectum, prostate, breast, chest wall etc. • Identify anatomical structures in endoscopic view
Orthopaedics	7days	3	• Apply the knowledge of anatomy in orthopaedic setting and Function as a clinical anatomist; ascertain relevance of anatomical basis in routine operative procedures
ENT	7 days	3	• Apply anatomical knowledge and identify different structures encountered in operative or clinical procedures including endoscopy • Comprehend anatomical basis of functional alterations or clinical presentations
Obstetrics & Gynaecology	7 days	3	• Have a logical review of clinical examination, procedures and planning part of operative interventions • Develop inquisitiveness to explore possible justification of developmental defects in babies or gestational tissues
Super speciality Departments			
Vascular & cardio	7 days	3	• Comprehend the anatomical basis of microsurgeries

thoracic surgery			
Plastic surgery	7 days	3	• Apply and comprehend the anatomical basis of plastic surgical principles of skin flap, muscle flap and vascular pedicle-based reconstructions
urology	7 days	3	• Comprehend anatomical basis of urological procedures
Neuro surgery	7 days	3	• Comprehend the anatomical basis of neuro surgical intervention
Paediatric surgery	7 days	3	• Apply and comprehend the embryological basis of congenital anomaly correction surgeries

- The resident should attend Minimum three procedures/surgeries during 7 days postings in surgical departments.
- The resident should attended Minimum six procedures/surgeries during 15 days postings in surgical departments.
- In 45 days posting in Radio-diagnosis of, the break up of posting will be as follows
    - 20 days: in x-ray unit (plain and special procedures)
    - 10 days: in ultrasound
    - 15 days: CT and MRI

Outline of teaching learning activities

Academic Year	Activity
I	**Regular core anatomy learning** • Dissection and theory • Basic histology • Basic embryology • Basic neuroanatomy • Embalming • Comparative anatomy **PSM– detailed aspects of Biostatistics.** **Thesis topic to submit with synopsis.** **Participating in internal assessment activities**
II	**Core anatomy learning** • Genetics • Special staining • Molecular and immunology • Anthropology and anthropometry • Dissection • Imaging anatomy • Living and surface anatomy • Forensic anatomy **Attending Postings.** **Participation in internal assessment activities**
III	**Core anatomy learning** • Dissection • Special microscopy • Applied anatomy

	Completing and submitting thesis. **Participation in internal assessment activities**

Assessment

Continuous assessment of day to day learning, will be done with documentation of following:

S No.	Activity/	Particulars
1	Log book record (as a record of all academic and research work)	For aseessment of Anatomical knowledge, procedural skills, professionalism, self-directed learning, research and ability to work as a part of the department
		The log book should be presented during exam
		Mention new skill acquired and using it- {Making a model, museum specimen, metaphase spread & 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 CME/ workshop/ training 4. Publication 5. Research methodology training with research ethics 6. Medical education training-Basic level 7. Self directed learning 8. Professionalism 9. Communication skills & Team working skills

Formative assessment schedule

As prescribed by Institute: Candidate should secure a minimum of 50% marks in Theory and Practical separately, in order to be eligible to appear for Professional Examination. Formative assessment will have following schedule and marks distribution criteria:

(A) Theory: **Schedule**

Period	Paper/s	Marks	To qualify
At end of First year	1 Paper	100	≥ 50 %
At end of Second year	1 paper	100	≥ 50 %
Pre-professional	4 Papers of 100 marks each	400	Overall ≥ 50 %; individual papers ≥ 40%
	Grand Total	**600**	≥ 50 %

(B) Practical: **Schedule**

Period	Total Marks	Pattern
At end of First year	100	Practical exercises
At end of Second year	100	Practical exercises
Pre-professional	400	Practical exercises 300 + Viva 100 marks
Grand Total	**600 Marks**	

Summative Assessment

The post graduate summative examination will consist of three components

- Submission of Thesis work
- Theory exanimation

- Practical examination

Summative examinations will be conducted as per following pattern and marks distribution

A	Theory	4 Papers each of 100 Marks = 400 Marks
B	Practical	Practical 300 + Viva 100 = 400 Marks

Eligibility to appear in Professional Examination:

Sr No.	Parameters	Criteria
1	Research Methodology Examination conducted at end of Induction Programme	Pass
2	Internal Assessment marks	≥50% marks, separately in theory & practicals
3	Dissertation	Accepted
4	MD Programme attendance	≥80% in each year
5	Poster & Paper presentation in conference	1 poster and 1 paper presentation
6	Peer reviewed Indexed Publication	One (Accepted / published /sent for publication)
7	Six Monthly Progress Report	At least 4 out of 6 satisfactory Progress Report

Final Result

(A) Theory – 400 Marks; (Minimum 40% marks in each paper and aggregate of 50% in order to be declared pass)

(B) Practical – 400 Marks; Minimum 50% marks required in Theory & Practical separately, in order to be declared successful at MD/MS Examination.

Thesis work:

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

Theory examination:

- Theory paper shall be of four parts

1. **Paper I:** Gross Anatomy with evolution and Comparative Anatomy. Gross Anatomy will include functional Anatomy.
2. **Paper II:** Developmental anatomy , Microscopic Anatomy and Genetics.
3. **Paper III:** Neuroanatomy.
4. **Paper IV:** Applied Human Anatomy & recent advances in anatomical Sciences.

Each paper will be for three hours duration and 100 marks.

Type of questions	Number of Qs	Mark for each Q	Total marks
Structured essay question	2	15	30
Short notes	5	8	40
Reasoning out	10	3	30
		Total	100

Structure of Practical & Viva conduction:

Day	**Session**	**Practical**	Number of practical x marks	**Total Marks**
1	Forenoon	Dissection and related viva voce	1x 80	80
	Afternoon	Histology slides spotting, drawing and discussion	10x 3	30
		Histology processing & section cutting	1x 10	10
		Embedding	1x 10	10
		staining	1x 20	20
		Identifying slide	1x 10	10
2	Forenoon	OSPE‡	6 x 5	30
		Neuroanatomy slide discussion	3x5	15
		Embryology slide discussion	3x5	15
		Pedagogy *	40	50
		Review of Dissertation /Thesis	30	30
	Afternoon	VIVA VOCE- on gross anatomy, neuroantomy, living anatomy, sectional and radiological anatomy and Osteology	5x20	100
		Total marks		400

Practical examination: Shall be spread over span of two days

- Practical exercises will comprise of 300 marks & Grand Viva of 100 marks.

*Pedagogy

Duration of the exercise will be of ten minutes in which 8 minutes for presentation and 2 minutes for questioning

Marking scheme for pedagogy will be

- Attitude, confidence, appearance and starting and ending the session -10 marks
- Using audio visual aids, models, and voice modulation-10marks
- Delivered content -10Marks
- Interaction and answering queries-10marks

ǂ OSPE

Two types of stations would be there

- Observation station
- Response station

Observation type given more number of stations where in the student will be scored upon performing /demonstrating a skill set

Response station will be scored by checking answers to structured questions given there.

Recommended Books&Journals

Gross Anatomy

1. Williams & Roger Warwick: **Gray's Anatomy, 40th ed**., 2008, Churchil Livingstone London, Malbourne l
2. John, V & Basmajian, and M.D.: **Grant's Methods of Anatomy**, 10th ed., 1999, S. Chand & Co Ltd.
3. Romanes, G.J.: **Cunningham's Textbook of Anatomy**, 12th Ed, 1981, Mc Millan Press.
4. Snell RS: **Clinical Anatomy by Region**s, 8th ed. 2008, Lippincott Williams & Wilkins, Baltimore.
5. Moore &Dalley: **Clinically oriented Anatomy**, 5th ed. 2006 Lippincott Williams & Wilkins, Baltimore.
6. A.K. Dutta: **Essentials of Human Anatomy** 3 Volume 3rd Edition, Current Book, 2004.
7. Patrick, Tank.W: **Grant's Dissector** 14th Edition, Lippincott,2009.
8. Frank H. Netter. **Atlas of Human Anatomy**. Saunders Elsevier.

Embalming & Museum Techniques

1. Tompset**: Anatomical Techniques**
2. Dr.Jayavelu : **Embalming Techniques**
3. M.L. Ajmani**: Embalming Principles & Legal Aspects** ,2009,Jaypee Publication

Histology

1. Junqueira et al: **Basic Histology: Text & Atlas With CD Rom**., 10th ed., 2003 ,Prentice Hall, USA
2. Paul R. Wheater, H. George Surkitt& Victor G. Banials**: Functional Histology: AText and Colour** Atlas. 4th ed., 2000 ELBS, Churchill Livingstone.
3. Fawcett Don W. & Bloom William: **A Textbook of Histology**,12thed.,2002, Champion& Hall,
4. Drury R.A.B: **Carltons Histological Techniques** - Wallington E.A,
5. D W Cormack:**Ham's Histology,**Lippincotts, Williams and Wilikins.
6. Lee Gross Clark: **Tissues of the Body**
7. Bancroft: **Histological Techniques** ,6th Edition, Churchill Livingston, 2008.
8. M.H. E Ross. **Histology: A textbook and atlas**. Williams and Wilkins.
9. Difiore's. **Atlas of histology with functional co-relation**.
10. Bloom and Fawcett. **Text book of histology.**
11. E.C. Clayden. **Practical of section cutting and staining.**

Genetics

1. Thompson J.S.: **Genetics in medicine**, 6th edition, 2001M.W. Thompson W.B. Saunders& Co. Philadelphia, London.
2. F. Robert Mueller**: Elements of Medical Genetics** ,13th Edition, ChurchillLivingston, 2007.
3. George Fraser and Oliver Mayo. **Text book of Human Genetics.** Blackwell Scientific Publications London, Oxford Edinburg, Melbourne.
4. Hann Sellwerger and Jame Simpson. **Chromosomes of Man.** Sparsher's International Medical Publications.

Neuroanatomy

1. Stuin J and Carpenter MB: **Human Neuroanatomy**, 9th edition, 1996
2. Inderbir Singh: **Textbook of Human Neuroanatomy**, 7th ed. 2006, Jaypee Publishers.
3. Snell R.S**.: Clinical Neuroanatomy**, 7th ed. 2010, Lippincott Williams & Wilkins.
4. John Kiernan.A :**Barr's Human Nervous System an anatomical viewpoint**., 9th Edition, Lippincott, 2009.

Surgical & Applied

1. Chummy Sinnatamby. S :**Last Anatomy Regional & Applied anatomy**, 11th Edition, Churchill Livingston, 2009.
2. Cornelius Rosse: **Hollinshed Text Book of Anatomy** – 5th Edition, Lippincott, 1997.
3. Mc Gregor: **Synopsis of surgical anatomy** –12th Edition, Varghese Publisling, 1986.

Surface &Radiological Anatomy

1. Slaby and Jacob: **Radiographic Anatomy** 1990 National Medical Series for Independent Study, Harwal Publishing Philadelphia
2. Halim R.: **Surface & Radiological Anatomy**, 2nd ed., 1993, CBS Publishers, India.
3. T.B. Moeller et.al:**Sectional Anatomy CT and MRI Vol. I, II, III** New York.Theme Stuttgart.
4. J.B. Walter et.al:**Basic Atlas of Sectional Anatomy with correlated imaging**. Saunders Elsevier.

Embryology

1. Sadler Langman's: **Medical Embryology**, 10th ed., 2006, Williams & Wilkins,
2. Baltimore
3. William J L: **Human Embryology**, 3rd ed.2001, Churchill Livingstone
4. Moore Persaud: **The Developing Human** Clinically Oriented Embryology, 6th ed,1999, Harcourt Publishers International company, Singapur.
5. W.J. Hamilton & H.W. Mossman: Human Embryology
6. Moore & Persaud: **Before we are born**, 7th Edition, 2008, Saunders.

Biostatistics:

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

Journals

1. Journal of Anatomical Society of India.
2. Journal of Anatomy (London)
3. Anatomical Record
4. American Journal of Anatomy
5. Clinical Adjuncts.
6. Anatomical Adjuncts.
7. Cells, Tissues & Organs (Formerly Acta Anatomica)
8. Surgical & Radiological Anatomy
9. Indian Journal of Human Genetics
10. International journal of Anatomy
11. J of Clinical Genetics (Willy's).

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Professor
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