

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL
(Formerly West Bengal University of Technology)
Syllabus of B. Sc. in Radiology & Imaging Technology
(Effective from 2024-25 Academic Sessions)

Graduate Attributes

By the end of the program the students will be able to:

- **Understand that this medical science program is aimed at providing excellent carrier opportunity for the students.**
- **Understand the methods and procedures involved during the creation of images of human parts for the purpose of clinical diagnosis or medical science.**
- **Know all major areas of modern medical sciences along with physics including Biochemistry, Anatomy, physiology, Radiation physics, all advanced technologies etc.**
- **get an overall exposure to various aspects with a learning outcome**
- **To learn basic anatomy and physiology relevant to imaging**
- **To learn basic physics with respect to each imaging modality**
- **to perform diagnostic radiology procedures safely and effectively**
- **to perform necessary post-processing of images**
- **to learn concepts of prevention of infection during Imaging procedures**
- **to understand the importance of radiation protection and radiation safety during imaging procedures**

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Course Name: Human Anatomy

Mode: Offline

Credits: 5(3T+2P)

BMMIT-1101 & BMMIT-1191

Aim of the Course:To acquaint students with Concepts of Basic Anatomy

- **Course Objectives:**
- **To Comprehend the normal disposition, interrelationships, gross, functional and applied anatomy of various structures in the human body.**
- **Understand the skeletal and locomotor system**
- **Demonstrate and understand the basic anatomy of Respiratory and Circulatory system**
- **Demonstrate and understand the basic anatomy of Digestive and Excretory system**

Sl	Graduate attributes	Mapped modules
CO1	Basic Knowledge on Introduction and structure of general tissue	M1
CO2	Overall knowledges on Bones, joints and locomotors system	M2
CO3	Learning about Heart and Blood Vessels and respiratory system	M3
CO4	Knowledge on Lymph node Groups and Reticulo-Endothelial system	M4
CO5	Overall knowledge on Alimentary system	M5
CO6	Knowledge on Excretory system	M6
CO7	Anatomy of male and female Reproductive system	M7
CO8	Knowing in details about Nervous system and special sensory organs	M8
CO9	Knowledge on Radiographic anatomy	M9

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Learning Outcome/ Skills:

Module Number	Content	Total Hours	% of questions	Bloom Level (applicable)	Remarks, if any
THEORY					
M1	Introduction and structure of general tissue- simple and complex epithelia; glands , blood, muscle tissues	4	5	1,2	NA
M2	Bones, joints and locomotors system, Position and function of main joint and diseases	4	10	1,2,3	NA
M3	Heart, Blood Vessels and respiratory system- circulation., respiratory system- Common terms used in connection with diseases	4	05	1,2	NA
M4	Lymphnode Groups and Reticulo-Endothelial system, main lymphatic gland groups and drainage areas, physiology of the red and white blood corpuscle's.	5	15	1,2,3	NA
M5	Alimentary system- motility of the alimentary tract; digestion, absorption and metabolism, Common terms used in connection with diseases of this system	5	15	2,3	
M6	Excretory system- excretion, common terms used in connection with diseases of the system.	5	15	2,3,4	
M7	Reproductive system-male and female genital structures, systems and ; common terms used in connection with diseases of this system	8	10	2,3,4	
M8	Nervous system and special sensory organs- autonomic nervous system; common terms used in connection with diseases of this system.	6	15	2,3,4	

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M9	Radiographic anatomy- overview	4	10	3,4	
Total Theory		45	100		
<u>Practical</u>		30			
	TOTAL	75			

Detailed Syllabus

Module 1:

Introduction and structure of general tissue

Structure of General Tissues : Epithelium; simple and complex epithelia; glands; skin. Connective tissue; fibrous tissue; cartilage; bone; Haversian systems; blood; numbers and types of cells in blood; clotting of blood. Muscle tissue; involuntary, voluntary and cardiac muscle. Nerve tissue.

Total Hours: 4

Module 2:

Bones, joints and locomotors system

Bones, joints and locomotors system: General description of bones, their main processes and attachments, 'including the skull with emphasis on the skull as a whole. Development of bones, Primary and secondary bone centres; diaphyses and epiphyses. Position and function of main joints. Some common diseases and injuries of bones and joints; Healing of fractures.

Thorax and Abdomen : Structure of thoracic cage, abdominal cavity; diaphragm and mediastinum

Total Hours: 4

Module 3:

Heart and Blood Vessels and respiratory system

Heart and Blood Vessels: Structure and function of the heart, pericardium, peripheral vascular system; names of main arteries and veins, circulation. Common terms used in connection with diseases of this system.

Respiratory system : Nasal passages and accessory nasal sinuses, pharynx and larynx, trachea, bronchi and lungs; pleura, nature and function of respiration. Common terms used in connection with diseases of this system

Total Hours: 4

Module 4:

Lymphnode Groups and Reticulo-Endothelial system

Lymphnode Groups: Lymph and tissue fluid, main lymphatic gland groups and drainage areas, lymphoid tissue and tonsil.

Reticulo-Endothelial system : Spleen and liver, bone marrow, extent and nature, physiology of the red and

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white blood corpuscle's.

Total Hours: 5

Module 5:

Alimentary system

Alimentary system :Mouth, tongue and teeth, salivary glands, pharynx and oesophagus, stomach, small and large bowel, liver and biliary tract, pancreas, motility of the alimentary tract; digestion, absorption and metabolism, nutrition and dietetics, Common terms used in connection with diseases of this system.

Total Hours: 5

Module 6:

Excretory system

Urinary tract: Kidneys, ureters, bladder and urethra; urine formation & excretion, common terms used in connection with diseases of the system.

Total Hours: 5

Module7

Reproductive system

Reproductive system : Male genital tract; testes, epididymis, seminal vesicle and prostate; female genital tract; uterine tubes, ovaries, uterus, vagina and vulva, the mammary glands; menstruation, pregnancy and lactation; common terms used in connection with diseases of this system

Total Hours: 8

Module 8:

Nervous system and special sensory organs

Nervous system: Brain; main subdivisions and lobes; ventricular system, spinal cord, concept of motor, sensory and reflex pathways; meninges and cerebrospinal fluid; its circulation; autonomic nervous system; common terms used in connection with diseases of this system.

Special sensory organs: Structure and function of the eye; structure and function of the ear; structure and function of the skin

Total Hours: 6

Module9:

Radiographic anatomy

Surface markings and topographical relations; radiographic anatomy

Total Hours: 4

PRACTICAL

Credit: 2

Total Hours: 30

Demonstration of Major organs through models and slides

- a. parts of circulatory systems
- b. parts of respiratory system
- c. digestive system d. excretory system
- d) structure of eye and ear from model
- e) structural differences between skeletal, smooth and cardiac muscles.
- f) various bones and joints
- g) various parts of male & female reproductive system from models

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Suggested Readings:

Text book

1. Anatomy and Physiology for Radiographers - C.A. Warrick Reference books
2. Gray's anatomy Descriptive and applied - T.B. Johnston.
3. Foundation of Anatomy and Physiology - Ross and Wilson.
4. An Atlas of Normal Radiographic Anatomy - Richard & Alvin
5. Essentials of Human Anatomy - Russell
6. Best and Taylor : The Human Body – its anatomy and physiology (Chapman and Hall)
7. Blewett and Rackow : Anatomy and Physiology for Radiographers (Butterworth)
8. Dean : Basic Anatomy and Physiology for Radiographers (Blackwell)
9. Fitzgerald : Anatomy 1600 multiple choice question (Butterworth)
10. Hamilton et al : Surface and Radiological Anatomy (Heffer)

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Course Name: Biochemistry

Mode: Offline

Credits: 5(3T+2P)

BMMIT-1102 & BMMIT-1192

Aim of the Course: To acquaint students with Vitals of Biochemistry

• **Course Objectives:**

- introduces the students about the basic knowledge and functions of different biomolecules like carbohydrates, amino acids, proteins, enzymes, lipids, nucleic acids, vitamins and minerals.
- Students will know the basics of reagent preparation, instrument handling and can perform common analytical test.
- It also considers different structural and reaction of different simple macromolecules. Upon completion of this course, students should understand the structural, functional and metabolic aspects of carbohydrates, lipids, amino acids and proteins along with nucleic acids, They should understand the structure and functional details of biological membranes.
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Sl	Graduate attributes	Mapped modules
CO1	To know about different types carbohydrates, which we are taking as meal for generation of energy by metabolic pathways and understand the disease related to carbohydrates.	M1
CO2	Understanding the structure, properties and significance of amino acids and proteins, and the catalytic activity of enzymes.	M2
CO3	Learning about the lipid with its function and related disease	M3
CO4	Knowledge on the nucleic acids present in human body.	M4
CO5	knowledge about functions of the vitamin, minerals and its deficiency disease	M5

Learning Outcome/ Skills:

- The students will know about the basic knowledge and functions of different biomolecules like carbohydrates, amino acids, proteins, enzymes, lipids, nucleic acids, vitamins and minerals.
- Students will know the basics of reagent preparation, instrument handling and can perform common analytical test.
- It also considers different structural and reaction of different simple macromolecules. Upon completion of this course, students should understand the structural, functional and metabolic aspects of carbohydrates, lipids, amino acids and proteins along with nucleic acids, They should understand the structure and functional details of biological membranes.

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Module Number	Content	Total Hours	% of questions	Bloom Level (applicable)	Remarks, if any
THEORY					
M1	Carbohydrates and related diseases	5	15	1,2	NA
M2	Amino acids and proteins	10	15	1,2,3	NA
M3	Lipids and biological membranes	10	25	1,2	NA
M4	Nucleic acids Double helical model of DNA	10	20	1,2,3	NA
M5	vitamin, minerals and its deficiency disease	10	25	2,3	NA
Total Theory		45	100		
<u>Practical</u>		30			
TOTAL		75			

Detailed Syllabus

Module 1:

Carbohydrates:

Classification, biomedical importance & properties. Brief outline of metabolism: Glycogenesis, Glycogenolysis, Gluconeogenesis, Glycolysis, Citric acidcycle, HMP shunt, Regulation of blood glucose concentration, Diabetes Mellitus, Glycosuria, GlucoseTolerance Test.

Total Hours: 5

Module 2:

Amino acids, Proteins and enzymes:

Amino acid: Amino acid-definition, classification, function, properties. Protein and metabolic pathways: Protein-definition, classification and function. Primary, secondary, tertiary, quaternary structures of protein, Non-protein nitrogen, Nitrogen balance, Transamination and deamination, Uric acid formation, Urea cycle. Enzymes: Definition, Cofactor & Coenzymes, Concept of active sites and general mode of action of enzymes, factor affecting enzyme activity, units of enzyme.

Total Hours: 10

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Module 3:

- Lipids: 9h Classification of lipids, Biomedical importance, Classification of fatty acids, Essential fatty acids, Ketone body formation, Fatty liver, Ketosis, Cholesterol & its clinical significance, Lipoproteins in the blood composition & their functions in brief.

Total Hours: 10

Module 4:

Nucleic acids: Nitrogen bases, Nucleosides, Nucleotides, Structure, function and types of DNA and RNA, Role of Nucleic acid.

Total Hours: 10

Module 5:

- Vitamins and Minerals: 8h Vitamins: classification, function and disease associated with vitamins. Minerals: Requirement, function and biological importance of Calcium, Iron, Iodine, Zinc, Phosphorus, Copper, Sodium and Potassium

Total Hours: 10

PRACTICAL

Credit: 2

Total Hours: 30

1. Demonstration of glass and plastic apparatus and equipment (Colorimeter, spectrophotometer, Water distillation plant, pH meter) used in the Biochemistry Lab.
2. Handling and cleaning of the apparatus and equipment.
3. Preparation of different percentage, normal, molar solutions.
4. Preparation of solution by dilution.
5. Preparation of different buffers used in pathological laboratory and determine their PH.
6. Determination of glucose in a sample by both qualitatively (Benedict's method) and quantitatively
7. Determine of total protein and albumin (quantitative estimation)
8. Determination of Ketone bodies, Bile salt, Bile pigments and urobilinogen in given sample.
9. Determination of cholesterol and triglyceride.
10. Determination of urea in blood.
11. Determination of creatinine in blood.
12. Determination of uric acid

Suggested Readings:

Text book

Text Books: 1. M Adhya & B Singha, (2018), Biochemistry (General and Ocular).

2. D M Vasudevan, (2011), Textbook of Medical Biochemistry, 6th edition Jaypee Publishers.

3. M N Chatterjea & Rana Shinde, (2012), Textbook of Medical Biochemistry, 8th edition, Jaypee Publishers. 4.

D M Vasudevan & S K Das, Practical text Book of Biochemistry for medical Students, second edition, Jaypee Brothers Medical Publishers (P) Ltd

5. G Hegyi, J Kardos, M Kovács, A M Csizmadia, L Nyitray, G Pal, L Radnai, A Remenyi & IVenekei, (2013), National Development Agency.

Suggested Readings:

1. R K Murray, D K Granner, P A Mayes, V W Rodwell, 31st edition, Harper's Illustrated Biochemistry, MC Graw Hill Education (LANGE).

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2. Nelson & Cox, 4th Edition, Lehninger principles of Biochemistry
3. J Berg J Tymoczko & L Stryer, 7th Edition, Biochemistry, W. H. Freeman and Company, NewYork
4. Voet & Voet, 4th edition, Biochemistry, John Wiley & Sons, Inc.