

## **CURRICULUM FOR MD ANATOMY**

### **BROAD GOAL**

The broad goal of MD Anatomy course aims at providing comprehensive training to postgraduate students for teaching Anatomy and research methodology.

### **OBJECTIVES**

At the end of the three years post-graduate training programme in Anatomy, the student should:

1. acquire a detailed knowledge of the gross and microscopic structure of human body and correlate it with its normal and altered functions.
2. have indepth knowledge of the basic principles of growth and differentiation. Understand critical periods of human growth and development as well as ontogeny of the entire organ /systems of body. Analyze the congenital malformations; know the etiological factors involved in abnormal development and their effects on functions.
3. be able to plan and implement teaching programmes for under-graduate medical/dental students and paramedical courses.
4. be able to plan and conduct evaluation of medical and allied courses.
5. be able to use different teaching methods and modern learning resources for teaching and research presentations.
6. have ability to critically appraise published literature, plan investigative procedures for research, and interpret data and to broaden his knowledge by keeping abreast with modern developments in the specialty.
7. be able to search online, use information technology to his advantage and critically evaluate medical literature and draw his own conclusion.
8. be a competent anatomist, capable of organizing specialty department.

### **POST GRADUATE TRAINING**

The training period of three year MD anatomy course, includes:

## **I. Teaching:**

The post-graduate teaching includes:

Lectures: Didactic lectures (minimum 12 every year) are taken on selected topics in gross anatomy, microanatomy, embryology, neuroanatomy, histochemistry and genetics.

Practical exercises: Faculty members teach the students regularly during practicals.

Group discussions: The post-graduate students are encouraged to discuss the demonstration topics with faculty members before teaching the undergraduate students.

## **II. Training:**

The students are trained in:

**a) Communication skills:** Each student participates in

- Seminars
- Group discussions
- Journal Club

**b) Hands on experience:**

Techniques in microanatomy, neuroanatomy, gross anatomy (embalming, dissection, mounting of specimens), embryology, histochemistry and genetics.

**c) Teaching Skill:**

All postgraduate students are encouraged to take part in undergraduate teaching programmes in the form of demonstrations, tutorials and practicals.

Each postgraduate student is trained in the third year to take lectures under the supervision of a senior faculty member.

**d) Educational technology:**

- Preparation of teaching modules, museum specimens and casts
- Preparation of audiovisual aids for teaching
- Preparation of posters for presentation in conferences/workshops
- Preparation of manuscript for publication in journals
- Participation / organization of symposia/workshops

### **III. Research:**

**Thesis :** Every student is required to work on a research project and submit the thesis at the end of two years of training period. This training will help them to develop skills in planning, designing and conduct of research studies.

### **SCOPE OF TRAINING:**

#### **SECTION-1: GROSS ANATOMY**

##### **Course content**

Osteology, arthrology, muscle & fascia, skin, nervous tissue, principles governing arterial, venous and lymphatic pathways and innervation of blood vessels, detailed gross anatomy of the human body including sectional anatomy and evolution, functional anatomy and anatomical basis of clinical conditions, principles involved in plain radiography, special investigative procedures and newer imaging techniques, forensic anatomy and living anatomy.

##### **PRACTICALS**

1. Dissection of entire body.
2. Anatomical techniques: Fixation and preservation of dead bodies, preparation of museum specimens, preparation of bones, preparation of corrosion casts and plastination.
3. Interpretation of the normal plain & special X-rays of whole body, Computerized Tomography (CT) Scan, Sonogram, MRI etc. and correlate with the sectional anatomy of the body.
4. Surface marking & living anatomy

#### **SECTION – 2**

##### **a. DEVELOPMENTAL ANATOMY**

##### **Course content**

Gametogenesis, fertilization, implantation, development of placenta, early human embryonic development, assisted reproductive technology, the basic principles and sequential development of the organs and systems, the critical stages of development and the effects of common teratogens, genetic mutations and environmental hazards, developmental basis of the variations, physiological correlations of congenital anomalies and postnatal growth & development.

## **PRACTICAL**

Models/ specimens of human development and congenital malformations

### **b. HISTOLOGY AND HISTOCHEMISTRY**

#### **Course content**

Light and electron microscopic detailed structure of cell and its components, tissues of body, systems/organs and structural basis of function, general principles of light and other microscopes and principles of basic histological and cytological techniques.

## **PRACTICAL**

Light microscopy and its applications, electron microscopy and its applications, identification of normal and abnormal organelles in electron micrographs.

Preparation of tissues for histological sections

Histological Staining: routine & special, identification of artifacts and three-dimensional interpretation.

### **c. IMMUNOLOGY**

#### **Course content**

Immune system and the cell types involved in defense mechanisms of the body. Gross features, cytoarchitecture, functions, development and histogenesis of various primary and secondary lymphoid organs in the body. 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. Common techniques employed in cellular immunology and histocompatibility testing.

### **d. GENETICS**

#### **Course content**

Structure of gene and chromosomes, karyotyping and banding patterns, chromosomal aberrations, inheritance, molecular genetics, mutations, genome imprinting, cancer genetics, pharmacogenetics, reproduction genetics (male and female Infertility, assisted reproduction, preimplant genetics, prenatal diagnosis, genetic counselling).

## **SECTION – 3: NEUROANATOMY**

### **Course content:**

Development and structural organization of various parts of the nervous system with particular reference to their connections and functions, localisation and effects of lesions in different parts of the central nervous system and nerve injuries.

### **PRACTICALS**

Identification of structures in stained sections of brain and spinal cord.

Staining nervous tissue using Nissl's staining.

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

## **SECTION- 4: APPLIED ANATOMY AND RECENT ADVANCES**

### **Course content**

Clinical correlations of structure and functions of human body and anatomical basis for clinical presentations. Applications of knowledge of embryology, microanatomy, neuroanatomy to comprehend deviations from normal. Recent advances in medical sciences that facilitate comprehension of structure-functional correlations and its applications in clinical problem solving.

### **EVALUATION OF TRAINING:**

Regular internal evaluation is done in the form of written and oral examination including dissection and histology practicals in each semester and grading is done as follows:

A	>80%
B	70-79%
C	60- 69%
D	50 - 59%
E	40-49%
E	<39%

Each student is given a formal feed back on his/her weak points in teaching/training programmes and how to overcome his/her deficiencies.

## **UNIVERSITY EXAMINATION**

### **THEORY**

**Paper I:** Gross anatomy including evolution, comparative anatomy, functional, radiological & forensic anatomy (Section I)

**Paper II:** Microscopic Anatomy, developmental anatomy and genetics (section-2)

**Paper III:** Neuroanatomy including its development and microscopic structure (section-3)

**Paper IV:** Applied Anatomy & recent advances (Section 4)

**Each paper has 3 questions**

Q1. Structured long question

Q2. Three short questions

Q3. Three short questions

## **PRACTICAL AND VIVA**

### **1. Histology**

#### **Histological techniques:**

Paraffin block making, section cutting, staining and identification of the slide.

#### **Histology Viva**

Ten stained slides are given for identification under light microscope followed by viva-voce examination.

### **2. Dissection**

Window dissection of the body part allotted is followed by viva-voce examination.

### **3. Viva-voce Examination**

Gross anatomy

Soft Parts

Hard Parts

Living Anatomy

Radiological Anatomy

Embryology

Microteaching on any short topic allotted by the examiners

### **Assessment of theory and practical**

All internal and external examiners give grades and a candidate must secure grade D and above in both theory and practicals to pass.

**Thesis evaluation**

Thesis is sent to external examiners for evaluation and result is declared before the final University examination.

**Recommended Books****Gross Anatomy**

Williams & Roger Warwick: **Gray's Anatomy**, 39<sup>th</sup> ed., 2005, Churchill Livingstone London, Malbourne 1

John, V & Bassamjian, and M.D.: **Grant's Methods of Anatomy**, 10th ed., 1999, S.Chand & Co Ltd.

Romanes, G.J.: **Cunningham's Textbook of Anatomy**, 12th Ed, 1981, McMillan Press.

Snell RS: **Clinical Anatomy by Regions**, 8th ed. 2008, Lippincott Williams & Wilkins Baltimore.

Moore & Dalley: **Clinically oriented Anatomy**, 5th ed. 2006 Lippincott Williams & Wilkins, Baltimore.

**Histology**

Junqueira et al: **Basic Histology: Text & Atlas With CD Rom.**, 10th ed., 2003 Prentice Hall, USA

Paul R. Wheater, H. George Surkitt & Victor G. Banials: **Functional Histology: A Text and Colour Atlas**. 4th ed., 2000 ELBS, Churchill Livingstone.

Fawcett Don W. & Bloom William: **A Textbook of Histology**, 12th ed., 2002, Champion & Hall,

**Genetics**

Thompson J.S.: **Genetics in medicine**, 6th edition, 2001 M.W. Thompson W.B. Saunders & Co. Philadelphia, London.

**Neuroanatomy**

Stuin J and Carpenter MB: **Human Neuroanatomy**, 9th edition, 1996

Inderbir Singh: **Textbook of Human Neuroanatomy**, 7th ed. 2006, Jaypee Publishers.

Snell R.S.: **Clinical Neuroanatomy**, 6th ed. 2006, Lippincott Williams & Wilkins.

**Surface & Radiological Anatomy**

Slaby and Jacob: **Radiographic Anatomy** 1990 National Medical Series for Independent Study, Harwal Publishing Philadelphia

Halim R.: **Surface & Radiological Anatomy**, 2nd ed., 1993, CBS Publishers, India.

**Embryology**

Sadler Langman's: **Medical Embryology**, 10th ed., 2006, Williams & Wilkins, Baltimore

William J L: **Human Embryology**, 3rd ed.2001, Churchill Livingstone  
Moore Persaud:**The Developing Human Clinically Oriented Embryology** ,6th ed  
,1999,Harcourt Publishers International company',Singapur.

### **Journals**

Journal of Anatomical Society of India.  
Journal of Anatomy (London)  
Anatomical Record  
American Journal of Anatomy  
Clinical Adjuncts.  
Anatomical Adjuncts.  
Cells, Tissues & Organs (Formerly Acta Anatomica)