



# MGM INSTITUTE OF HEALTH SCIENCES

Accredited by NAAC with 'A' Grade

(Deemed University u/s 3 of UGC Act, 1956)

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## CHOICE BASED CREDIT SYSTEM (CBCS)

(With effect from 2019-20 Batches)

### Curriculum for M.Sc Medical Anatomy

Approved as per Resolution No. 3.2.1.6.i of BOM -57/2019, Dated 26/04/2019


Approved as per Resolution No. 3.1.1.4 of BOM-59/2019, dated 11/11/2019

Approved as per Resolution No. 3.2.1.5 of BOM-62/2020, dated 16/09/2020

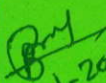
Approved as per Resolution No. 3.2.1.6 of BOM-62/2020, dated 16/09/2020

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Post facto approval will be accorded to certain changes by AC-39/2021 & BOM-63/2021

  
Dr. Rajesh B. Goel  
Registrar

MGM Institute of Health Sciences  
(Deemed University u/s 3 of UGC Act, 1956)  
Navi Mumbai- 410 209

  
11-1-2022

LEARNING OUTCOME BASED CURRICULAM FRAMEWORK

M.Sc Medical Anatomy Course

Sr. No.		
1	Objectives of PG Education	<ul style="list-style-type: none"><li>• At the end of the course, the students shall be able to</li><li>• <b>1. Knowledge</b><ol style="list-style-type: none"><li>1. Describe gross anatomy of entire body including upper limb, lower limb, thorax, abdomen, pelvis, perineum, head and neck, brain and spinal cord.</li><li>2. Explain the normal disposition of gross structure, and their interrelationship in the human body. She/He should be able to analyze the integrated functions of organs systems and locate the site of gross lesions according to deficits encountered.</li><li>3. Describe the process of gametogenesis, fertilization, implantation and placenta formation in early human embryonic development along with its variation and applied anatomy.</li><li>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. She/He should be able to explain developmental basis of variations and congenital anomalies.</li><li>5. Explain the principles of light, transmission and scanning, compound, electron, fluorescent and virtual microscopy.</li><li>6. Describe the microscopic structure of various tissues &amp; organs and correlate structure with functions as a prerequisite for understanding the altered state in various disease processes.</li><li>7. Describe knowledge about cell and its components, cell cycle, cellular differentiation and proliferation.</li><li>8. Describe structure, number, classification, abnormalities and syndromes related to human chromosomes.</li><li>9. Describe important procedures in cytogenetics and molecular genetics with its application.</li><li>10. Demonstrate knowledge about single gene pattern</li></ol></li></ul>

		<p>inheritance, intermediate pattern and multiple alleles, mutations, non-mendelian inheritance, mitochondrial inheritance, genome imprinting and parental disomy.</p> <ol style="list-style-type: none"> <li>11. Demonstrate knowledge about reproduction genetics, assisted reproduction, prenatal diagnosis, genetic counseling and ethics in genetics.</li> <li>12. Explain principles of gene therapy and its applied knowledge.</li> <li>13. 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.</li> <li>14. Demonstrate knowledge about common techniques employed in cellular immunology and histo compatibility testing.</li> <li>15. Demonstrate applications of knowledge of structure &amp; development of tissue organ system to comprehend deviations from normal.</li> <li>16. Demonstrate knowledge about recent advances in medical sciences which facilitate comprehension of structure function correlations and applications in clinical problem solving.</li> <li>17. Demonstrate knowledge about surface marking of all regions of the body.</li> <li>18. Demonstrate knowledge about outline of comparative anatomy of whole body and basic human evolution</li> <li>19. Demonstrate knowledge about identification of human bones, determination of sex, age, and height for medico legal application of anatomy</li> </ol> <ul style="list-style-type: none"> <li>• <b>2. Skills</b></li> </ul> <p>At the end of the course the student should be able to:</p> <ol style="list-style-type: none"> <li>1. Identify, locate and demonstrate surface marking of clinically important structures in the cadaver and correlate it with living anatomy.</li> <li>2. Acquire mastery in dissection skills, embalming, tissue preparation, and staining and museum preparation.</li> <li>3. Locate and identify clinically relevant structures in dissected cadavers.</li> <li>4. Locate and identify cells &amp; tissues under the microscope.</li> <li>5. Identify important structures visualized by imaging techniques, specifically radiographs, computerized tomography (CT) scans, MRI and ultrasonography.</li> <li>6. Demonstrate various movements at the important joints and actions of various groups of muscles in the human body.</li> <li>7. Demonstrate anatomical basis of common clinical procedures expected to be performed by a basic medical doctor.</li> <li>8. Demonstrate different methods of teaching-learning and make presentations of the subject topics and research outputs</li> </ol>
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**Specific practice based competencies:**

**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 a) soft parts b) models c) charts
- 1.6 Preparation and preservation of human bones / skeleton as assigned by the faculty

**2. Histology:**

- 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

**3. Histochemical Methods:**

- 3.1 Practical classes for staining of glycogen, mucopolysaccharides, alkaline phosphatase acid phosphatase, and calcium

**4. Cytogenetics:**

- 4.1 Knowledge about preparation of media, different solutions, stains etc.
- 4.2 Preparation of buccal smear for sex chromatin Human chromosome preparation from peripheral blood and karyotyping.
- 4.3 Banding techniques ( G and C)
- 4.4 Making of Pedigree charts for study of patterns of inheritance.
- 4.5 Chromosomal Analysis.

**5. Neuroanatomy:**

- 5.1 Dissection of brain and spinal cord for teaching and learning

		<p>purpose</p> <p>5.2 Preparation of brain and spinal cord macroscopic and microscopic sections and identification of different parts in them.</p> <p>5.3 Discussions on clinical problems related to neurological disorders and anatomical explanation for the same.</p>
2	Generic Graduate Attributes	<p><b>Scholarly Attitude :</b></p> <ul style="list-style-type: none"> <li>• Acquire competencies in gross and surface anatomy, Neuroanatomy, embryology, genetics, histology, radiological anatomy, applied aspects and recent advances of the above mentioned branches of anatomy to teach medical students.</li> <li>• Acquire mastery in dissection skills, embalming, tissue preparation, staining and museum preparation.</li> <li>• Acquire skills in teaching, research methodology, epidemiology &amp; basic information technology.</li> <li>• Acquire knowledge in the basic aspects of Biostatistics and research methodology.</li> <li>• Has knowledge to plan the protocol of a thesis, carry out review of literature, execution of research project and preparation of report.</li> <li>• Has ability to use computer applications Microsoft office (Microsoft word, excel, power point), Internet, Searching scientific databases (e.g. PubMed, Medline, Cochrane reviews).</li> <li>• Acquire skills in paper &amp; poster preparation, writing research papers and Thesis.</li> </ul> <p><b>Research Aptitude :</b></p> <ul style="list-style-type: none"> <li>• Making presentations of the subject topics and research outputs.</li> <li>• 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.</li> <li>• Demonstrate the ability to correlate the clinical conditions to the anatomical/ embryological/hereditary factors.</li> <li>• Demonstrate the ability to evaluate scientific/clinical information and critically analyze conflicting data and</li> </ul>

		<p>hypothesis.</p> <ul style="list-style-type: none"> <li>• Develop honest work ethics and empathetic behavior with students and colleagues.</li> <li>• Acquire capacity of not letting his/her personal beliefs, prejudices, and limitations come in the way of duty.</li> <li>• Acquire attitude and communication skills to interact with colleagues, teachers and students.</li> <li>• Practicing different methods of teaching-learning.</li> </ul> <p><b>Exemplary Leadership:</b></p> <ul style="list-style-type: none"> <li>• Demonstrate self-awareness and personal development in routine conduct. (Self awareness)</li> <li>• Communicate effectively with peers, students and teachers in various teaching learning activities. (Communication)</li> <li>• Demonstrate a. Due respect in handling human body parts &amp; cadavers during dissection. (Ethics &amp; Professionalism) b. Humane touch while demonstrating living surface marking in subject/patient. (Ethics &amp; Professionalism)</li> <li>• Acquire capacity of not letting his/her personal beliefs, prejudices and limitations come in the way of duty.</li> <li>• Appreciate the issues of equity and social accountability while exposing students to early clinical exposure. (Equity and social accountability).</li> </ul>
3	Desired Learning Outcomes of Degree	<p><b>Element of Critical thinking</b></p> <ol style="list-style-type: none"> <li>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.</li> <li>2. Demonstrate the ability to correlate the clinical conditions to the anatomical/ embryological/hereditary factors.</li> <li>3. Demonstrate the ability to evaluate scientific/clinical information and critically analyze conflicting data and hypothesis.</li> </ol> <p><b>Dynamic Professionalism</b></p>

		<ol style="list-style-type: none"> <li>1. Develop honest work ethics and empathetic behavior with students and colleagues.</li> <li>2. Acquire capacity of not letting his/her personal beliefs, prejudices, and limitations come in the way of duty.</li> <li>3. Acquire attitude and communication skills to interact with colleagues, teachers and students.</li> </ol>
4	Proportion of knowledge / Skill / Soft Skill in Curriculum	<b>Effective Communication Skills</b> <ol style="list-style-type: none"> <li>1. Practicing different methods of teaching-learning.</li> <li>2. Making presentations of the subject topics and research outputs</li> </ol>
5	Curriculum and Employability	<b>Global Competencies :</b> <ol style="list-style-type: none"> <li>1. Skilled and employed to be a globally competent teacher, researcher and anatomist.</li> </ol>

## **Name of the Degree: M.Sc. Medical Anatomy**

### **AIMS OF THE PROGRAM**

Medical Anatomists are in great demand of India and abroad.

Postgraduate qualification in Anatomy can earn to placements in teaching medical institutes, Paramedical courses, medical coding centres and research laboratories run by the government and the corporate sector.

In academics, one can go for higher qualifications like Ph.D. in various field of biology. There is a great demand of this course abroad as most of the foreign countries are looking for expert in this field. After completion of the course, one can work as Tutor in a Medical set up or as a Research Assistant in Research Laboratories.

**Duration of Study:** The duration of the study for M.Sc. Medical Anatomy will be of six semesters spread over three years.

### **Program pattern- Commencement of Semester**

- First Semester: August
- Second Semester: February
- Third Semester: August
- Fourth Semester: February
- Fifth Semester: August
- Sixth Semester: February

**Eligibility Criteria:** As a minimum criterion of eligibility, aspiring candidates are needed to have attained a B.Sc. in any discipline of Life Sciences, Biosciences, Bachelor's degree in any of Physics, Biological Sciences, M.B.B.S, BDS, BAMS, BHMS, B.Pharm., B.Tech (Biotechnology), Bachelor's Degree in Agricultural, Veterinary and Fishery Sciences, or equivalent examination with a minimum aggregate score of 50%.

**For any query visit the website: [www.mgmuhs.com](http://www.mgmuhs.com)**

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### **CURRICULUM FOR M. Sc. Medical Anatomy**



I st YEAR

Semester I						
Syllabus Ref. No.	Subject	Credits	Teaching hours	Marks		
Theory				Internal Assessment	Semester Exam	Total
MA101T	Medical Anatomy	4	4	20	60	80
MA102T	Medical Physiology	4	4	20	60	80
MA103T	Medical Biochemistry	4	4	20	60	80
MA104T	Medical Pharmacology	4	4	20	60	80
MA105T	Medical Microbiology	4	4	20	60	80
Practical						
MA101P	Medical Anatomy	1	2	20	50	70
MA102P	Medical Physiology	1	2	20	50	70
MA103P	Medical Biochemistry	1	2	20	50	70
MA104P	Medical Pharmacology	1	2	20	50	70
MA105P	Medical Microbiology	1	2	20	50	70
<b>Total</b>		<b>25</b>	<b>30</b>	<b>200</b>	<b>550</b>	<b>750</b>

Semester II							
Syllabus Ref. No.	Subject	Credits	Teaching hours	Marks			
Theory				Internal Assessment	Semester Exam	Total	
MA201T	Medical Anatomy	4	4	20	60	80	
MA202T	Medical Physiology	4	4	20	60	80	
MA203T	Medical Biochemistry	4	4	20	60	80	
MA204T	Medical Pharmacology	4	4	20	60	80	
MA205T	Medical Microbiology	4	4	20	60	80	
MA206T	Research Methodology & Biostatistics (Core Course)	4	4	20	60	80	
Practical							
MA201P	Medical Anatomy	1	2	20	50	70	
MA202P	Medical Physiology	1	2	20	50	70	
MA203P	Medical Biochemistry	1	2	20	50	70	
MA204P	Medical Pharmacology	1	2	20	50	70	
MA205P	Medical Microbiology	1	2	20	50	70	
MA206P	Research Methodology & Biostatistics (Core Course)	1	2	20	50	70	
<b>Total</b>		<b>30</b>	<b>36</b>	<b>240</b>	<b>660</b>	<b>900</b>	

2<sup>ND</sup> YEAR

Semester III							
	Syllabus Ref. No.	Subject	Credits	Teaching hours	Marks		
	Theory				Internal Assessment	Semester Exam	Total
	MA301T	General Anatomy, General Histology, General Embryology, Upper limb, Thorax	4	4	20	100	120
		<b>Core Elective course***</b>			Internal Exam 80 Marks*		
	MA302CET	Developmental Genetics					
	MA303CET	Radiological Anatomy	4	4			
	MA304CET	Surgical Anatomy					
	MA305	Clinical Postings (Radiology, Surgery, Orthopedics, FMT, Genetics )	6	18		20 *	20
	MA306	Dissertation/Project Proposal**	5	10		20*	20
	MA307	Seminar, Microteaching, Journal club presentation	2	2		20*	20
	<b>Practical</b>						
	MA301P	General Anatomy, General Histology, General Embryology, Upper limb, Thorax	2	4	20	100	120
		<b>Core Elective practical***</b>			Internal Exam 50 Marks*		
	MA302CEP	Developmental Genetics	1	2			
	MA303CEP	Radiological Anatomy					
	MA304CEP	Surgical Anatomy					
		<b>Total</b>	24	44	40	260	300

\* Exam to be Taken at Departmental Level

Semester IV								
	Syllabus Ref. No.	Subject	Credits	Teaching hours	Marks			
	Theory				Internal Assessment	Semester Exam	Total	
	MA401T	Abdomen and Pelvis, Lower limb with systemic histology and embryology, Genetics	4	4	20	100	120	
		<b>General elective ***</b>	4	4				
	MA402GET	Bioethics, Biosafety, IPR & Technology Transfer	Internal Exam of 80 Marks *					
	MA403GET	Disaster Management and Mitigation Resources						
	MA404GET	Human rights						
	MA405	Clinical Postings (Radiology, Surgery, Orthopedics, FMT, Genetics )	7	21		20*	20	
	MA406	Dissertation / Project**	5	10		20*	20	
	MA407	Seminar, Microteaching, Journal club presentation	2	2		20*	20	
	<b>Practical</b>							
	MA401P	Abdomen and Pelvis, Lower limb with systemic histology and embryology, Genetics	2	4	20	100	120	
		<b>Total</b>	24	45	40	260	300	

\* Exam to be Taken at Departmental Level

IIIrd YEAR

Semester V							
	Syllabus Ref. No.	Subject	Credits	Teaching hours	Marks		
	Theory				Internal Assessment	Semester Exam	Total
	MA501T	Head, Face and Neck, NeuroAnatomy with Systemic histology and Embryology	4	4	20	100	120
	MA502	Clinical Postings (Radiology, Surgery, Orthopedics, FMT, Genetics )	6	18		20*	20
	MA503	Dissertation / Project**	10	20		20*	20
	MA504	Seminar/Journal Club	2	2		20*	20
	<b>Practical</b>						
	MA501P	Head, Face and Neck, Neuro Anatomy with Systemic histology and Embryology	1	2	20	100	120
		<b>Total</b>	23	46	40	260	300

\* Exam to be Taken at Departmental Level

Semester VI							
	Syllabus Ref. No.	Subject	Credits	Teaching hours	Marks		
	Theory				Internal Assessment	Semester Exam	Total
	MA601T	Gross Anatomy, Histology and Embryology, Neuro anatomy and Genetics	4	4	20	100	120
	MA602	Clinical Postings (Radiology, Surgery, Orthopedics, FMT, Genetics )	5	15		20*	20
	MA603	Seminar/Journal Club	1	1		20*	20
	Practical						
	MA601P	Gross Anatomy, Histology and Embryology, Neuro anatomy and Genetics	2	4	20	50	70
	MA602P	<b>Dissertation/Project**</b>	12	24		70	70
		<b>Total</b>	24	48	40	260	300

\* Exam to be Taken at Departmental Level

\*\* (a) **Dissertation / Project Course** commences in II nd Semester.

Students should undergo ICMR Online Course of Research Methodology before submitting the protocol for their Dissertation. ( Ist / II nd Semester)

Allotment of Guide	II nd Semester ( On or Before 30 April )
Submission of Protocol for Scientific and Ethical Committee Approval	III rd Semester ( On or Before 14 th Aug )
Scientific and Ethical Approval	III rd Semester ( On or Before 14 th October)
Commencement of Research Work	III rd Semester 15 <sup>th</sup> October
Submission of Thesis	VI th Semester 31 st March

\*\*\***(Elective): Any one subject is to be chosen from the subjects offered** (Subjects offered may change from time to time depending on the availability of expertise)

Elective courses may or may not have practical and/or field work.

**M.Sc. MEDICAL ANATOMY  
SEMESTER - 1 SYLLABUS**

**Hours dedicated for every week: 6 (Theory: 4 Practical: 2)**

<b>Course Objective ( Teaching Objectives)</b>	<ul style="list-style-type: none"><li>• To teach basic Anatomical concepts related to General Anatomy, General histology, General Embryology and Musculoskeletal system</li></ul>
<b>Course Outcomes ( learning Objectives)</b>	<ul style="list-style-type: none"><li>• To understand the basic anatomical concepts of General Anatomy</li><li>• To understand the basic anatomical concepts of General Histology</li><li>• To understand the basic anatomical concepts of General Embryology</li><li>• To understand the basic anatomical concepts of Muscular System</li><li>• To understand the basic anatomical concepts of Skeletal System</li></ul>

Unit no.	Theory Topics	Hours allotted No. of-- hrs																
1.	<p><b>General Anatomy</b></p> <table border="1"> <thead> <tr> <th>Name of the Subunit</th> <th>Topics covered under each subunit</th> </tr> </thead> <tbody> <tr> <td>1.1 Terminology</td> <td>General anatomy includes introduction to anatomy, Terminology related to anatomy, Different anatomical planes and subdivisions</td> </tr> <tr> <td>1.2 Bone</td> <td>Skeleton system with classification, types of bone, features of long bone, ossification, blood supply</td> </tr> <tr> <td>1.3 Joints</td> <td>General classification with examples, structure of typical synovial joints, Classification of synovial joint with examples, Fibrous joints, Cartilaginous joints, Nomenclature</td> </tr> <tr> <td>1.4 Muscles</td> <td>General features of muscles, classification with examples, types of skeletal muscles, Structures associated with muscle, Cardiac muscle and Smooth muscle, Functions, Naming of muscles</td> </tr> <tr> <td>1.5 Cardiovascular system</td> <td>Types of circulations, Classification of blood vessels, Anastomosis, Collateral circulation, End arteries, Vasa vasorum</td> </tr> <tr> <td>1.6 Nervous System</td> <td>Subdivisions of nervous system, Spinal cord and spinal segments, nerve fibers and myelination, Autonomic nervous system</td> </tr> <tr> <td>1.7 Integumentary System</td> <td>Introduction to skin and fascia, Skin components and layers, types of skin, Fascia, Appendages of skin, Functions</td> </tr> </tbody> </table>	Name of the Subunit	Topics covered under each subunit	1.1 Terminology	General anatomy includes introduction to anatomy, Terminology related to anatomy, Different anatomical planes and subdivisions	1.2 Bone	Skeleton system with classification, types of bone, features of long bone, ossification, blood supply	1.3 Joints	General classification with examples, structure of typical synovial joints, Classification of synovial joint with examples, Fibrous joints, Cartilaginous joints, Nomenclature	1.4 Muscles	General features of muscles, classification with examples, types of skeletal muscles, Structures associated with muscle, Cardiac muscle and Smooth muscle, Functions, Naming of muscles	1.5 Cardiovascular system	Types of circulations, Classification of blood vessels, Anastomosis, Collateral circulation, End arteries, Vasa vasorum	1.6 Nervous System	Subdivisions of nervous system, Spinal cord and spinal segments, nerve fibers and myelination, Autonomic nervous system	1.7 Integumentary System	Introduction to skin and fascia, Skin components and layers, types of skin, Fascia, Appendages of skin, Functions	7 hrs
Name of the Subunit	Topics covered under each subunit																	
1.1 Terminology	General anatomy includes introduction to anatomy, Terminology related to anatomy, Different anatomical planes and subdivisions																	
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2.	<p><b>General Histology</b></p> <table border="1"> <thead> <tr> <th>Name of the Subunit</th> <th>Topics covered under each subunit</th> </tr> </thead> <tbody> <tr> <td>2.1 Epithelium and glandular tissue</td> <td>Classification of epithelia, Simple epithelium and types, Stratified epithelium and types, Goblet cells, Transitional epithelium, Basement membrane, Surface projections and junctions, Classification of glandular tissue with suitable examples</td> </tr> <tr> <td>2.2 Connective tissue</td> <td>Components of connective tissue, Fibres, Ground substance, Cells of connective tissue, Loose connective tissue, Dense connective tissue, Adipose tissue</td> </tr> <tr> <td>2.3 Skeletal system</td> <td>Classification of cartilage with examples, Composition of Cartilage and bone, Cells of bone, Bone matrix, Microscopic anatomy of bones</td> </tr> <tr> <td>2.4 Muscular system</td> <td>Microscopic structure of skeletal muscle, cardiac muscle and smooth muscle, Differences between the muscle structures</td> </tr> </tbody> </table>	Name of the Subunit	Topics covered under each subunit	2.1 Epithelium and glandular tissue	Classification of epithelia, Simple epithelium and types, Stratified epithelium and types, Goblet cells, Transitional epithelium, Basement membrane, Surface projections and junctions, Classification of glandular tissue with suitable examples	2.2 Connective tissue	Components of connective tissue, Fibres, Ground substance, Cells of connective tissue, Loose connective tissue, Dense connective tissue, Adipose tissue	2.3 Skeletal system	Classification of cartilage with examples, Composition of Cartilage and bone, Cells of bone, Bone matrix, Microscopic anatomy of bones	2.4 Muscular system	Microscopic structure of skeletal muscle, cardiac muscle and smooth muscle, Differences between the muscle structures	6 hrs						
Name of the Subunit	Topics covered under each subunit																	
2.1 Epithelium and glandular tissue	Classification of epithelia, Simple epithelium and types, Stratified epithelium and types, Goblet cells, Transitional epithelium, Basement membrane, Surface projections and junctions, Classification of glandular tissue with suitable examples																	
2.2 Connective tissue	Components of connective tissue, Fibres, Ground substance, Cells of connective tissue, Loose connective tissue, Dense connective tissue, Adipose tissue																	
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2.4 Muscular system	Microscopic structure of skeletal muscle, cardiac muscle and smooth muscle, Differences between the muscle structures																	



	2.5 Cardiovascular system and nervous system	Microscopic structure of Medium sized artery, Elastic artery, Vein, Structure of neuron, neuroglia, peripheral nerve, Ganglia	
	2.6 Lymphoid system	Cells of lymphoid system, Lymphatic vessels, Microscopic structure of lymphnode, thymus, spleen and tonsil	
<b>3.</b>	<b>Unit:3 General Embryology:</b>		<b>7 hrs</b>
	<b>Name of the Subunit</b>	<b>Topics covered under each subunit</b>	
	3.1 Introduction to Embryology and cell cycles	Basic terminology, Stages of human development, Cell Cycle, Cell division – Mitosis and Meiosis, related abnormalities	
	3.2 Gametogenesis	Primordial germ cells, Spermatogenesis, Spermiogenesis, Oogenesis	
	3.3 Female reproductive Cycles	Ovarian cycle, Structure of Ovum, Changes in Menstrual cycle, Strata of endometrium	
	3.4 Fertilization	Definition, Stages of fertilization, Effects of fertilization	
	3.5 First week of development	Cleavage division, blastocyst, Implantation, Normal and abnormal sites of implantation and related applied embryology	
	3.6 Second week of development	Formation of 2 germ layers, Yolk sac, Chorion and amnion	
	3.7 Third week of development	Gastrulation, Notochord, Neurulation, Folding of embryo	
	3.8 Placenta	Fetal membranes, Chorionic villi, Placenta formation, functions of placenta, Umbilical cord	
<b>4.</b>	<b>Unit:4 Muscular system:</b>		<b>25 hrs</b>
	<b>Name of the Subunit</b>	<b>Topics covered under each subunit</b>	
	4.1 Muscles of upper limb	Muscles of Pectoral region, muscles of arm, Axilla, spaces of axilla, Cubital fossa , muscles of forearm, intrinsic muscles of palm, flexor and extensor retinacula, carpal tunnel and syndrome, Brachial plexus and related nerves	
	4.2 Muscles of lower limb	Femoral triangle, Front of the thigh, Adductor canal, gluteal region, Hamstrings, Popliteal fossa, Muscles of leg, Arches of foot, Nerve supply to lower limb – Femoral nerve, Obturator nerve and Sciatic nerve, Blood supply to lower limb	
	4.3 Muscles of Abdomen	Muscles of anterior abdominal wall, Inguinal canal and hernia, Diaphragm, Muscles of posterior abdominal wall	
	4.4 Muscles of head and neck	Muscles of scalp and face, Muscles of mastication, Posterior triangle, Anterior triangle, Sternocleidomastoid, Trapezius , Related nerve supply	

	4.5 Muscles of thoracic cage	Intercostal space, Intercostal muscles, respiratory movements	
<b>5.</b>	<b>Unit:5 Skeletal System:</b>		
	<b>Name of the Subunit</b>	<b>Topics covered under each subunit</b>	
	5.1 Bones of Head and neck	Norma verticalis, Norma Basalis, Norma Occipitalis, Norma Lateralis, Interior of skull, Mandible	<b>15</b>
	5.2 Vertebral column	Curvatures of vertebral column, General features of vertebrae, Typical and atypical vertebrae, intervertebral disc	
	5.3 Thoracic bones	Sternum, Classification of ribs, General features of typical rib, 1st, 2nd, 10th, 11th and 12th rib features	
	5.4 Upper limb skeleton	Clavicle, Scapula, Humerus, Shoulder joint, Elbow joint, Radius, Ulna, Radioulnar joints, Wrist joint, Bones of hand	
	5.5 Lower limb skeleton	Hip bone, Femur, Hip joint, Knee joint, Tibia, Fibula, Ankle joint, Bones of foot	
	<b>Total</b>		<b>60 hrs</b>

<b>Unit no.</b>	<b>Practical Topics</b>	<b>Hours allotted No. of--hrs</b>
1.	General Anatomy <ul style="list-style-type: none"> <li>• Bone</li> <li>• Joints</li> </ul>	1 hr
2.	<b>General Histology</b> <ul style="list-style-type: none"> <li>• Epithelium</li> <li>• Connective tissue</li> <li>• Cartilage and Bone</li> <li>• Muscular tissue</li> <li>• Vascular tissue</li> <li>• Skin and fascia</li> <li>• Lymphoid Tissue</li> <li>• Nervous tissue</li> </ul>	6 hrs
3.	<b>General Embryology</b> <ul style="list-style-type: none"> <li>• Gametes and Gametogenesis</li> <li>• Cleavage and blastulation</li> <li>• Implantation and Abnormal sites of Implantation</li> <li>• Formation and derivatives of three germ layers</li> <li>• Notochord formation and Neurulation</li> <li>• Folding of embryo</li> <li>• Placenta</li> </ul>	3 hrs
4.	<b>Muscular system</b> <ul style="list-style-type: none"> <li>• Muscles of pectoral region</li> <li>• Muscles of Arm and Cubital fossa</li> <li>• Muscles of forearm</li> <li>• Muscles of palm</li> <li>• Muscles of thigh</li> <li>• Muscles of popliteal fossa and Gluteal region</li> <li>• Muscles of leg</li> <li>• Muscles of foot</li> <li>• Muscles of Thorax</li> <li>• Muscles of abdominal wall</li> <li>• Muscles of head and neck region</li> </ul>	10 hrs
5.	<b>Skeletal System</b> <ul style="list-style-type: none"> <li>• Bones of Upper limb</li> <li>• Bones of Lower limb</li> <li>• Joints of upper limb</li> <li>• Joints of lower limb</li> <li>• Vertebral column</li> <li>• Bones of thoracic cage</li> <li>• Skull and Mandible</li> </ul>	10 hrs
	<b>Total</b>	<b>30 hrs</b>

**Reference Books:**

1. B D Chaurasia Vol-1,2 and 3
2. Vishram Singh Vol-1,2,and 3
3. General Anatomy- B.D.Chaurasia
4. General Histology – Krishna Garg
5. General Embryology – Inderbir Singh

**Hours dedicated for every week: 6 (Theory: 4 Practical: 2)**

<p><b>CourseObjective ( Teaching Objectives)</b></p>	<ul style="list-style-type: none"><li>• To teach basic Anatomical concepts related to Respiratory system, Cardiovascular system, Gastrointestinal system, Genitourinary system, Endocrine system, Nervous system.</li></ul>
<p><b>Course Outcomes ( learning Objectives)</b></p>	<ul style="list-style-type: none"><li>• To understand the basic anatomical concepts of Respiratory system</li><li>• To understand the basic anatomical concepts of Cardiovascular system</li><li>• To understand the basic anatomical concepts of Gastrointestinal system</li><li>• To understand the basic anatomical concepts of Genitourinary system</li><li>• To understand the basic anatomical concepts of Endocrine system</li><li>• To understand the basic anatomical concepts of Nervous system</li></ul>

Unit no.	Theory Topics	Hours allotted No. of-- hrs																		
1.	<p><b>Respiratory System</b></p> <table border="1"> <thead> <tr> <th>Name of the Subunit</th> <th>Topics covered under each subunit</th> </tr> </thead> <tbody> <tr> <td>1.1 Nose and Nasal Cavities</td> <td>General anatomy of Nose, Nasal Septum, Lateral wall of the Nose</td> </tr> <tr> <td>1.2 Larynx</td> <td>Gross features of larynx, Cartilages of larynx, Muscles of larynx, Blood and Nerve supply of larynx</td> </tr> <tr> <td>1.3 Trachea</td> <td>Trachea features, Tracheobronchial tree</td> </tr> <tr> <td>1.4 Bronchopulmonary Segments</td> <td>Features, Segments of Right and Left lung, Blood Supply to segments</td> </tr> <tr> <td>1.5 Pleura</td> <td>Types of pleura, Pleural cavity, Extensions and relations, Blood and Nerve supply</td> </tr> <tr> <td>1.6 Lungs</td> <td>Gross features, Lobes and fissures, Surfaces and relations, Blood and nerve supply</td> </tr> <tr> <td>1.7 Mediastinum</td> <td>Divisions of Mediastinum, Contents of Mediastinum, Thoracic duct, Azygous venous systems.</td> </tr> <tr> <td>1.8 Diaphragm</td> <td>Gross features, Surfaces and relations, Parts and Openings, Clinical features related to Diaphragm, Blood and nerve supply, Functions and Actions of Diaphragm</td> </tr> </tbody> </table>	Name of the Subunit	Topics covered under each subunit	1.1 Nose and Nasal Cavities	General anatomy of Nose, Nasal Septum, Lateral wall of the Nose	1.2 Larynx	Gross features of larynx, Cartilages of larynx, Muscles of larynx, Blood and Nerve supply of larynx	1.3 Trachea	Trachea features, Tracheobronchial tree	1.4 Bronchopulmonary Segments	Features, Segments of Right and Left lung, Blood Supply to segments	1.5 Pleura	Types of pleura, Pleural cavity, Extensions and relations, Blood and Nerve supply	1.6 Lungs	Gross features, Lobes and fissures, Surfaces and relations, Blood and nerve supply	1.7 Mediastinum	Divisions of Mediastinum, Contents of Mediastinum, Thoracic duct, Azygous venous systems.	1.8 Diaphragm	Gross features, Surfaces and relations, Parts and Openings, Clinical features related to Diaphragm, Blood and nerve supply, Functions and Actions of Diaphragm	12 hrs
Name of the Subunit	Topics covered under each subunit																			
1.1 Nose and Nasal Cavities	General anatomy of Nose, Nasal Septum, Lateral wall of the Nose																			
1.2 Larynx	Gross features of larynx, Cartilages of larynx, Muscles of larynx, Blood and Nerve supply of larynx																			
1.3 Trachea	Trachea features, Tracheobronchial tree																			
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1.8 Diaphragm	Gross features, Surfaces and relations, Parts and Openings, Clinical features related to Diaphragm, Blood and nerve supply, Functions and Actions of Diaphragm																			
2.	<p><b>Cardiovascular System</b></p> <table border="1"> <thead> <tr> <th>Name of the Subunit</th> <th>Topics covered under each subunit</th> </tr> </thead> <tbody> <tr> <td>2.1 Pericardium</td> <td>Parts and divisions of pericardium, Sinuses of pericardium, Blood and nerve supply of pericardium</td> </tr> <tr> <td>2.2 Heart</td> <td>External features, Internal features of heart with right atrium in detail, Coronary circulation, Nerve supply of heart</td> </tr> <tr> <td>2.3 Major vessels related to heart</td> <td>Aorta in detail, Superior and Inferior vena cava, Pulmonary vessels</td> </tr> </tbody> </table>	Name of the Subunit	Topics covered under each subunit	2.1 Pericardium	Parts and divisions of pericardium, Sinuses of pericardium, Blood and nerve supply of pericardium	2.2 Heart	External features, Internal features of heart with right atrium in detail, Coronary circulation, Nerve supply of heart	2.3 Major vessels related to heart	Aorta in detail, Superior and Inferior vena cava, Pulmonary vessels	6hrs										
Name of the Subunit	Topics covered under each subunit																			
2.1 Pericardium	Parts and divisions of pericardium, Sinuses of pericardium, Blood and nerve supply of pericardium																			
2.2 Heart	External features, Internal features of heart with right atrium in detail, Coronary circulation, Nerve supply of heart																			
2.3 Major vessels related to heart	Aorta in detail, Superior and Inferior vena cava, Pulmonary vessels																			
3.	<p><b>Unit:3 Gastrointestinal System:</b></p> <table border="1"> <thead> <tr> <th>Name of the Subunit</th> <th>Topics covered under each subunit</th> </tr> </thead> <tbody> <tr> <td>3.1 Tongue</td> <td>Gross features, Divisions, Muscles of tongue, Blood Supply, Nerve Supply in detail.</td> </tr> </tbody> </table>	Name of the Subunit	Topics covered under each subunit	3.1 Tongue	Gross features, Divisions, Muscles of tongue, Blood Supply, Nerve Supply in detail.	16 hrs														
Name of the Subunit	Topics covered under each subunit																			
3.1 Tongue	Gross features, Divisions, Muscles of tongue, Blood Supply, Nerve Supply in detail.																			

	3.2 Soft Palate	Gross features, Muscles of soft palate, Blood and nerve supply of soft palate	
	3.3 Pharynx	Gross features, Subdivisions, Features of Naso pharynx, Features of Oropharynx, Features of Laryngo Pharynx, Muscles of Pharynx, Blood and Nerve Supply.	
	3.4 Peritoneum	Divisions, Peritoneal reflections, Peritoneal Folds, Lesser Sac	
	3.5 Oesophagus and Stomach	Oesophageal -divisions, Muscles, Constrictions, Blood and nerve supply. Stomach – Gross features, Surfaces and relations, Interior, Blood and Nerve Supply	
	3.6 Small Intestine	Duodenum- Features, divisions, Interior, relations, Blood and nerve supply, General features of Jejunum and Ileum, Differences between each part of small intestine.	
	3.7 Large intestine	Features, divisions, Cecum in detail, Appendix in detail, Blood supply, Differences between small and large intestine.	
	3.8 Rectum and Anal Canal	Rectum – Features, Interior, Folds, Blood supply and Nerve supply, Anal canal – Features, Muscles, Interior, Clinical Anatomy.	
	3.9 Liver and Extra hepatic biliary apparatus (EHBA)	Liver – gross features, Segments, lobes, Surfaces and relations, Porta hepatis, Blood supply, EHBA – Gall bladder, Cystic duct, Bile ducts	
	3.10 Pancreas	Gross features, Surfaces and relations, Blood supply and Applied anatomy	
	3.11 Spleen	Gross features, Surfaces and relations, Blood supply and Applied anatomy	
	3.12 Abdominal Aorta	Features, Branches and relations	
<b>4.</b>	<b>Unit:4 Genitourinary system:</b>		
	<b>Name of the Subunit</b>	<b>Topics covered under each subunit</b>	
	4.1 Kidney	Gross features, Surfaces and relations, Interior, Blood supply, Applied Anatomy	
	4.2 Ureter and Urinary Bladder	Ureter - Gross features, Extensions and divisions, Constrictions, Blood supply, Applied Anatomy, Urinary Bladder - Gross features, Surfaces and relations, Interior, Blood supply, Applied Anatomy	
	4.3 Male reproductive system	Testis – Gross features, Surfaces and coverings, Relations, Interior, Blood supply, Applied Anatomy, Epididymis, Vas deferens, Prostate, and External genitalia of Male.	
	4.4 Female Reproductive System	Uterus – Gross features, Surfaces and relations, Supports of uterus, Interior and Blood supply. Ovaries – Surfaces, relations, Blood supply, Fallopian tubes – parts, relations, blood supply	
	4.5 Urethra	Male And Female urethra – Extension, parts, relations, interior, applied.	<b>10 hrs</b>

<b>5.</b>	<b>Unit:5 Endocrine System:</b>		<b>3 hrs</b>
	<b>Name of the Subunit</b>	<b>Topics covered under each subunit</b>	
	5.1 Thyroid Gland and Parathyroids	Gross features of thyroid gland, coverings, Surfaces and relations, blood supply, Applied anatomy and Parathyroids	
	5.2 Pituitary Gland	Gross features, Parts and divisions, Relations, Composition, Blood supply and Functions	
	5.3 Suprarenal Gland	Gross features, Coverings, Relations, Blood supply	
<b>6.</b>	<b>Unit:6 Nervous System:</b>		<b>13 hrs</b>
	<b>Name of the Subunit</b>	<b>Topics covered under each subunit</b>	
	6.1 Meninges and Dural Venous Sinuses	Meninges, Dural folds, Dural venous sinuses- Classification, Cavernous sinus in detail	
	6.2 Spinal Cord	External features, Parts and divisions, Section of spinal cord showing ascending and descending tracts, Spinal nerves, Blood supply	
	6.3 Brain Stem	External features of medulla, Pons and Midbrain, Fourth ventricle	
	6.4 Cerebellum	Gross features, Lobes and fissures, surfaces and relations, Blood supply and Applied Anatomy	
	6.5 Cerebrum	Sulci and Gyri, Functional areas of brain, White matter of the brain, Lateral ventricle, Third ventricle, Blood supply of brain	
	6.6 Cranial nerves	Cranial nerves – I-XII, Facial nerve in detail, Hypoglossal nerve in detail, Trigeminal nerve in detail.	
	<b>Total</b>		<b>60 hrs</b>

<b>Unit no.</b>	<b>Practical Topics</b>	<b>Hours allotted No. of---hrs</b>
1.	<b>Respiratory System</b> <ul style="list-style-type: none"> <li>• Sagittal section of HFN</li> <li>• Larynx and Trachea</li> <li>• Lung</li> <li>• Bones of thorax</li> <li>• Structures in Mediastinum</li> <li>• Paranasal Air Sinuses</li> </ul>	5 hrs
2.	<b>Cardiovascular System</b> <ul style="list-style-type: none"> <li>• Exterior of heart</li> <li>• Interior of heart</li> <li>• Major vessels related to heart</li> </ul>	3 hrs
3.	<b>Gastrointestinal System</b> <ul style="list-style-type: none"> <li>• Sagittal section of HFN</li> <li>• Stomach</li> <li>• Small Intestine</li> <li>• Large intestine with differences</li> <li>• Liver</li> <li>• Spleen</li> <li>• Pancreas</li> </ul>	6 hrs
4.	<b>Genitourinary system</b> <ul style="list-style-type: none"> <li>• Kidney</li> <li>• Ureter, Urinary bladder</li> <li>• Prostate and Seminal vesicles</li> <li>• Testis</li> <li>• Uterus</li> <li>• Fallopian tubes and Ovary</li> <li>• Sagittal section of male and female pelvis</li> <li>• Bones- male and female pelvis</li> <li>• Lumbar vertebrae</li> </ul>	8 hrs
5.	<b>Endocrine System</b> <ul style="list-style-type: none"> <li>• Thyroid gland and relations in neck</li> </ul>	1 hrs
6.	<b>Nervous System</b> <ul style="list-style-type: none"> <li>• Spinal Cord</li> <li>• Brain stem</li> <li>• Cerebellum</li> <li>• Cerebrum</li> <li>• Ventricles</li> <li>• Sections of brain</li> </ul>	7 hrs
	<b>Total</b>	<b>30 hrs</b>

**Reference Books:**

1. B D Chaurasia Vol-1,2 and 3
2. Vishram Singh Vol-1,2,and 3
3. NeuroAnatomy- Inderbir Singh



<b>MGM INSTITUTE OF HEALTH SCIENCES</b>		
<b>M. Sc. Medical Students</b>		
<b>Syllabus for Research Methodology and Biostatistics</b>		
	No. of Hours	
<b>I. Research Methodology:</b>	Theor y	Practica l
<b>Scientific Methods of Research :</b> Definition of Research, Assumptions, Operations and Aims of Scientific Research. Research Process, Significance and Criteria of Good Research , Research Methods versus Methodology, Different Steps in Writing Report, Technique of Interpretation, Precaution in interpretation, Significance of Report Writing, Layout of the Research Report	5	—
<b>Research Designs:</b> Prospective, retrospective, Observational Studies: Descriptive, explanatory, and exploratory, Experimental Studies: Pre-test design, post-test design, Follow-up or longitudinal design, Cohort Studies, Case Control Studies, Cross sectional studies, Intervention studies, Panel Studies.	5	—
<b>Sampling Designs :</b> Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs (Probability sampling and non probability sampling), How to Select a Random Sample?, Systematic sampling, Stratified sampling, Cluster sampling, Area sampling, Multi-stage sampling, Sampling with probability proportional to size, Sequential sampling.	4	0
<b>Measurement in research:</b> Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools, Scaling Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques, Possible sources of error in measurement, Tests of sound measurement	5	5
<b>Methods of Data Collection:</b> Types of data, Collection of Primary Data, Observation Method, Interview Method, Collection of Primary Data	3	0
<b>Ethics and Ethical practice in research and plagiarism</b>	1	
<b>Sampling Fundamentals :</b> Need and importance for Sampling, Central Limit Theorem, Sampling Theory, Concept of Standard Error, Estimation, Estimating the Population Mean Estimating Population Proportion, Sample Size and its Determination, Determination of Sample Size through the Approach Based on Precision Rate and Confidence Level.	5	2
<b>II. Biostatistics</b>		

<b>Data Presentation</b> : Types of numerical data: Nominal, Ordinal, Ranked, Discrete and continuous. Tables: Frequency distributions, Relative frequency, Graph: Bar charts, Histograms, Frequency polygons, one way scatter plots, Box plots, two way scatter plots, line graphs	3	3
<b>Measures of Central Tendency and Dispersion</b> : Mean, Median, Mode Range, Inter quartile range, variance and Standard Deviation, Coefficient of variation, grouped mean and grouped standard deviation (including merits and demerits).	3	3
<b>Testing of Hypotheses:</b> Definition, Basic Concepts, Procedure for Hypothesis Testing, Normal distribution, data transformation Important Parametric Tests, Hypothesis Testing of Means, Hypothesis Testing for Differences between Means, Hypothesis Testing for Comparing Two Related Samples, Hypothesis Testing of Proportions, Hypothesis Testing for Difference between Proportions, Testing the Equality of Variances of Two Normal Populations.	6	6
<b>Chi-square Test:</b> Chi-square as a Non-parametric Test, Conditions for the Application Chi-square test, Steps Involved in Applying Chi-square Test, Alternative Formula, Yates' Correction, and Coefficient by Contingency.	2	2
<b>Measures of Relationship:</b> Need and meaning, Correlation and Simple Regression Analysis	2	2
<b>Analysis of Variance and Covariance:</b> Analysis of Variance (ANOVA): Concept and technique of ANOVA, One-way ANOVA, Two-way ANOVA, ANOVA in Latin-Square Design Analysis of Co-variance (ANOCOVA), ANOCOVA Technique.	4	4
<b>Nonparametric or Distribution-free Tests:</b> Important Nonparametric or Distribution-free Test Sign test, Wilcoxon signed-Rank Test, Wilcoxon Rank Sum Test: Mann-Whitney U test Kruskal Walli's test, Friedman's test, and Spearman Correlation test.	3	3
<b>Vital Health Statistics:</b> Measurement of Population: rate, crude rate, specific rate, <i>Measurement of fertility:</i> specific fertility rate, Total fertility rate, <i>Reproduction rate,</i> Gross Reproduction Rate, Net Reproduction Rate, Measures related to mortality: Crude Death Rate (CDR) , Age-specific death Rate, Infant and child mortality rate, Measures related to morbidity.	4	3
<b>Computer Application</b> Use of Computer in data analysis and research, Use of Software and Statistical package.	0	2
<b>Total hours</b>	55	35

## Assessment Pattern for MSc Medical Courses (2019 Onwards)

### 1. LETTER GRADES AND GRADE POINTS:

MGMIHS has adopted the UGC recommended system of awarding grades and CGPA under Choice Based Credit Semester System for MSc Medical courses.

1. MGMIHS would be following the absolute grading system, where the marks are compounded to grades based on pre-determined class intervals.
2. The UGC recommended 10-point grading system with the following letter grades will be followed:

**Table 1: Grades and Grade Points**

Letter Grade	Grade Point
O (Outstanding)	10
A+ ( Excellent)	9
A (Very Good)	8
B (Good)	7
C (Above Average)	6
F (Fail)/ RA (Reappear)	0
Ab ( Absent)	0
Not Completed (NC)	0
RC (<50% in attendance or in Internal Assessment)	

- a. A student obtaining Grade RA shall be considered failed and will be required to reappear in the examination.
- b. Candidates with NC grading are those detained in a course (s); while RC indicate student not fulfilling the minimum criteria for academic progress or less than 50% in attendance or less than 50% in internal assessments (IA). Registrations of such students for the respective courses shall be treated as cancelled. If the course is a core course, the candidate has to re-register and repeat the course when it is offered next time.

c. CBCS Grading System - Marks Equivalence Table

Table 2: Grades and Grade Points

Letter Grade	Grade Point	% of Marks
O (Outstanding)	10	86-100
A+ (Excellent)	9	70-85
A (Very Good)	8	60 -69
B (Good)	7	55 -59
C (Above Average) – <b>Pass both for UG and PGs</b>	6	50- 54
F (Fail) )/ RA (Reappear)	0	Less than 50
Ab (Absent)	0	-
NC- not completed	0	-
RC- Repeat the Course	0	0

Table 3: Cumulative Grades and Grade Points

Letter Grade	Grade Point	CGPA
O (Outstanding)	10	9.01 - 10.00
A+ ( Excellent)	9	8.01 – 9.00
A (Very Good)	8	7.01 – 8.00
B (Good)	7	6.00 - 7.00
C (Above Average)	6	5.01 - 6.00

- d. **Assessment of a Course:** Evaluation for a course shall be done on a continuous basis. Uniform procedure will be adopted under the CBCS to conduct continuous internal assessments (IA), followed by one end-semester university examination (ES) for each course.
- e. Courses in programs wherein Theory and Lab are assessed jointly, the minimum passing head has to be 50% Grade each for theory and practical's separately. RA grade in any one of the components will amount to reappearing in both components. i.e. theory and practical.

## **2. Eligibility to appear for the end-semester examinations for a course includes:**

2.1 Candidates having  $\geq 75\%$  attendance and obtaining the minimum 35% in internal assessments in each course to qualify for appearing in the end-semester university examinations.

2.2 The students desirous of appearing for university examination shall submit the application form duly filled along with the prescribed examination fee.

2.3 Incomplete application forms or application forms submitted without prescribed fee or application form submitted after due date will be rejected and student shall not be allowed to appear for examination.

## **3. Passing Heads**

3.1 The minimum passing head shall be 50% in both Theory and practicals separately including the internal assessment.

3.2 Elective subjects – the minimum prescribed marks for a pass in elective subject should be 50%. The marks obtained in an elective subjects should be communicated to the university before the commencement of the university examination. ( From IIIrdSem Onwards)

## **4 Detention:**

A student not meeting any of the above criteria may be detained (NC) in that particular course for the semester. In the subsequent semester, such a candidate improve in all, including attendance and/or IA minimum to become eligible for the next end-semester examination.

5 The maximum duration for completing the course will be 6 years (minimum duration of course x 2) i.e. (3x2) =6 years for PG Courses, failing which his/her registration will be cancelled. Full fees of entire course of three years may be liable to be paid by the students.

## **6 Carry over benefit:**

6.1 A candidate who fails in any two main subjects of previous semester shall be permitted to carry over those subjects to the next semester.

6.2 A candidate shall not be allowed to appear in the final semester examination unless the candidate has cleared all the previous semester examinations.

## **7 Grace Marks for PG Courses:**

No grace marks will be awarded for PG Exams.

## **8. University End-Semester Examination**

**8.1** There will be one final university examination at the end of every semester.

**8.2** A candidate must have minimum 75% attendance (Irrespective of the type of absence) in theory and practical in each subject to be eligible for appearing the University examination.

**8.3** The Dean shall send to the university a certificate of completion of required attendance and other requirements of the applicant as prescribed by the university, two weeks before the date of commencement of the written examination.

**8.4** A candidate shall be eligible to sit for the examination only, if she / he has secured minimum 35% in internal assessment of that subject. The internal examinations will be conducted at college/ department level.

**8.5** Notwithstanding – anything in any examination, a deficiency of attendance at lectures or practical maximum to the extent of 10% - may be condoned by the Dean.

**8.6** If a candidate fails either in theory or in practical, he/ she have to re-appear for both.

**8.7** There shall be no provision of re- evaluation of answer sheets. Candidates may apply to the university following due procedure for recounting of theory marks in the Presence of the subject experts.

**8.8** Internal assessments shall be submitted by the Head of the Department to the university through the Dean MGMMC at least two weeks before commencement of University theory examination.

**8.9** Supplementary examination: There shall be no supplementary examination

**8.10** Re-Verification -There shall be provision of retotaling of the answer sheets, candidate shall be permitted to apply for recounting/retotaling of theory papers within 8 days from the date of declaration of results.

**8.11** Scheme of University Exam Theory PG Program: General structure / patterns for setting up question papers for Theory / Practical courses, their evaluation weightages for PG programs are given in the following tables.

### 8.12 Theory Question Paper Pattern for Core Subjects in University Examinations

Under CBCS - 60Marks (for 1<sup>st</sup> & 2<sup>nd</sup> Semester)

Question Type	No. of Questions	Questions to be Answered	Questions X Marks	Total Marks
Brief Answer Questions	7	6	1X 10	60

#### General Instructions (Theory):

- A. Time duration of each Theory Paper will be of Three (3) Hrs .
- B. Total Marks of each Theory Paper will be 60 Marks

### 8. 13 Practical Question Paper Pattern For University Examinations Under CBCS - 50 Marks

Exercise	Description	Marks
Q No 1	Practical exercise – 1	1 x15=15 M
Q No 2	Station exercise	5x5M=25 M
Q No 3	VIVA	10 M
		<b>Total = 50 M</b>

#### General Instructions (Practical):

- A. All the students have to remain present at the examination center 15 minutes before the scheduled time for examination.
- B. Students have to carry with them certified journal, I-card or examination receipt, and other necessary requirements for examination.
- C. Candidate should not leave the practical hall without the permission of examiner.
- D. Use of calculator is allowed but the use of mobile phones is strictly prohibited.
- E. The candidate has to leave the laboratory only after the submission of all the answer sheets of the exercises performed.

**8.14 Internal examination pattern (Theory) : 30marks**

<b>Question type</b>	<b>No. of questions</b>	<b>Questions to be answered</b>	<b>Question X marks</b>	<b>Total marks</b>
<b>Brief Answer Questions</b>	4	3	1X10	30

**8.15 Breakup of theory IA calculation for 20 marks**

Internal exam (Department -30 Marks)	15 marks
Seminar	5 marks
	Total = 20 M



### 8.16 Internal Examination Pattern (Practical): 30 Marks

Practical Exercise	10marks
Station Exercise	10 marks
Viva	10 marks
Total practical	30 Marks

### 8.17 Breakup of practical IA calculation:

Internal exam ( Department -30 Marks)	15 marks
Journal	5 marks
	Total = 20 M

**Internal Assessment marks should be submitted to the university by respective departments at least 15 days prior to onset of university examination.**

**9. Submission of Protocol of Dissertation:** Students should undergo Online Course of Research Methodology ( MCI- PG) before submitting the protocol for their Dissertation.

# MGM Institute of Health Sciences, Navi Mumbai

## MGM MEDICAL COLLEGE

### Academic Year 2019 – 2020

#### Academic Calendar For M.Sc. (3 Years) Medical Courses

(Anatomy, Physiology, Biochemistry, Pharmacology, Microbiology)

SCHEDULE OF ACTIVITY	DATES
Commencement of First Semester	01.08.2019
Receipt of completed Eligibility forms at MGMIHS from Respective college without late fees	On or before 30.10.2019
Receipt of completed Eligibility forms at MGMIHS from Respective college with late fees (Only for new admission)	On or before 30.11.2019
Commencement of Internal Exam	3 <sup>rd</sup> Week of November 2019
Winter Vacation for Staff	16.10.2019 to 15.11.2019
Notification of First Semester University Examination	As per MGMIHS
Commencement of First Semester University Examination	1 Week of January 2020
Conclusion of respective semesters	Last week of January 2020
Declaration of final Result	As per MGMIHS
Commencement of Second Semester	1 <sup>st</sup> Week of February 2020
Commencement of Internal Examination	3 <sup>rd</sup> Week of April 2010
Allotment of Guide for Dissertation	On or Before 30 <sup>th</sup> April 2020
Notification of Second Semester University Examination	As per MGMIHS
Summer Vacation for staff	01.05.2020 to 10.06.2020
Commencement of Second Semester University Examination	1 Week of July 2020
Conclusion of Second Semester	15 July 2020
Declaration of final Result	As per MGMIHS
Commencement of Next Academic Session	16.07.2020

# MGM Institute of Health Sciences, Navi Mumbai

## MGM MEDICAL COLLEGE

### Academic Year 2019 – 2020

#### Academic Calendar For M.Sc. (3 Years) Medical Courses

(Anatomy, Physiology, Biochemistry, Pharmacology, Microbiology)

SCHEDULE OF ACTIVITY	DATES
Commencement of Third Semester	16.07.2020
Submission of Protocol for Scientific and Ethical Approval	14.08.2020
Commencement of Internal Exam	3 <sup>rd</sup> Week of November 2020
Winter Vacation for Staff	16.10.2020 to 15.11.2020
Notification of First and Third Semester University Examination	As per MGMIHS
Commencement of Third Semester University Examination	1 Week of January 2021
Conclusion of respective semesters	15 January 2021
Declaration of final Result	As per MGMIHS
Commencement of Fourth Semester	3 <sup>rd</sup> week of January 2021
Commencement of Internal Examination	2nd Week of April 2021
Notification of Fourth Semester University Examination	As per MGMIHS
Summer Vacation for staff	01.05.2021 to 10.06.2021
Commencement of Fourth Semester University Examination	3 <sup>rd</sup> Week of June 2021
Conclusion of Respective Semesters	30 June 2021
Declaration of final Result	As per MGMIHS
Commencement of Next Academic Section	1.07.2021

# MGM Institute of Health Sciences, Navi Mumbai

## MGM MEDICAL COLLEGE

**Academic Year 2019 – 2020**

### **Academic Calendar For M.Sc. (3 Years) Medical Courses**

**(Anatomy, Physiology, Biochemistry, Pharmacology, Microbiology)**

<b>SCHEDULE OF ACTIVITY</b>	<b>DATES</b>
Commencement of Fifth Semester	1.07.2021
Commencement of Internal Exam	3 <sup>rd</sup> Week of November 2021
Winter Vacation for Staff	16.10.2021 to 15.11.2021
Notification of First, Third and Fifth Semester University Examination	As per MGMIHS
Commencement of Fifth Semester University Examination	First Week of December 2021
Conclusion of Fifth semester	Second Week of December 2021
Declaration of final Result	As per MGMIHS
Commencement of Sixth Semester	16 December 2021
Submission of Dissertation	31 March 2022
Commencement of Internal Examination	2nd Week of April 2022
Notification of Fourth Semester University Examination	As per MGMIHS
Summer Vacation for staff	01.05.2022 to 10.06.2022
Commencement of Sixth Semester University Examination	1st June 2022
Conclusion of Respective Semesters	30 June 2022
Declaration of final Result	As per MGMIHS

**DEPARTMENT OF ANATOMY**  
**MGM MEDICAL COLLEGE, KAMOTHE, NAVI MUMBAI**  
**SYLLABUS**

Name of the course - M.SC Medical Anatomy  
Semester – 3

Unit no.	Topic	Sub Topics		Hours T + P
1	General Anatomy	1.1	Terminology	7+2
		1.2	Bone	
		1.3	Joints	
		1.4	Muscles	
		1.5	Cardiovascular system	
		1.6	Nervous System	
		1.7	Integumentary System	
2	General Histology	2.1	Epithelium and glandular tissue	7+14
		2.2	Connective tissue	
		2.3	Skeletal system	
		2.4	Muscular system	
		2.5	Cardiovascular system and nervous system	
		2.6	Lymphoid system	
		2.7	Integumentary system	
3	General Embryology	3.1	Introduction to Embryology and cell cycles	7+4
		3.2	Gametogenesis	
		3.3	Female reproductive Cycles	
		3.4	Fertilization	
		3.5	First week of development	
		3.6	Second week of development	
		3.7	Third week of development	
		3.8	Placenta	
4	Upper Limb:	4.1	Bones of Upper Limb	19+20
		4.2	Mammary Gland	
		4.3	Venous drainage of Upper limb	
		4.4	Pectoral Region	
		4.5	Axilla	
		4.6	Arm and Cubital Region	
		4.7	Back and Scapular regions	
		4.8	Forearm	
		4.9	Palm	
		4.10	Joints of Upper limb	
		4.11	Brachial plexus and Nerves of Upper limb	

<b>Unit no.</b>	<b>Topic</b>	<b>Sub Topics</b>	<b>Hours T + P</b>
<b>5</b>	<b>Thorax</b>	<b>5.1</b> Bones – Ribs, sternum, Thoracic vertebrae	20+20
		<b>5.2</b> Joints of Thorax - type, articular surfaces & movements of manubriosternal, costovertebral, costotransverse and xiphisternal joints	
		<b>5.3</b> Thoracic cage – Inlet, cavity, outlet	
		<b>5.4</b> intercostal spaces - types, boundaries, contents with vessels, nerves with its clinical importance,	
		<b>5.5</b> mechanism of respiration - types, movements, muscles, applied anatomy	
		<b>5.6</b> Pericardium - subdivisions, sinuses, blood supply, nerve supply and applied aspect	
		<b>5.7</b> heart - features, blood supply, fibrous skeleton, conducting system, applied anatomy	
		<b>5.8</b> Mediastinum – Divisions, boundaries and contents	
		<b>5.9</b> Oesophagus - features, relations, blood supply, nerve supply, lymphatic drainage and applied anatomy	
		<b>5.10</b> Thoracic duct - extent, relations, tributaries, applied anatomy	
		<b>5.11</b> Superior vena cava, azygos venous system - origin, course, relations, tributaries, termination and applied anatomy	
		<b>5.12</b> Aorta - extent, branches, relations and applied anatomy	
		<b>5.13</b> Thoracic sympathetic chain	
		<b>5.14</b> Pleura - extent, recesses, blood supply, lymphatic drainage, nerve supply, applied anatomy	
		<b>5.15</b> Lung - features, relations, Bronchopulmonary segments, blood supply, lymphatic drainage, nerve supply, applied anatomy	
		<b>5.16</b> Phrenic nerve - formation & distribution	
		<b>5.17</b> Diaphragm	
		<b>5.18</b> Systemic Histology of Respiratory system & Cardiovascular system	

**DEPARTMENT OF ANATOMY**  
**MGM MEDICAL COLLEGE, KAMOTHE, NAVI MUMBAI**  
**SYLLABUS**

Name of the course - M.SC Medical Anatomy - 3<sup>rd</sup> Semester – Core Elective -1

**Histo techniques, Museum techniques & Embalming**

<b>Sr. no.</b>	<b>Topic</b>	<b>Sub Topics</b>	<b>Hours T + P</b>
1	<b>Histo techniques</b>	An Introduction to Histology	25 + 15
		Different types of Microscopes	
		Procurement and fixation of biological specimens	
		Decalcification	
		Dehydration and clearing	
		Impregnation and embedding	
		Paraffin waxes and paraffin - block making	
		Microtomes and microtome knives	
		Technique of section cutting	
		Stains and staining	
		Special staining methods	
Mounting, covering and labeling of sections			
2	<b>Embalming</b>	Various embalming solutions & techniques	10 + 5
3	<b>Museum techniques</b>	Various Museum techniques	25 + 10
		Plastination	
		Casting	

MGM MEDICAL COLLEGE, AURANGABAD  
MSC MEDICAL ANATOMY  
CORE ELECTIVE: RADIOLOGICAL AND SURGICAL SYLLABUS

Core Elective -2

Sr no	Topic	Lecture (Hr)	Practical (Hr)
	RADIOLOGICAL ANATOMY		
1	Modes of investigations	1	1
2	History and principle of X-Rays and digital X Ray	2	0
3	History and principle of Ultrasonography, colour Doppler and types	2	1
4	History and principle of CAT scan	3	0
5	History and principle of MRI and MRI angiography	2	1
6	PET scan and Nuclear imaging	2	0
7	Thoracic imaging from conventional to HRCT and Echocardiography Indications Mode of conducting investigation specially for X ray chest Algorithm of observing Chest X Ray Choosing mode of investigation and advantages and disadvantages	4	2
8	Limb imaging and vascular imaging	4	1
9	Abdominal imaging GIT Indications Mode of conducting investigation specially for X ray KUB Barium studies and endoscopy Algorithm of observing Choosing mode of investigation and advantages and disadvantages	4	2
10	Abdominal imaging GUT Indications Mode of conducting investigation specially for X ray KUB Algorithm of observing IVP, HSG Choosing mode of investigation and advantages and disadvantages	4	2
11	HNF and Brain imaging Indications Mode of conducting investigation specially for X ray Algorithm of observing skull, paranasal sinouses. CT and MRI at various sections Choosing mode of investigation and advantages and disadvantages	5	2
12	Ultrasonography for fetal anatomy and colordopplar	4	3



13	Role of PET and nuclear medicine in investigation	3	0
14	Surgical anatomy of Paranasal sinus with clinical correlation	1	1
15	Surgical anatomy of laryngopharyngeal complex and surgical approach	1	1
16	Anatomy of orbit and extraocular muscles	1	1
17	Laparoscopic anatomy of abdomen and pelvis and clinical significance	2	2
18	Endoscopic landmarks in upper GI tract and anatomical correlation in clinical practice	2	2
19	Upper limb neurovascular anatomy for nerve block and colour Doppler	1	1
20	Lower limb neurovascular anatomy for nerve block and colour Doppler	1	1
21	Surgical anatomy of anterior abdominal wall	2	1
22	Anatomy of inguinal canal	1	1
23	Development of heart: ASD, VSD and transposition of great vessels	3	2
24	Portal circulation and Portal hypertension and anastomosis	1	0
25	Spinal cord lesions and clinical localization	2	1
26	Peripheral nerves: Radial, Median, Ulnar and sciatic	2	1
	Total	60	30

**DEPARTMENT OF ANATOMY**  
**MGM MEDICAL COLLEGE, KAMOTHE, NAVI MUMBAI**  
**SYLLABUS**

Name of the course - M.SC Medical Anatomy

Semester - 4

Unit no.	Topic	Sub Topics	Hours T + P
1	<b>Abdomen and Pelvis</b>	<p><b>1.1</b> Bone</p> <p>lumbar vertebrae, sacrum - features, articulations &amp; attachments</p> <p>Pelvis: Types of pelvis, inlet, cavity, outlet of pelvis and pelvimetry and sex differences</p> <p><b>1.2 Anterior &amp; Posterior abdominal wall</b></p> <p>Anterior abdominal wall – planes, quadrants, regions, layers, Muscles, nerve &amp; blood supply, applied aspect</p> <p>Rectus sheath and inguinal canal - site, boundaries, contents, applied aspect</p> <p>Posterior abdominal wall: muscles, fascia, nerves - lumbar plexus</p> <p><b>1.3 Male reproductive system</b></p> <p>Testis - coverings, structure, blood &amp; nerve supply, lymphatic drainage &amp; applied anatomy, Epididymis, Spermatic cord, scrotum, Penis - parts, components, blood supply and lymphatic drainage</p> <p>Histology &amp; Embryology of male reproductive system</p> <p><b>1.4 Abdominal cavity</b></p> <p>Peritoneum – Greater sac, lesser sac, Epiploic foramen, peritoneal folds, pouches, recesses and applied anatomy</p> <p>Viscera - Position, features, relations, blood &amp; nerve supply, lymphatic drainage and applied aspects - Stomach, Duodenum, Small and large intestine, Appendix, Liver, Pancreas, spleen, kidney, suprarenal glands, ureter</p> <p>extrahepatic biliary apparatus - Position, parts, features, relations, blood &amp; nerve supply, lymphatic drainage and applied aspects</p> <p>Vessels - formation, course, relations and Branches/ tributaries and applied aspects of Abdominal aorta, Coeliac trunk, Superior mesenteric, Inferior mesenteric, Common iliac artery &amp; Portal vein, Inferior vena cava &amp; Renal vein,</p> <p>thoracoabdominal diaphragm - attachments, openings, nerve supply, actions and applied anatomy</p> <p>Histology &amp; Embryology of gastrointestinal system &amp; urinary system</p>	32+30

<b>Unit no.</b>	<b>Topic</b>	<b>Sub Topics</b>	<b>Hours T + P</b>	
<b>1</b>	<b>Abdomen and Pelvis</b>	<b>1.5</b>	<b>Pelvic wall and viscera</b>	
			Pelvic diaphragm - layers, attachments, openings, nerve supply, actions and applied anatomy	
			Viscera - Position, features, relations, blood & nerve supply, lymphatic drainage and applied aspects - urinary bladder, Rectum and anal canal, vas deference, prostate, urethra, ovary, Uterus, fallopian tubes, vagina	
			Histology & Embryology of female reproductive system	
			Vessels - formation, course, relations and Branches and applied aspects of internal iliac arteries	
			Nerves - Lumbosacral plexus	
		<b>1.6</b>	<b>Perineum</b>	
			Perineal pouches, ischioanal fossa - site, boundaries, contents, applied aspect	
			Urogenital diaphragm - layers, attachments, openings, actions and applied anatomy with Perineal body	
		<b>1.7</b>	<b>Vertebral column</b>	
			curvatures, Intervertebral joints - type, articular ends, ligaments and movements, applied aspect	
			Contents of the vertebral canal,	
		<b>1.8</b>	<b>Sectional Anatomy</b>	
			Cross-section at the level of T8, T10 and L1	
Midsagittal section of male and female pelvis				

<b>Unit no.</b>	<b>Topic</b>	<b>Sub Topics</b>		<b>Hours T + P</b>	
<b>2</b>	<b>Lower Limb</b>	<b>2.1</b>	<b>Bones</b>	20+25	
			Hip bone, Femur, Tibia, Fibula, Patella, articulated foot, (esp. talus and calcaneum) importance of ossification of lower end of femur & upper end of tibia, blood supply of head of femur		
		<b>2.2</b>	<b>Front &amp; medial side of thigh</b>		
			Muscles – Attachments, nerve supply and actions of muscles of front & medial side of thigh (esp. quadriceps femoris, sartorius, adductor longus, magnus)		
			Nerves - Femoral nerve, Obturator nerve, Vessels – Femoral artery		
			Boundaries, contents, applied anatomy of - femoral triangle with femoral sheath & adductor canal		
		<b>2.3</b>	<b>Gluteal region, back of thigh,</b>		
			Muscles – Attachments, nerve supply and actions of muscles of Gluteal region (Glutei), back of thigh with anatomical basis of sciatic nerve injury during gluteal intramuscular injections and Trendelenburg sign		
			Nerves – Sciatic nerve, vessels - cruciate and trochanteric anastomosis, popliteal artery		
			Boundaries, contents, applied anatomy of - popliteal fossa		
		<b>2.4</b>	<b>Anterolateral compartment of leg &amp; dorsum of foot</b>		
			Muscles – Attachments, nerve supply and actions of Anterolateral compartment of leg (esp. tibialis anterior)		
Nerve - common peroneal nerve with anatomical basis of foot drop, vessels - anterior tibial and dorsalis pedis artery					

<b>Unit no.</b>	<b>Topic</b>	<b>Sub Topics</b>	<b>Hours T + P</b>	
<b>2</b>	<b>Lower Limb</b>	<b>2.5</b>	<b>Back of Leg &amp; Sole</b>	
			Muscles – Attachments, nerve supply and actions of muscles of Back of Leg (esp. triceps surae with concept of Peripheral heart, tibialis posterior) & Sole, layers ( names of muscles)	
			Nerve - tibial nerve, vessels - posterior tibial, and medial and lateral plantar nerves and vessels	
		<b>2.6</b>	<b>General Features</b>	
			Fascia lata, Retinacula & Dermatomes of lower limb	
			Venous drainage of lower limb with applied anatomy (esp. anatomical basis of varicose veins and deep vein thrombosis)	
			Lymphatic drainage,	
		<b>2.7</b>	<b>Joints</b>	
			Hip joint, knee joint, tibiofibular, ankle joint - type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements, muscles involved, blood supply, nerve supply and applied anatomy (esp. Trendelenburg sign, )	
			arches of foot - formation, functions, maintaining factors and applied anatomy	
		<b>2.8</b>	<b>Bones</b>	
			Various bones in the articulated foot with individual muscle attachment	
<b>2.9</b>	<b>Applied</b>			
	Anatomical basis of Psoas abscess & Femoral hernia, complications of fracture neck of femur, dislocation of hip joint and surgical hip replacement, knee joint injuries, Osteoarthritis, rupture of calcaneal tendon, Flat foot & Club foot, Metatarsalgia & Plantar fasciitis, enlarged inguinal lymph nodes			
<b>2.1</b>	<b>Joints</b>			
	Subtalar and transverse tarsal joints - type, articular surfaces, ligaments, movements, muscles involved, nerve supply and applied anatomy			
<b>Unit no.</b>	<b>Topic</b>	<b>Sub Topics</b>	<b>Hours T + P</b>	

<b>3</b>	<b>Genetics</b>	<b>3.1</b>	Introduction, Mendel's Laws	8+5
			<b>Chromosomes</b>	
			Chromosome - structure & classification, Karyotyping - process & application , Barr body, Lyon's hypothesis	
			Structural and numerical chromosomal aberrations	
		<b>3.2</b>	<b>Patterns of Inheritance</b>	
			Various modes of inheritance with examples, Pedigree charts, multifactorial inheritance	
		<b>3.3</b>	<b>Variation</b>	
			Genetic basis of: polymorphism and mutation	
		<b>3.4</b>	<b>Genetic Counseling</b>	
			Principles	
		<b>3.5</b>	<b>Diseases &amp; syndromes</b>	
			Genetic basis & clinical features of Achondroplasia, Cystic Fibrosis, Vitamin D resistant rickets, Haemophilia, Duchene's muscular dystrophy & Sickle cell anaemia, Prader Willi syndrome, Edward syndrome & Patau syndrome	
<b>3.6</b>	<b>Cell lines</b>			
	Mosaicism and chimerism with example			

Name of the Programme	<b>M. SC MEDICAL Anatomy</b>
Name of the Course	<b>BIOETHICS, BIOSAFETY, IPR &amp; TECHNOLOGY TRANSFER</b>

<b>Course objective</b>	<p>The students will gain structural knowledge on:</p> <ol style="list-style-type: none"> <li>1. To list the routes of exposure for a pathogen to a human being .</li> <li>2. To demonstrate and assess the proper use of PPE, best practices, biological containment, and be prepared to safely conduct research</li> <li>3. To identify the role of the Biosafety Professional in Biomedical Research Laboratories</li> <li>4. To appreciate the importance of assertion in interpersonal communication and be introduced to some key assertion strategies</li> <li>5. To understand the interpersonal nature of giving feedback, receiving criticism and resolving conflicts.</li> <li>6. To establish attentive listening as an assertion strategy</li> </ol>
<b>Course outcomes</b>	<p>Students will learn to:</p> <ol style="list-style-type: none"> <li>1. Effectively manage the health and safety aspects of a biological laboratory.</li> <li>2. Give reliable, professional and informed advice and information to colleagues and managers.</li> <li>3. Help to ensure that their institution complies with relevant legislation, liaise effectively with enforcing authorities and be aware of the penalties for failing to comply.</li> <li>4. Build a context of understanding through communication.</li> <li>5. Mediate between other conflicting parties.</li> <li>6. Exhibit de-escalatory behaviors in situations of conflict.</li> <li>7. Demonstrate acknowledgment and validation of the feelings, opinions, and contributions of others.</li> </ol>

Unit no.	Topics	Hours allotted 60hrs
1	<b>Ethics:</b> Benefits of Ethics, ELSI of Bioscience, recombinant therapeutic products for human health care, genetic modifications and food consumption, release of genetically engineered organisms, applications of human genetic rDNA research, human embryonic stem cell research.	<b>15 hrs</b>
2	<b>Patenting:</b> Patent and Trademark, Bioscience products and processes, Intellectual property rights, Plant breeders rights, trademarks, industrial designs, copyright biotechnology in developing countries. Biosafety and its implementation, <i>Quality control in Biotechnology.</i>	<b>15 hrs</b>
	<b>Introduction to quality assurance, accreditation &amp; SOP writing :</b> Concept of ISO standards and certification , National regulatory body for accreditation, Quality parameters, GMP & GLP, Standard operating procedures, Application of QA in field of genetics, Data management of clinical and testing laboratory	<b>15 hrs</b>
3	<b>Funding of biotech business</b> (Financing alternatives, funding, funding for Bioscience/ Medical Health Sector in India, Exit strategy, licensing strategies, valuation), support mechanisms for entrepreneurship (Bio-entrepreneurship efforts in India, difficulties in India experienced, organizations supporting growth, areas of scope, funding agencies in India, policy initiatives), Role of knowledge centers and R&D (knowledge centers like universities and research institutions, role of technology and up gradation)	<b>15 hrs</b>

#### Reference Books:

1. [www.pdfdrive.net](http://www.pdfdrive.net)
2. [www.khanacademy.org](http://www.khanacademy.org)
3. [www.acadeicearths.org](http://www.acadeicearths.org)
4. [www.edx.org](http://www.edx.org)
5. [www.open2study.com](http://www.open2study.com)
6. [www.academicjournals.org](http://www.academicjournals.org)



Name of the Programme	<b>M. SC MEDICAL Anatomy</b>
Name of the Course	<b>DISASTER MANAGEMENT AND MITIGATION RESOURCES</b>

<b>Course objective</b>	<p>The course will uplift about:</p> <ol style="list-style-type: none"> <li>1. Understand and appreciate the specific contributions of the Red Cross/Red Crescent movement to the practice and conceptual understanding of disaster management and humanitarian response and their significance in the current context.</li> <li>2. Recognize issues, debates and challenges arising from the nexus between paradigm of development and disasters.</li> <li>3. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.</li> <li>4. Respond to disaster risk reduction initiatives and disasters in an effective, humane and sustainable manner.</li> </ol>
<b>Course outcomes</b>	<p>At the successful completion of course the student will gain:</p> <ol style="list-style-type: none"> <li>1. knowledge and understanding of the disaster phenomenon, its different contextual aspects, impacts and public health consequences.</li> <li>2. Knowledge and understanding of the International Strategy for Disaster Reduction (UN-ISDR) and to increase skills and abilities for implementing the Disaster Risk Reduction (DRR) Strategy.</li> <li>3. Ensure skills and abilities to analyse potential effects of disasters and of the strategies and methods to deliver public health response to avert these effects.</li> </ol>

Unit no.	Topics	Hours allotted 60hrs
1	<b>Introduction:</b> Definition of Disaster, hazard, global and Indian scenario, general perspective, importance of study in human life, Direct and indirect effects of disasters, long term effects of disasters. Introduction to global warming and climate change.	<b>08 hrs</b>
2	<b>Natural Disaster and Manmade disasters:</b> Natural Disaster: Meaning and nature of natural disaster, Flood, Flash flood, drought, cloud burst, Earthquake, Landslides, Avalanches, Volcanic eruptions, Mudflow, Cyclone, Storm, Storm Surge, climate change, global warming, sea level rise, ozone depletion Manmade Disasters: Chemical, Industrial, Nuclear and Fire Hazards. Role of growing population and subsequent industrialization, urbanization and changing lifestyle of human beings in frequent occurrences of manmade disasters.	<b>15 hrs</b>
3	<b>Disaster Management, Policy and Administration:</b> Disaster management: meaning, concept, importance, objective of disaster management policy, disaster risks in India, Paradigm shift in disaster management. Policy and administration: Importance and principles of disaster management policies, command and co-ordination of in disaster management, rescue operations-how to start with and how to proceed in due course of time, study of flowchart showing the entire process.	<b>12 hrs</b>
4	<b>Financing Relief Measures:</b> Ways to raise finance for relief expenditure, role of government agencies and NGO's in this process, Legal aspects related to finance raising as well as overall management of disasters. Various NGO's and the works they have carried out in the past on the occurrence of various disasters, Ways to approach these teams. International relief aid agencies and their role in extreme events.	<b>13 hrs</b>
5	<b>Preventive and Mitigation Measures:</b> Pre-disaster, during disaster and post-disaster measures in some events in general structural mapping: Risk mapping, assessment and analysis, sea walls and embankments, Bio shield, shelters, early warning and communication Non Structural Mitigation: Community based disaster preparedness, risk transfer and risk financing, capacity development and training, awareness and education, contingency plans. Do's and don'ts in case of disasters and effective implementation of relief aids.	<b>12 hrs</b>

**Reference Books:**

1. ShailendraK.Singh : Safety & Risk Management, Mittal Publishers
2. J.H.Diwan : Safety, Security & Risk Management,APH
3. Stephen Ayers &Garmvik: Text Book of Critical Care, Holbook and Shoemaker
4. [www.pdfdrive.net](http://www.pdfdrive.net)
5. [www.khanacademy.org](http://www.khanacademy.org)
6. [www.acadeicearths.org](http://www.acadeicearths.org)
7. [www.edx.org](http://www.edx.org)
8. [www.open2study.com](http://www.open2study.com)
9. [www.academicjournals.org](http://www.academicjournals.org)

Name of the Programme	<b>M. SC MEDICAL Anatomy</b>
Name of the Course	<b>HUMAN RIGHTS</b>

<b>Course objective</b>	<p>Students will comprehend on:</p> <ol style="list-style-type: none"> <li>1. A branch of public international law, and relevant juridical mechanisms at global as well as regional levels,</li> <li>2. Human rights as an object of study in history, philosophy and the social sciences, as well as a practical reality in national and international politics.</li> <li>3. Different forms of promoting and implementing human rights, domestically as well as on the international level.</li> <li>4. The role of human rights in contemporary issues relating to terrorism, religion, ethnicity, gender and development.</li> <li>5. Cholarly values such as transparency, impartiality, clarity, reliance and the importance of sound reasoning and empirical inference.</li> </ol>
<b>Course outcomes</b>	<p>Student will be able to virtue:</p> <ol style="list-style-type: none"> <li>1. identify, contextualise and use information about the human rights situation in a given country</li> <li>2. critically appraise source material, including cases from human rights committees and tribunals and reports and summary records from treaty bodies</li> <li>3. analyse a country's situation or an international situation in terms of human rights and formulate human rights-based initiatives and policies</li> <li>4. Promote human rights through legal as well as non-legal means.</li> <li>5. Participate in legal, political and other debates involving human rights in a knowledgeable and constructive way</li> </ol>

<b>Unit no.</b>	<b>Topics</b>	<b>Hours allotted 60hrs</b>
1	<i>Background:</i> Introduction, Meaning, Nature and Scope, Development of Human Rights, Theories of Rights, Types of Rights	<b>08 hrs</b>
2	<i>Human rights at various level :</i> Human Rights at Global Level UNO, Human Rights – UDHR 1948 – UN Conventions on Human Rights: International Covenant on civil and Political Rights 1966, International Convent on Economic, Social and Cultural Right, Racial Discrimination -1966 International, Instruments: U.N. Commission for Human Rights, European Convention on Human Rights.	<b>15 hrs</b>
3	<i>Human rights in India :</i> Development of Human Rights in India, Human Rights and the Constitution of India, Protection of Human Rights Act 1993- National Human Rights Commission, State Human Rights Commission, Composition Powers and Functions, National Commission for Minorities, SC/ST and Woman	<b>12 hrs</b>
4	<i>Human Rights Violations:</i> Human Rights Violations against Women, Human Rights Violations against Children, 35 Human Rights Violations against Minorities SC/ST and Trans-genders, Preventive Measures.	<b>13 hrs</b>
5	<i>Political issues:</i> Political Economic and Health Issues, Poverty, Unemployment, Corruption and Human Rights, Terrorism and Human Rights, Environment and Human Rights, Health and Human Rights	<b>12 hrs</b>

**Reference Books:**

1. JagannathMohanty Teaching of Human sRights New Trends and Innovations Deep & Deep Publications Pvt. Ltd. New Delhi2009
2. Ram Ahuja: Violence Against Women Rawat Publications JewaharNager Jaipur.1998.
3. SivagamiParmasivam Human Rights Salem 2008
4. Hingorani R.C.: Human Rights in India: Oxford and IBA New Delhi.

## Evaluation Pattern- MSc Medical Anatomy ( Admission Batch 2019 Onwards)

### Evaluation Pattern for III rd and IV th Semester Exam ( Core Subject )

Final Theory Marks will be 120 Marks (100 Marks University Theory Exam + 20 Marks Internal Assessment)

Theory Marks 100 ( Time 3 Hours)

Question Type	Marks Per Question	No. of Questions	Questions to be Answered	Questions X Marks	Total Marks
Brief Answer Questions	10	11	10	10 X 10	100

#### ○ Semester III

Practical Exam Pattern- Marks 100 –

Exercise	Description	Marks	Total marks
Q No 1	Practical exercise	Upper limb – 15m	50
		Thorax – 15m	
		Histology – 10m	
		Embryology – 10m	
Q No 2	Station exercise	Spots	25
Q No 3	VIVA	25 M	25
	Total		100

#### ○ Semester IV-

Practical Exam Pattern- Marks 100

Exercise	Description	Marks	Total marks
Q No 1	Practical exercise	Lower limb – 10m	50
		Abdomen & pelvis – 15m	
		Histology – 10m	
		Embryology – 10m	
		Genetics – 5m	
Q No 2	Station exercise	Spots	25
Q No 3	VIVA	25 M	25
	Total		100

## Internal Examination ( Mid-Semester Exam)

Theory Marks 50 ( Time 1 1/2 Hours)

Question Type	Marks Per Question	No. of Questions	Questions to be Answered	Questions X Marks	Total Marks
Brief Answer Questions	10	6	5	5 X 10	50

Practical Marks 50

Exercise	Description	Marks
Q No 1	Practical exercise – 1	1 x25=25 M
Q No 2	Station exercise	5x2M=10 M
Q No 3	VIVA	15 M
		Total = 50 M

### For Calculation of Internal Assessment

The Marks obtained in Internal Examination out of 50 will be converted to out of 20 for Theory and Practical Internal Assessment.

## Evaluation Pattern for III rd and IV th Semester Exam

### ( Elective Subjects & PG Activity)

#### Elective Subjects

- III rd Semester students have a choice to select one Core Elective Subject out of the two as mentioned above; for which there will be Internal Evaluation exam for Theory and Practical.
- IV th Semester students have a choice to select one General Elective Subject out of the three mentioned above; for which there will be Internal Evaluation exam for Theory.

#### Evaluation Pattern for Elective Subject (Theory)- Time 3 Hrs

Section	Question	Marks Distribution	Marks Alloted per section	Marks
Section A	MCQ	10 X 1 M=10	10	10
Section B	SAQ LAQ	3/4 X 5 M= 15 2/3 X10 M= 20	15 20	35
Section C	SAQ LAQ	3/4 X 5 M= 15 2/3 X10 M= 20	15 20	35
				Total 80

#### Practical Exam Pattern

Excercise	Discription	Marks
Q 1	Practical Excercise	1 X 20 = 20 M
Q 2	Station Excercise	2 X 5 = 10 M
Q 3	Viva	10 M
	Journal	10 M
		Total = 50 M

### PG Activities

- The record of Clinical Postings, Dissertation/ Project/ Seminars will be maintained in Logbook. Each of the activity will be evaluated as per the evaluation format given in the Logbook and will be signed by the Departmental Co-ordinator before Semester end Examination.

#### Allotment of Marks for PG Activities

PG Activity	Marks Alloted
Clinical & Sectional Postings	20
Seminars/ Journal Clubs	20
Dissertation/ Project Work	20

**The Marks obtained in the Internal Assessment, Elective Subjects and PG Activities to be sent to MGMIHS before the Semester End Examination as per the date announced by the university.**