SYLLABUS & CURRICULA (Revised 2019)
w.e.f. 2019-20&onwards

FOR

DOCTOR OF PHYSICAL THERAPY (DPT)

(Five Year Degree Program)

Department of Allied Health Sciences

Sargodha Medical College Campus

University of Sargodha

DPT CURRICULA / SYLLABI

1st YEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	ANATOMY I	150	50	200
2	PHYSIOLOGY I	150	50	200
3	BIOCHEMISTRY I	150	50	200
4	KINESIOLOGY	150	50	200
5	ENGLISH	100	Not Applicable	100
6	INTRODUCTION TO COMPUTER	100	Not Applicable	100
	TOTAL	**800**	**200**	**1000**

2nd YEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	ANATOMY II	150	50	200
2	PHYSIOLOGY II	150	50	200
3	BIOCHEMISTRY II	150	50	200
4	BIOMECHANICS & ERGONOMICS	150	50	200
5	ISLAMIC STUDIES	100	Not applicable	100
6	PAKISTAN STUDIES	100	Not applicable	100
	TOTAL	**800**	**200**	**1000**

3rdYEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	PHARMACOLOGY	150	50	200
2	GENERAL PATHOLOGY & MICROBIOLOGY	150	50	200
3	PHYSICAL AGENTS & ELECTROTHERAPY INCLUDING MEDICAL PHYSICS	150	50	200
4	THERAPEUTIC EXERCISESAND TECHNIQUES &MANUAL THERAPY	150	50	200
	TOTAL	**600**	**200**	**800**

4thYEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	COMMUNITY HEALTH, RESEARCH METHODOLOGY, SOCIAL AND BEHAVIORAL SCIENCES	100	Not applicable	100
2	SPECIAL PATHOLOGY	150	50	200
3	PHYSICAL THERAPY IN MEDICINE	150	50	200
4	PHYSICAL THERAPY IN SURGERYINCLUDING RADIOLOGY & DIAGNOSTIC IMAGING	150	50	200
5	CLINICAL DECISION MAKING & DIFFERENTIAL DIAGNOSIS	100	Not applicable	100
6	PHYSICAL THERAPY TREATMENT & TECHNIQUES-I *(Musculoskeletal, Sports, Gerontology including Geriatric, Paediatric Physical Therapy and Supervised Clinical Practices I)*	150	50	200
	TOTAL	**800**	**200**	**1000**

FINAL YEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	EVIDENCE BASED PHYSICAL THERAPY& PROFESSIONAL PRACTICE	100	Not applicable	100
2	EMERGENCY PROCEDURES & PRIMARY CARE IN PHYSICAL THERAPY	150	50	200
3	*(Cardiopulmonary, Neurological, Gynecological & Obstetrics, ,Integumentary Physical Therapy , and Supervised Clinical Practices II)*	150	50	200
4	PROSTHETICS, ORTHOTICS, HUMAN DEVELOPMENT& COMMUNITY BASED REHABILITATION	100	Not applicable	100
5	EXERCISE PHYSIOLOGY &HEALTHANDWELLNESS	150	50	200

	TOTAL	**650**	**150**	**800**
	REPORT WRITING (In Final Year)	**Qualifying Mandatory**		

Note:

1. There shall be 01Question Paper in each subject having equal contribution from all sections.
2. Supervised Clinical Practices I shall commence from 3rd year & evaluated at the end of 4th year along with relevant subject while Supervised Clinical Practices II shall commence from 4th year & evaluated at the end of final year along with relevant subject.
3. 10% marks are reserved for internal assessment based upon 3-5 Class Tests average, Class attendance, and Overall performance.

CREDIT ACCUMULATION AND TRANSFER SYSTEM(CAT)

A Credit accumulation and transfer system is a systematic way of describing an educational program based upon its components. Credit hour or credit unit is basically the academic currency of the academic activities.

In DPTunderthe CAT system is defined as

Title	**Recommended**	**Actual**		
		Teaching	**Clinical**	**Total**
1. Contact hours 1500-1800 hrs/year 2.25-30 Contact hours = 01 credit point 3.Number of credit points in a year = 55-60	1500-1800 hours/year	1400+1400+1100+1500+1100+300(R.W.) =6800	550+520+840= 1910	8710/5=1742 hours/year

1. DIVISION OF STUDY HOURS

1st YEAR

Sr. No.	**Subject Title**	**Total Contact Hours**	**Theory**	**Practical**
1	ANATOMY I	300	200	100
2	PHYSIOLOGY I	300	200	100
3	BIOCHEMISTRY I	300	200	100
4	KINESIOLOGY	300	200	100
5	ENGLISH	100	100	N/A
6	INTRODUCTION TO COMPUTER	100	100	N/A
	TOTAL	**1400**		

2ndYEAR

Sr. No.	**Subject Title**	**Total Contact Hours**	**Theory**	**Practical**
1	ANATOMY II	300	200	100
2	PHYSIOLOGY II	300	200	100
3	BIOCHEMISTRY II	300	200	100
4	BIOMECHANICS &ERGONOMICS	300	200	100
5	ISLAMIC STUDIES	100	100	N/A
6	PAKISTAN STUDIES	100	100	N/A
	TOTAL	**1400**		

3rdYEAR

Sr. No.	**Subject Title**	**Total Contact Hours**	**Theory**	**Practical**
1	GENERAL PATHOLOGY & MICROBIOLOGY	300	200	100
2	PHARMACOLOGY	200	100	100
3	PHYSICAL AGENTS & ELECTROTHERAPY INCLUDING MEDICAL PHYSICS	300	200	100
4	THERAPEUTICS EXERCISES AND TECHNIQUES & MANUAL THERAPY	300	200	100
	TOTAL	**1100**		

4th YEAR

Sr. No.	Subject Title	Total Contact Hours	Theory	Practical
1	COMMUNITY HEALTH, RESEARCH METHODOLOGY, SOCIAL AND BEHAVIORAL SCIENCES	100	100	N/A
2	SPECIAL PATHOLOGY	300	200	100
3	PHYSICAL THERAPY IN MEDICINE	300	200	100
4	PHYSICAL THERAPY IN SURGERYINCLUDING RADIOLOGY & DIAGNOSTIC IMAGING	200	100	100
5	CLINICAL DECISION MAKING & DIFFERENTIAL DIAGNOSIS	100	100	N/A
6	PHYSICAL THERAPY TREATMENT & TECHNIQUES-I *(Musculoskeletal, Sports, Gerontology including Geriatric, Paediatric Physical Therapy and Supervised Clinical Practices I)*	500	300	200
	TOTAL	**1500**		

FINAL (5th)YEAR

Sr. No.	Subject Title	Total Contact Hours	Theory	Practical
1	EVIDENCE BASED PHYSICAL THERAPY & PROFESSIONAL PRACTICE	100	100	N/A
2	EMERGENCY PROCEDURES & PRIMARY CARE IN PHYSICAL THERAPY	200	100	100
3	PHYSICAL THERAPY TREATMENT & TECHNIQUES-II *(Cardiopulmonary, Neurological, Gynecological & Obstetrics, Integumentary Physical Therapy, and Supervised Clinical Practices -II)*	500	300	200
4	PROSTHETICS, ORTHOTICS, HUMAN DEVELOPMENT& COMMUNITY BASED REHABILITATION	100	100	N/A
5	EXERCISE PHYSIOLOGY & HEALTH AND WELLNESS	200	100	100
6	**TOTAL**	**1100**		
	Report Writing (in final year)	300		
	G. TOTAL	**6800**		

BREAK DOWN OF HOURS OF CLINICAL PRACTICE

YEAR	WARD/CLINIC	HOURS	PERIOD
THIRD YEAR	PHYSIOTHERAPY CLINIC	550	ONE YEAR
	TOTAL	**550**	
FOURTH YEAR	PHYSIOTHERAPY CLINIC	200	THREE MONTHS
	GENERAL MEDICINE	80	TWO MONTHS
	PULMONOLOGY & CARDIOLOGY	40	ONE MONTH
	GENERAL SURGERY	80	TWO MONTHS
	GYNECOLOGY & OBSTETRICS	40	ONE MONTHS
	PEDIATRICS	80	TWO MONTHS
	TOTAL	**520**	
FINAL YEAR	PHYSIOTHERAPY CLINIC	200	THREE MONTHS

	CHEST MEDICINE	80	ONE MONTH
	BURN & PLASTIC SURGERY	80	ONE MONTH
	GENERAL SURGERY	80	TWO MONTHS
	ORTHOPEDICS SURGERY	120	TWO MONTHS
	NEUROLOGY	120	ONE MONTH
	CARDIOVASCULAR & THORACIC SURGERY	80	ONE MONTH
	ICU & CCU	80	ONE MONTH
	TOTAL	**840**	
	S. TOTAL	**1910**	
	G. TOTAL (including Theory & Clinical) =6800+1910	8710	

Note:

* 2/3rd of the clinical training shall be provided in the morning whereas 1/3rd of the clinical training shall be provided in the evening. There shall be 1-2 months of summer vacations in an academic session.

DETAILED COURSE OUTLINE DPT

1st YEAR

1. Anatomy I 200 Marks
2. Physiology I 200 Marks
3. Biochemistry I 200 Marks
4. Kinesiology 200 Marks
5. English 100 Marks
6. Introduction to Computer 100 Marks

Total 1000 Marks

1. ANATOMY I

CELL BIOLOGY

GENERAL ANATOMY

Terms related to position and movements, the skin and subcutaneous tissues, Layers of skin, Integuments of skin, Glands associated with hair follicle, Microscopic picture of skin

BONES AND CARTILAGES

Osteology, Functions of Bones, Classification of bones, Parts of developing long bones, Blood supply of bones, Lymphatic vessels & nerve supply, Rule of direction of nutrient foramen, Gross structure of long bone, Surface markings, Cartilage, Development of bone and cartilage and Microscopic picture of cartilage and bone

THE MUSCLE

Introduction, Histological Classification, Functions of muscles in general, Type of skeletal muscles, Parts of skeletal muscle and their action and Nomenclature and Microscopic picture of muscle

STRUCTURES RELATED TO MUSCLES & BONES

Tendons, Aponeurosis, Fasciae, Synovial bursae, Tendon Synovial sheaths, Raphaes, Ligaments, Condyle, Epicongyle, Ridge, Tuberosity, Tubercle, Foramen, Canal, Groove, Process and Spur

THE JOINTS

Introduction, Functional classifications, Structural classification, Structures comprising a Synovial joint, Movements of joints, Blood supply of Synovial joints, their nerve supply and lymphatic drainage and Factors responsible for joint stability and Development of joints

CARDIOVASCULAR SYSTEM

Definition, Division of circulatory system into pulmonary & systemic, Classification of blood vessels and their microscopic picture and Heart and its histology and Function of the Heart and Anastomosis

NERVOUS SYSTEM

Definition, Outline of cellular architecture, Classification of nervous system, Parts of the central nervous system, Microscopic picture of cerebrum, cerebellum, spinal cord, Functional components of a nerve, Typical spinal nerve and Microscopic picture of nerve and Introduction of autonomic nervous system and Anatomy of neuromuscular junction

UPPER LIMB

OSTEOLOGY:

Detailed description of all bones of upper limb and shoulder girdle along their musculature and ligamentous attachments

MYOLOGY

Muscles connecting upper limb to the axial skeletal, Muscles around shoulder joint, Walls and contents of axilla, Muscles in brachial region, Muscles of forearm, Muscles of hand, Retinacula and Palmar apouenrosis and Flexor tendon dorsal digital expansion

NEUROLOGY

Course, distribution and functions of all nerves of upper limb and Brachial plexus

ANGIOLOGY (CIRCULATION).

Course and distribution of all arteries and veins of upper limb, Lymphatic drainage of the upper limb and Axillary lymph node and Cubital fossa

ARTHROLOGY

Acromioclavicular and sternoclavicular joints, Shoulder joint, Elbow joint, Wrist joint, Radioulnar joints, Inter carpal joints, Joints MCP and IP and Surface Anatomy of upper limb, and Surface marking of upper limb

DEMONSTARIONS:

Demonstration on Shoulder joint, attached muscles and articulating surfaces, Demonstration on Elbow joint, Demonstration on Wrist joint, Demonstration on Radioulnar joint, Demonstration on MCP and IP joints, Demonstration on acromioclavicular joint, Demonstration on sternoclavicular joint and Demonstration on Brachial plexus and Demonstration on Structure of bones

THORAX

STRUCTURES OF THE THORACIC WALL:

Dorsal spine (Vertebrae), Sternum, Costal Cartilages & Ribs, Intercostal Muscles, Intercostal Nerves, Diaphragm, Blood supply of thoracic wall and Lymphatic drainage of thoracic wall and Joints of thorax

THORACIC CAVITY:

Mediastinum, Pleura, Trachea, Lungs, Bronchopulmonary segments, Pericardium, Heart – Its blood supply, venous drainage & nerve supply, Large veins of thorax, superior and in-ferior vena cava., pulmonary veins brachiocephalic veins and Large Arteries – Aorta & its branches

LOWER LIMB

OSTEOLOGY

Detailed description of all bones of lower limb and pelvis along their musculature and ligamentous attachments.

MYOLOGY

Muscles of gluteal region, Muscles around hip joint, Muscles of thigh (anteriorly, posteriorly, laterally and medially) and Muscles of lower leg and foot

NEUROLOGY

Course, distribution, supply of all nerves of lower limb and gluteal region and Lumbosacral plexus.

ANGIOLOGY

Course and distribution of all arteries, veins and lymphatic drainage of lower limb

ARTHROLOGY

Pelvis, Hip joint, Knee joint, Ankle joint, Joints of the foot, Surface Anatomy of lower limb and Surface marking of lower limb

GENERAL HISTOLOGY

Cell, Epithelium, Connective tissue, Bone, Muscles tissue, Nervous tissues, Blood vessels, Skin and appendages and Lymphatic organs

GENERAL EMBRYOLOGY:

Cell division and Gametogenesis, Fertilization, cleavage, blastocyst formation and implantation of the embryo. Stages of early embryonic development in second and third week of intrauterine life, Foetal membrane (amniotic cavity, yolk sac, allantois, umbilical cord and Placenta) and Developmental defects, musculo skeletal system.

General Histology

Microscope, Epithelium, Connective Tissue, Cartilage, Bone, Muscles, Nerves System, Skin, Respiratory System.

Practicals:

During study of Anatomy, emphasis should be given on applied aspect, radiological anatomy, histological anatomy, surface anatomy and cross-sectional anatomy of the region covered in the respective year.

RECOMMENDED TEXT BOOKS:

1. Gray's Anatomy by Prof. Susan Standring 39thEd.,
2. Elsevier, Clinical Anatomy for, Medical Students by Richard S.Snell,
3. Clinically Oriented Anatomy by Keith Moore,
4. Clinical Anatomy by R.J. Last, Latest Ed,
5. Cunningham's Manual of Practical Anatomy by G.J. Romanes, 15th Ed., Vol-I, II and III,
6. The Developing Human. Clinically Oriented Embryology by Keith L. Moore, 6th Ed, Wheater's Functional Histology by Young and Heath,
7. Latest Ed, Medical Histology by Prof. Laiq Hussain, Neuroanatomyby Richard S.Snell.

2. PHYSIOLOGY I

BASIC AND CELL PHYSIOLOGY

Functional organization of human body, Homeostasis, Control systems in the body, Cell membrane and its functions, Cell organelles and their functions and Genes: control and function

NERVE AND MUSCLE

Structure and function of neuron, Physiological properties of nerve fibers, Physiology of action potential, Conduction of nerve impulse, Nerve degeneration and regeneration. Synapses, Physiological structure of muscle, Skeletal muscle contraction, Skeletal, smooth and cardiac muscle contraction, Neuromuscular junction and transmission, Excitation contraction coupling, Structure and function of motor unit

Clinical Module

Perform nerve conduction studies and explain their clinical importance. Myopathies and neuropathies. Peripheral nerve injuries

CARDIOVASCULAR SYSTEM

Heart and circulation, Function of cardiac muscle, Cardiac pacemaker and cardiac muscle contraction, Cardiac cycle, ECG: recording and interpretation. Common arrhythmias and its mechanism of development, Types of blood vessels and their function, Haemodynamics of blood flow (local control systemic circulation its regulation and control). Peripheral resistance its regulation and effect on circulation, Arterial pulse, Blood pressure and its regulation, Cardiac output and its control, Heart sounds and murmurs Importance in circulation and control of venous return., Coronary circulation, Splanchnic, pulmonary and cerebral circulation , Clinical Module

Clinical significance of cardiac cycle, correlation of ECG and heart sounds to cardiac cycle. Clinical significance of cardiac cycle, interpretation of ischemia and arrhythmias. Effects of hypertension. Clinical significance of heart sounds. Effects of ischemia. Shock

RESPIRATORY SYSTEM

Function of respiratory tract, Respiratory and non-respiratory function of the lungs, Mechanics of breathing, Production & function of surfactant and compliance of lungs, Protective reflexes, Lung volumes and capacities including dead space, Diffusion of gases across the alveolar membrane, Relationship between ventilation and perfusion. Mechanism of transport of oxygen and carbon dioxide in blood, Nervous and chemical regulation of respiration, Abnormal breathing, Hypoxia, its causes and effects, Cyanosis, its causes and effects

Clinical Module
Clinical importance of lung function tests. Causes of abnormal ventilation and perfusion. Effects on pneumothoax, pleural effusion, and pneumonia. Respiratory failure. Artificial respiration and uses & effects of O2 therapy. Clinical significance of hypoxia, cyanosis, and dyspnoea
BLOOD
Composition and general functions of blood, Plasma proteins their production and function, Erythropoiesis and red blood cell function, Structure, function, production and different types of haemoglobin, Iron absorption storage and metabolism, Blood indices, Function, production and type of white blood cells, Function and production of platelets, Clotting mechanism of blood, Blood groups and their role in blood transfusion, Complications of blood transfusion with reference to ABO & RH incompatibility, Components of reticuloendothelial systems, gross and microscopic structure including tonsil, lymph node and spleen, Development and function of reticuloendothelial system
Clinical Module
Anemia and its different types. Blood indices in various disorders. Clotting disorders. Blood grouping and cross matching. Immunity
SKIN AND BODY TEMPERATURE REGULATION+ SPORT PHYSIOLOGY

Practicals:

HEMATOLOGY
Use of the microscope. Determination of haemoglobin. Determination of erythrocyte sedimentation rate. Determining packed cell volume. Measuring bleeding and clotting time. RBC count. Red cell indices. WBC count. Leukocyte count. Prothrombin and thrombin time
RESPIRATORY SYSTEM
Clinical examination of chest. Pulmonary volume, their capacities and clinical interpretation. Stethography
CARDIOVASCULAR SYSTEM
Cardiopulmonary resuscitation (to be coordinated with the department of medicine), Examination of arterial pulse, ECG recording and interpretation, Arterial blood pressure, Effects of exercise and posture on blood pressure, Apex beat and normal heart sounds
RECOMMENDED TEXT BOOKS

1. Textbook of Physiology by Guyton and Hall, Latest Ed.
2. Review of Medical Physiology by William F. Ganong, Latest Ed.
3. Physiology by Berne and Levy, Latest Ed.
4. Human Physiology: The Basis of Medicine by Gillian Pocock, Christopher D. Richards
5. Physiological Basis of Medical Practice by John B. West and Taylor, 12th Ed.

3. BIOCHEMISTRY I

CELL
Introduction to Biochemistry, Cell: (Biochemical Aspects), Cell Membrane Structure, Membrane Proteins, Receptors & Signal Molecules
BODY FLUIDS
Structure and properties of Water, Weak Acids & Bases, Concept of pH &pK, Buffers, their mechanism of action, Body buffers
BIOMOLECULES
Amino Acids, Peptides & Proteins
Amino acids: Classification, Acid-Base Properties, Functions & Significance, Protein Structure, Primary, Secondary & Super secondary. &, Structural Motifs, Tertiary & Quaternary Structures of Proteins, Protein Domains, Classification of Proteins, Fibrous proteins (collagens and elastins) & Globular proteins
ENZYMES
Introduction, Classification & Properties of Enzymes, Coenzymes, Isozymes & Proenzymes, Regulation & Inhibition of Enzyme activity & enzymes inhibitors, Clinical Diagnostic Enzymology
CARBOHYDRATES
Definition, Classification, Biochemical Functions & Significance of Carbohydrates,
Structure & Properties of Monosaccharides & Oligosaccharides, Structure & Properties of Polysaccharides, Bacterial cell Wall, Heteropolysaccharides, GAGS

LIPIDS
Classification of Lipids, Fatty Acids: Chemistry, Classification occurrence & Functions, Structure & Properties of Triacylglycerols and Complex Lipids, Classification & Functions of Eicosanoids, Cholesterol: Chemistry, Functions & Clinical Significance, Bile acids/salts
NUCLEIC ACIDS
Structure, Functions & Biochemical Role of Nucleotides. Structure & Functions of DNA, Structure & Functions of RNA
MINERALS & TRACE ELEMENTS
Sources, RDA, Biochemical Functions & Clinical Significance of Calcium & Phosphorus, Sources, RDA, Biochemical Functions & Clinical Significance of Ca, Na, K, Cl, Mg, S, &P, Biochemical Functions & Clinical Significance of Fe, Cu, Zn, Mn, Mb, Se, Co, I,F
VITAMINS
Sources, RDA& Biochemical Functions & Clinical Significance of Fat Soluble Vitamins, Sources, RDA& Biochemical Functions & Clinical Significance of Water Soluble, Vitamins
NUTRITION
Dietary Importance of Carbohydrates, Lipids & Proteins and other dietary Ingredients. Balanced Diet. Diet in specialized conditions
MOLECULAR BIOLOGY
Nitrogenous basis, Nucleosides and Nucleotides, Structure & Role of Nucleotide.
TISSUE BIOCHEMISTRY
Extracellular Matrix, Collagen, Elastin and Extracellular Matrix Components, Biochemistry of Proteoglycans, Bone & Teeth, Muscle & Cytoskeleton

Practicals:

Section 1: Introduction to Biochemistry
Working SOPs for a Biochemistry Practical Laboratory. Introduction to Laboratory Equipments and Techniques. Preparation of solution (Normal, Molar Equivalent solution etc).
Section 2: Physical Biochemistry
Surface Tension. Process of adsorption. Buffer Action. Practical application of Henderson-Hasselbalch's equation
Section 3: Carbohydrate
Molisch's Test & Iodine Test. Benedict's Test &Barfoed's Test. Selivanoff's Test &Phenylhydrazine Test. Sucrose Hydrolysis. Starch Hydrolysis. Schematic Identification of an unknown carbohydrate
Section 4: Proteins
Biuret Test, Heat Coagulation Test & Salt Saturation Test. Ninhydrin Test, Xanthoproteic Test &Millon-Nasse's Test. Aldehyde Test, Sakaguchi's Test & Lead Sulphide Test. Determination of Isoelectric pH of casein Protein. Schematic Identification of unknown protein
Section 5: Lipids
Emulsification of natural fat & Solubility of soap. Acrolein Test & Test for Cholesterol Iodine & Peroxide value calculation. Saponification value calculation
Section 6: Biochemical analysis of different body fluid
Sample Collection & Physical Evaluation of Urine. Analysis of Normal Urine. Analysis of Abnormal Urine

RECOMMENDED BOOKS

1. Harper's Biochemistry by Robbert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwel (Latest Edition).
2. Lippincott's Illustrated Review of Biochemistry by Pamela C. Champe and Richard A. Harvey (Latest Edition).
3. Practical Clinical Biochemistry by Varley (Latest Edition).
4. Textbook of Biochemistry by Devlin (Latest Edition).
5. Textbook of Medical Biochemistry by M.A. Hashmi (Latest Edition).
6. Biochemistry by Stryer (Latest Edition).

4. KINESIOLOGY

INTRODUCTION TO KINESIOLOGY
Definition of kinesiology, Definition of rehabilitation

MECHANICS:
Mechanical Principles and Mechanics of Position
Force - force system – Description of units, Gravity: Center of gravity and line of gravity, Level of gravity, Equilibrium, Fixation and Stabilization
Mechanics of movement
Axes /Plane, Speed, Velocity, Acceleration, Momentum, Inertia, Friction, Lever - types – application, Pulley - types – application, Anatomical application of lever system and other pulley system application, Angle of pull
INTRODUCTION TO MOVEMENT
The body levers, Forces applied to the body levers, Types of movement and posture, Patterns of movement, Timing in movement, Rhythm of movement, the nervous control of movement
STARTING POSITIONS
Definition, Fundamental positions, Standing, Kneeling, Sitting, Lying, Hanging, The pelvic tilt
POSTURE
Inactive postures, Active postures, The postural mechanism, The pattern of posture, Principles of Re- Education, Techniques of Re-Education, Prevention of muscles wasting, The initiation of muscular contraction, Strengthening methods, Abnormal postures
MUSCLE STRENGTH AND MUSCLE ACTION
Types of Muscles contraction, Muscles tone, Physiological application to postural tone, Group action of muscles, Overview of muscle structure, Types of muscle work, Range of muscle work, Group action of muscles, Two joint muscle work, Active and passive insufficiency, Group movement of joints, Muscular weakness and paralysis
RANGE OF MOTION
Active Movements
Voluntary movements
Definition, Classification
Free Exercises
Classification of free exercises, Techniques of free exercises, Effects and uses
Assisted Exercises
The principles of assistance, Technique, Effects and uses
Assisted Resisted Exercises
Resisted Exercises
The principles of resistance, Variation of the power of the muscles in different parts of their range, Techniques of resisted exercises, Resistances, Progressive resistance exercise, Progression, Effects and uses of resisted exercises
Involuntary Movement
Reflex movement, reflex arc, stretch reflex, righting reflexes, postural reflexes, Effects and uses of reflex movement
PASSIVE MOVEMENT
Classification, Specific definitions, Relaxed passive movements, Principles of giving relaxed passive movements & its Effects and uses, Accessory movements, Principles of giving accessory movements and its Effects and uses, Passive manual mobilization and manipulations, Principles and Effects and uses, Controlled sustained stretching, Principles and Effects and uses.
RELAXATION
Definition, Muscle tone, Postural tone, Voluntary movement, mental attitudes, Degrees of relaxation, Pathological tension in the muscles, Technique, General relaxation, Local relaxation
DERIVED POSITIONS
Purpose of derived positions, Positions derived from standing By: alteration of arms, alteration of the legs, alteration of trunk & alteration of legs and trunk, positions derived from kneeling, sections derived from sitting By: alteration of the legs & by alteration of trunk, Positions derived from lying, By alteration of arms and by alteration of the legs, Positions derived from hanging, Other positions in which some of the weight is taken on the arms
SUSPENSION THERAPY

Suspension application, Suspension concept of inclined planes, The fixed point suspension, Supporting rope and its types, Sling and its types, Type of suspension: axial &vertical, Methods, techniques of suspension: upper limb & lower limb, Suspension effect on muscle work and joint mobility

NEUROMUSCULAR CO-ORDINATION

Coordinated movement, Group action of muscles, Nervous control, Inco-ordination, Re-Education, Frenkel's exercises.

WALKING AIDS

Crutches, Sticks, Tripod or Quadra pod, Frames.

Practicals:

Fundamentals of muscle testing, Methods of muscle recording, Basic muscle grading system, Evaluation of posture, Regional manual muscle testing of all the regions of the body, Practical demonstrations of muscles work and its ranges, Practical demonstrations of various fundamental positions and posture analysis, Practical demonstrations of the techniques of active, passive movements, Practical demonstrations of relaxation procedures, Practical demonstrations of various derived positions

RECOMMENDED TEXT BOOKS:

1. Practical exercise therapy by Margaret Hollis (Latest Edition).
2. Brunnstrom's Clinical Kinesiology (Latest Edition).
3. Clinical Kinesiology and anatomy by Lynn S Lippert(Latest Edition).
4. Joint structure and function: a comprehensive analysis by: Pamela. K. Levangie and Cynthia. C. Norkin (Latest Edition).
5. Muscle function testing by: Cunningham and Daniel (Latest Edition).
6. Human movement explained by kimjonas and karenbaker(Latest Edition).
7. The principles of exercise therapy by: M Dena Gardiner (Latest Edition).

5. ENGLISH

DETAILED COURSE OUT LINE

Comprehension; Answers to questions on a given text

Translation skills; Urdu to English

Paragraph writing; Topics to be chosen at the discretion of the teacher

Paragraph writing; Practice in writing a good, unified and coherent paragraph

Essay writing; Introduction

CV and job application; Translation skills, Urdu to English

Study skills; Skimming and scanning, intensive and extensive, and speed reading, summary and précis writing and comprehension

Academic skills; Letter/memo writing, minutes of meetings, use of library and internet

How to write a proposal for research paper/term paper

How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency)

Technical report writing, Progress Report writing

RECOMMENDED TEXT BOOKS:

1. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 1. Third edition. Oxford University Press. 1997. ISBN 0194313492
2. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press. 1997. ISBN 0194313506
3. Writing. Intermediate by Marie-Christine Boutin, Suzanne Brinand and Francoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0 19 435405 7 Pages 20-27 and 35-41 45-53.
4. Reading. Upper Intermediate. Brain Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 453402 2.
5. Writing. Upper-Intermediate by Rob Nolasco. Oxford Supplementary Skills. Fourth Impression 1992. ISBN 0 19 435406 5 (particularly good for writing memos, introduction to presentations, descriptive and argumentative writing).
6. Reading. Advanced. Brian Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1991. ISBN 0 19 453403 0.
7. Reading and Study Skills by John Langan

6. INTRODUCTION TO COMPUTER

Basic Definitions & Concepts

Hardware: Computer Systems & Components
Storage Devices, Number Systems
Software: Operating Systems, Programming and Application Software
Introduction to Programming, Databases and Information Systems
Networks
Data Communication
The Internet, Browsers and Search Engines
The Internet: Email, Collaborative Computing and Social Networking
The Internet: E-Commerce
IT Security and other issues

RECOMMENDED TEXT BOOKS

1. Introduction to Computers by Peter Norton, 6th International Edition (McGraw HILL)
2. Using Information Technology: A Practical Introduction to Computer & Communications by Williams Sawyer, 6th Edition (McGraw HILL)
3. Computers, Communications & information: A user's introduction by Sarah E. Hutchinson, Stacey C. Swayer
4. Fundamentals of Information Technology by Alexis Leon, Mathewsleon Leon press

2nd Year

1.	Anatomy II	200 Marks
2.	Physiology II	200 Marks
3.	Biochemistry II	200 Marks
4.	Biomechanics & Ergonomics	200 Marks
5.	Islamic Studies	100 Marks
6.	Pak Studies	100 Marks
	Total Marks	**1000 Marks**

1. ANATOMY II

THEORY

THE HEAD AND NECK

THE NECK:

Muscles around the neck, Triangles of the neck, Main arteries of the neck, Main veins of the neck, Cervical part of sympathetic trunk, cervical plexus, cervical spine (Vertebrae), Joint of neck

THE FACE:

Sensory nerves of the face, Bones of the face, Muscles of the face, Facial nerve, Muscles of mastication, Mandible, Hyoid bone, Temporomandibular joint, Brief description of orbit and nasal cavity

THE SKULL:

Bones of skull, Anterior cranial fossa, Middle cranial fossa, Posterior cranial fossa, Base of skull and Structures passing through foramina

NEURO ANATOMY

Central Nervous System: Disposition, Parts and Functions, Brain stem (Pons, Medulla, and Mid Brain), Cerebrum, Cerebellum, Thalamus, Hypothalamus, Internal Capsule, Blood Supply of Brain, Stroke and its types, Ventricles of Brain, CSF circulation and Hydrocephalus, Meninges of Brain, Neural pathways (Neural Tracts), Pyramidal and Extra pyramidal System (Ascending and Descending tracts), Functional significance of Spinal cord level, Cranial Nerves with special emphasis upon IV, V, VII, XI, XII (their course, distribution, and palsies), Autonomic nervous system, its components and Nerve receptors

SPINAL CORD

Gross appearance, Structure of spinal cord, Grey and white matter (brief description), Meninges of spinal cord, Blood supply of spinal cord and Autonomic Nervous system

ABDOMEN

ABDOMINAL WALL:

Structures of anterior abdominal wall: superficial and deep muscles, Structure of rectus sheath, Structures of Posterior abdominal wall, description of Gut Tube, Lumbar spine (vertebrae), Brief description of viscera.

PELVIS

Brief description of anterior, posterior and lateral walls of the pelvis, Inferior pelvic wall or pelvic floor muscles, Sacrum, Brief description of perineum and Nerves of perineum.
SPECIAL EMBRYOLOGY:
Gastrointestinian system, cardiovascular system, CNS, Respiratory system
SPECIAL HISTOLOGY
Tongue, Oesophagus, Stomach, Small Intestine, Large Intstine, Major Salivary Glands, Liver, Kidneys, Pituitary / Adrenal, Thyroid / Parathyroid

Practicals:

During study, emphasis should be given on applied aspect, radiological anatomy, histological anatomy, surface anatomy and cross-sectional anatomy of the region covered in the respective year

RECOMMENDED TEXT BOOKS:

1. Gray's Anatomy by Prof. Susan Standring 39th Ed., Elsevier.
2. Clinical Anatomy for Medical Students by Richard S.Snell.
3. Clinically Oriented Anatomy by Keith Moore.
4. Clinical Anatomy by R.J. Last, Latest Ed.
5. Cunningham's Manual of Practical Anatomy by G.J. Romanes, 15th Ed., Vol-I, II and III.
6. The Developing Human. Clinically Oriented Embryology by Keith L. Moore, 6th Ed.
7. Wheater's Functional Histology by Young and Heath, Latest Ed.
8. Medical Histology by Prof. Laiq Hussain.
9. Neuroanatomyby Richard S.Snell

2. PHYSIOLOGY II

NERVOUS SYSTEM
General organization of the nervous system, Classification of nerve fibers, Properties of synaptic transmission, Function of neurotransmitters and neuropeptides, Type and function of sensory receptors, Function of the spinal cord and ascending tracts, Reflex action and reflexes, Muscle spindle and muscle tone, Mechanism of touch, temperature and pain., Functions of the cerebral cortex, Difference between the sensory and motor cortex and their functions, Motor pathways including pyramidal and extrapyramidal, Basal Ganglia and its functions, Cerebellum and its function, Control of posture and equilibrium, Physiology of sleep, Physiology of memory, Mechanism and control of speech, Function of the thalamus, Function of the hypothalamus and limbic system, Production of CSF.
Clinical Module
Significance of dermatomes. Injuries of the spinal cord. Hemiplegia and paraplegia. Parkinsonism. Effects of cerebellar dysfunction.

REPRODUCTION
Production and function of testosterone and Physiological changes during male puberty, Function of the female reproductive system, Production and function of oestrogen, and progesterone, Menstrual cycle, Physiological changes during female puberty and menopause.
Clinical Module
Male infertility. Female infertility. Basis for pregnancy tests.
GASTROINTESTINAL TRACT
General function of gastrointestinal tract, Enteric nervous system, control of gastrointestinal motility and secretion, Mastication, Swallowing: mechanism and control, Function, motility and secretions of stomach, Function, motility and secretions of small intestine, Function, motility and secretions of large intestine, Function of GIT hormones, Mechanism of vomiting and its control pathway, Defecation and its control pathway, Functions of liver, Functions of, gallbladder and bile in digestion and Endocrine & exocrine pancreas and functions of pancreas in digestion
Clinical Module
Dysphagia. Physiological basis of acid peptic disease. Causes of vomiting. Diarrhea and constipation in clinical settings. Jaundice and liver function tests in clinical settings
ENDOCRINOLOGY

Classification of endocrine glands, Mechanism of action, feedback and control of hormonal secretion, Functions of the hypothalamus, Hormones secreted by the anterior and posterior pituitary and their mechanism of action and function.. Function of the thyroid gland, Function of the parathyroid gland, Calcium metabolism and its regulation, Secretion and function of calcitonin, Hormones secreted by the adrenal cortex and medulla, and their function and mechanism of action, Endocrine functions of the pancreas, Control of blood sugar. Hormones secreted by the gastrointestinal system and their function, Function of the thymus and The endocrine functions of the kidney and Physiology of growth.

Clinical Module

Acromegaly, gigantism and dwarfism. Effects of panhypopitutiarism. Diabetes insipidus. Thyrotoxicosis and myxoedema. Pheochromocytoma. Cushing's disease. Adrenogenital syndrome. Diabetes mellitus and hypoglycemia.

BODY FLUIDS AND KIDNEY

Components and quantitative measurements of body fluids, Fluid compartments, tissue and lymph fluid, Structure of the kidney and nephron, General function of the kidney, GFR and its regulation, Formation of urine including filtration, re-absorption and secretion, Plasma clearance., Mechanism of concentration and dilution of urine, Water and electrolyte balance with reference to the kidney, Role of the kidney in blood pressure regulation, Hormonal functions of the kidney, Acidification of urine and its importance, Acid base balance with reference to the kidney and Micturition and its control.

Clinical Module

Renal function tests and their clinical importance. Fluid excess and depletion. Renal failure and dialysis. Metabolic acidosis and alkalosis. Abnormalities of micturition.

Practicals:

Nervous System

Examination of superficial and deep reflexes. Brief examination of the motor and sensory system. Examination of the cranial nerves.

RECOMMENDED TEXT BOOKS

1. Textbook of Physiology by Guyton and Hall, Latest Ed.
2. Review of Medical Physiology by William F. Ganong, Latest Ed.
3. Physiology by Berne and Levy, Latest Ed.
4. Human Physiology: The Basis of Medicine by Gillian Pocock, Christopher D. Richards
5. Physiological Basis of Medical Practice by John B. West and Taylor,12th Ed

3. BIOCHEMISTRY II

BIOENERGETICS

Introduction to Bioenergetics, Biological Oxidations and Electron Transport Chain and Oxidative Phosphorylation

METABOLISM OF CARBOHYDRATES

Digestion & Absorption of Carbohydrates, Glycolysis & its Regulation, Citric Acid Cycle, Metabolism of Glycogen, Gluconeogenesis and regulation of blood glucose and Pentose Phosphate Pathway & its Significance.

METABOLISM OF LIPIDS

Digestion & Absorption of Lipids, Metabolism & Clinical Significance of Lipoproteins, Fatty acid oxidation biosynthesis and metabolism of Triacylglycerols, Metabolism & clinical Significance of Cholesterol and Metabolism of Eicosanoids

METABOLISM OF PROTEINS & AMINO ACIDS

Digestion of Proteins & Absorption of Amino Acids, Transamination & Deamination of Amino Acids and urea cycle and Specialized products formed from Amino Acids

Metabolisium of Nucleic Acids

MOLECULAR BIOLOGY

Structural Organization of Chromosome and Genes. Replication, Transcription in Prokaryotes & Eukaryotes, Translation: (Genetic Code) in Prokaryotes & Eukaryotes, Translation Inhibition by Antibiotics, Regulation of Gene Expression and Recombinant DNA Technology & Polymerase Chain Reaction, Blotting Techniques.

HORMONES

Classification & Mechanism of Action of Hormones, Signal Transduction, Second Messengers and Receptors, Hypothalmic& Pituitary Hormones, Steroid Hormones: Glucocorticoids and Mineralocorticoids, Insulin & Glucagon and Disease related to hormones abnormalities

Practicals:

Techniques of Instruments in Clinical Biochemistry with examples.

Visible Spectrophotometry. Flame photometry. UV & IR spectrophotometry. Atomic Absorption spectrophotometry. pH Metry. Chromatography and determination of Amino Acids in Urine by pape chromatography

Clinical quantatives analysis in Biochemistry

Sample Collection Blood, Faces and body fluids. Serum Glucose Estimation. Glucose tolerance Test (GTT). Serum Cholesterol estimation (Total, HDL and HDL cholesterol). Serum Bilirubin Estimation (Total, Direct and Indirect bilirubins). Serum Amylase Estimation. Serum AST Estimation. Serum ALT Estimation. Serum ALP Estimation. Serum Creatine Kinase(CK) Estimation. Serum Ascorbic acid Estimation. Serum LDH Estimation. Serum Proteins Estimation (Total, Albumin & Globulin). Serum Total lipids Estimation. Serum calcium Estimation (total, ionized & unionized). Serum Uric acid Estimation. Serum Magnesium Estimation. Serum Urea Estimation. Serum Creatinine Estimation

RECOMMENDED TEXT BOOKS:

1. Harper's Biochemistry by Robbert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwel (Latest Edition).
2. Lippincott's Illustrated Review of Biochemistry by Pamela C. Champe and Richard A. Harvey (Latest Edition).
3. Practical Clinical Biochemistry by Varley (Latest Edition).
4. Textbook of Biochemistry by Devlin (Latest Edition).
5. Biochemistry by Stryer (Latest Edition).by Stryer, Lubert, Latest Ed

4. BIOMECHANICS & ERGONOMICS

Biomechanics

Basic terminology

Biomechanics, Mechanics, Dynamics, Statics, Kinematics, Kinetics and anthropometries, Scope of scientific inquiry addressed by biomechanics, Difference between quantitative and qualitative approach for analyzing human movements and Biomechanics of human bone growth and development.

Kinetic Concepts for Analyzing Human Motion

Common units of measurement for mass, force, weight, pressure, volume, density, specific weight, torque and impulse, Different types of mechanical loads that act on human body and Uses of available instrumentation for measuring kinetic quantities.

Biomechanics of Tissues And Structures of the Musculoskeletal System

Biomechanics of Bone, Biomechanics of Articular Cartilage, Biomechanics of Tendons and Ligaments, Biomechanics of Peripheral Nerves and Spinal Nerve Roots and Biomechanics of Skeletal Muscles.

Biomechanics of the Human Upper Extremity

Biomechanics of the Shoulder, Biomechanics of the Elbow, Biomechanics of the Wrist and Hand, Factors that influence relative mobility and stability of upper extremity articulation, Muscles that are active during specific upper extremity movements and Biomechanical contributions to common injuries of the upper extremity.

Biomechanics of Human Lower Extremity

Biomechanics of the Hip, Biomechanics of the Knee, Biomechanics of the ankle and foot, Factors influencing relative mobility and stability of lower extremity articulations, Adaptation of lower extremity to its weight bearing functions, Muscles that are active in specific lower extremity movements and Biomechanical contribution to common injuries of the lower extremity.

Biomechanics of Human Spine

Biomechanics of the Lumbar Spine, Biomechanics of the Cervical Spine, Factors influencing relative mobility and stability of different regions of Spine, Biomechanical adaptations of spine during different functions, Relationship between muscle location and nature and effectiveness of muscle action in the trunk, Biomechanical contribution to common injuries of the spine

applied biomechanics

Introduction to the Biomechanics of Fracture Fixation, Biomechanics of Arthroplasty, Engineering Approaches to Standing, Sitting, and Lying and Biomechanics of Gait.

Human Movement in Fluid Medium

The nature of fluids, Buoyancy and floatation of human body, Drag and components of drag, Lift Force and Propulsion in a fluid medium

Ergonomics

Overview And Conceptual Framework.

Ergonomics and Therapy: An Introduction, A Client-Centered Framework for Therapists in Ergonomics, Macroergonomics.

Knowledge, Tools, and Techniques.

Anthropometry, Psychosocial Factors in Work-Related Musculoskeletal Disorders, Physical Environment and Human Factors in Medical Rehabilitation Equipment: Product Development and Usability Testing.

Special Considerations

Lifting Analysis, Seating and Computers and Assistive Technology.

Application Process

Ergonomics of Children and Youth

Practicals:

- Biomechanical assessment of Upper extremity
- Biomechanical assessment of Lower Extremity
- Biomechanical assessment of Gait
- Reflective case assignment related to biomechanics of various regions of the body
- Measurement of angles of joints
- Biomechanical study of deformities
- Fundamentals of Goniometry: Introduction to Goniometry, Basic concepts in Goniometry, Joint motion, Range of motion, Factors affecting ROM, End-feel, Capsular and non capsular pattern of ROM limitation, Procedures, Positioning, Stabilization, Measurements Instruments, Alignment, Recording, Procedures
- Procedural Goniometry: Measurement of upper extremity, lower extremity, tempomendibular joint, cervical spine, thoracic spine and lumber joint ROM.

RECOMMENDED TEXT BOOKS

1. Basic biomechanics of musculoskeletal system By: Nordin& Frankel, 3rd edition.
2. Basic Biomechanics, By: Susan J. Hall 4th edition.
3. Additional study material as assigned by the tutor.
4. Ergonomics for the therapist by Karen Jacobs 3rd edition mosby and Elsevier publishers

5. ISLAMIC STUDIES

Fundamental Beliefs and Practices of Islam.

Tauheed (Unity of Allah), Risalat (Finality of the Prophet-hood). Akhirat (Day of Judgement).,Salat, Soum, Zakat, Hajj and Jehad

Need of Religion and its Role in Human Life.

Morality in Islam.

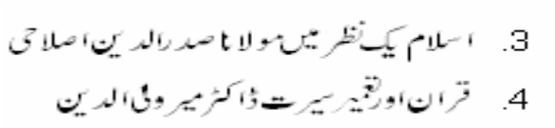
Concept of morality, Concept of morality and Faith., Islamic principles and methods of character building., Moral values in Islam.

Rights of the individual in Islam.

Quran as a guide for the modern society and scientific development.
Holy prophet (peace be upon him) and his life.
Islamic concept of state.
Islam and society.
Role of man and women in society, Rights of women children in Islam. Concept of woman's freedom in Islam., Hukook-ul-Ibad.
Importance of rizk-e-hilal.
Contribution of Islamic scholars in science and medicine.

RECOMMENDED BOOKS

1. Introduction to Islam by Dr.Hamidullah.
2. Islam: Its meaning and message by Khurshid Ahmad


3. اسلام یک نظر میں مولانا صدرالدین اصلاحی
4. قران اور تعمیر سیرت ڈاکٹر میر ولی الدین

6. PAKISTANSTUDIES

Ideology of Pakistan.
Definition and elucidation. Historical aspect. Ideology of Pakistan in the light of speeches and sayings of Allama Iqbal and Quaide-Azam.
Pakistan Movement
Basis for the creation of Pakistan. Historical developments: 1857-1947
Political Developments in Pakistan since 1947
Land and people of Pakistan
Geography, Society., Culture., Natural resources., Health and education with reference to characteristics trends and problems.

RECOMMENDED BOOKS

1. Ideological Orientations of Pakistan by Sharif Al Mujahid.
2. Struggle for Pakistan by I.H. Qureshi.
3. The Making of Pakistan by Richard Symond

3rd Year:

1.	Pharmacology	200 Marks
2.	General Pathology & Microbiology	200 Marks
3.	Physical Agents & Electrotherapy including Medical Physics	200 Marks
4.	Therapeutic Exercises and Techniques & Manual Therapy	200 Marks
	Total Marks	**800 Marks**

1. PHARMACOLOGY

General Pharmacology: Introduction, Sources of drugs, Active principles of crude drugs, Physical nature/ classification/ nomenclature of drugs, Nature of drugs, Routes of drugs of administration, Pharmacokinetics, Principle types of drug actions, Pharmacodynamic receptors, Dose response curve, Pharmacolinetics absorption & distribution, Quantal DRC + therapeutic index, Drug dosage, Factors modifying actions & dosage of drugs, Complex drug reactions, Cumulative drug reactions, Pharmacogenetics, Adverse drug effects, Teratogenicity + carcinogenicity, Adverse drug effects, Drug toxicity (blood & skin), Biotransformation, Drug toxicity, Interactions of drugs, Bioavaibility + plasma conc. of drug, Development of new drug, Development of new drug II & evaluation, Drug dependence, Kinetics of Metabolisms. Systemic Pharmacology: Autonomic nervous system, Autacoids, Blood, Gastrointestinal tract, Kidney, Musculo Skeletal, Endocrine, Respiratory System, Cardiovascular system, Central Nervous System, Chemotherapy.

P R A C T I C A L S

A -Experimental Pharmacology

Mixtures, KMNO4 lotion, Replacement Fluids & dehydration (Normal saline, half normal saline, ringer solution, dextrose solution), ORS powder. Experiments designed to observe the action of drugs on animals and isolated tissue. Experiments on the actions

of selected drugs to be demonstrated to the students. Effects of drugs on rabbit's eye, Effects of Acetylcholine and Atropine on isolated rabbit's ileum, Effects of histamine and antihistamines on isolated rabbit's ileum, Schemes to find out unknown drug having stimulatory or inhibitory effect on isolated rabbit's ileum, Methodology of clinical trials, Introduction to Biostatistics.

B. Prescription Writing

General principles

Guideline for rational use of drugs

Prescription writing for common ailments

Acute watery diarrhea, Bacillary dysentery, Amoebic dysentery, Ascariasis, Tape-worm, infestation, Acute streptococcal pharyngitis, Iron deficiency anemia, Allergic rhinitis, Scabies, Acute malarial fever, Cerebral malaria, Typhoid fever, Bronchial asthma, Hypertension, Migraine, Cardiac failure, Shock

Recommended Book:

I. Illustrated Reviews of Pharmacology by Lippincott. Basic & Clinical Pharmacology by Katzung

2. GENERAL PATHOLOGY & MICROBIOLOGY

i. GEN. PATHOLOGY

Cell Injury and Death: Causes of cell injury, Necrosis, Apoptosis and Sub cellular responses. Cell Adaptations: Hyperplasia, Hypertrophy, Atrophy, Metaplasia and Intracellular accumulation. Inflammation: Acute inflammation. Vascular events, Cellular events and Chemical mediators. Chronic Inflammation. General, Granulomatous and Morphologic patterns of acute and chronic inflammation. Healing and Repair:

Normal controls, Repair by connective tissue and Wound healing. Haemodynamic Disorders. Edema, Hyperemia / congestion, Hemorrhage, Thrombosis, Embolism, Infarction and Shock. Diseases of Immunity. General features, Hypersensitivity reactions, Immune deficiencies, Autoimmunity and Amyloidosis. Neoplasia: Nomenclature, Molecular basis, Carcinogenic agents and Clinical aspects

ii. MICROBIOLOGY

Basic Bacteriology

Bacteria Compared with Other Microorganisms, Structure of Bacterial Cells, Growth, Genetics, Classification of Medically Important Bacteria, Normal Flora, Pathogenesis,, Host Defenses, Laboratory Diagnosis, Antimicrobial Drugs: Mechanism of Action, Antimicrobial Drugs: Resistance, Bacterial Vaccines, Sterilization & Disinfection, Biosafety and bio risk management,

Clinical Bacteriology

Overview of the Major Pathogens & Introduction to Anaerobic Bacteria. Gram-Positive Cocci; Staphylococcus aureus,Streptococcus pyogenes, Staphylococcus epidermidis, Staphylococcus saprophyticus,S. pyogenes, Streptococcus agalactiae, Enterococcus faecalis,Viridansstreptococci, Streptococcus bovi and S. pneumoniae

Gram-Negative Cocci;NeisseriameningitidisandNeisseria gonorrhoeae.

Gram-Positive Rods;Bacillusanthracis,Bacillus cereus, Clostridium tetani, Clostridium botulinum, Clostridium perfringens,Clostridiumdifficile, CorynebacteriumdiphtheriaeandListeria monocytogenes.

Gram-Negative Rods Related to the Enteric Tract;E. coli, Salmonella species, Shigellaspecies, Vibrio cholerae, Vibrio parahaemolyticus,Vibriovulnificus, Campylobacter jejuni, Helicobacter pylori, Klebsiella, Enterobacter, Serratia, Proteus, Providencia, Morganella, Pseudomonas spp.,Bacteroides&Prevotella.

Gram-Negative Rods Related to the Respiratory Tract;Haemophilusinfluenzae, Bordetella pertussis, and Legionella pneumophila

Gram-Negative Rods Related to Animal Sources (Zoonotic Organisms);Brucellaspecies, Francisellatularensis, Yersinia pestis, and Pasteurellamultocida

Mycobacteria, Actinomycetes, Mycoplasmas, Spirochetes, Chlamydiae, Rickettsiae, Minor Bacterial Pathogens

Basic Virology

Structure, Replication, Genetics, Classification of Medically Important Viruses, Pathogenesis, Host Defenses, Laboratory Diagnosis, Viral Vaccines.

Clinical Virology

Herpes Viruses, Rabies Virus, Polio Virus, Hepatitis Viruses, Human Immunodeficiency Virus, Dengue Virus.

Mycology

Basic Mycology, Cutaneous & Subcutaneous Mycoses, Systemic Mycoses, Opportunistic Mycoses,

Parasitology

Intestinal & Urogenital Protozoa, Blood & Tissue Protozoa, Minor Protozoan Pathogens, Cestodes, Trematodes, Nematodes.

Sterilization

Laboratory Exercises:

Each lecture will be followed by two hour practical class where the student will apply their theoretical knowledge in the understanding of related microbiological investigations, which have been proved useful for the diagnosis of human diseases.

During the other laboratory sessions, the students will be engaged in the preparation of media, the sterilization of glass ware, Antigens, Antibodies, Vaccines – haemolysin, permanent slides, laboratory reagents and also to assisting postgraduate students in the isolation of micro – organisms from clinical materials.

Practicals:

- Acute Inflammation
- Chronic Inflammation
- Necrosis
- Gangrene
- Pigmentation
- Calcification
- Urine Examination
- Sterilization
- Culture Media
- Antibiotic Sensitivity testing
- Culturing bacterial pathogens
- Examination of different clinical specimens
- Blood Culture
- Anaerobic Culture
- Gram Staining
- ZN Staining
- Biochemical tests to identify bacteria (Conventional, API 20E, API 20NE, Automated systems)
- PCR
- KOH preparation for scraping
- Stool Examination
- ELISA

RECOMMENDED BOOKS

i. Basic Pathology by Robbins Latest Edition
ii. Clinical Pathology Interpretations by A.H. Nagi
iii. Pocket Companion to Robbins, Pathologic basis of disease Cotran, Kumar
iv. Theory and Practice of Histological Techniques by John D Bancrof

3. PHYSICAL AGENTS & ELECTROTHERAPY INCLUDING MEDICAL PHYSICS

i. PHYSICAL AGENTS & ELECTROTHERAPY

Introduction & General Consideration of Electrotherapy

Types of current used

Low Frequency Current

Medium Frequency Current:

High Frequency Current:

Faradic Current

Sinusoidal Current

Detailed description of sinusoidal current, Treatment and Methods of application

Galvanic Current

- Constant galvanic current
  - Detailed description of galvanic current treatment, Methods of application, Dangers, precautions, contraindications & Ionization

Medical Ionization

Modified Galvanic Current

Definition, Physical effects, Therapeutic effects, Uses, Treatment techniques & methods of application, Electrical stimulation of nerve & muscle

- A nerve impulse & Property of accommodation

Electrical Reactions, Normal & abnormal reactions of nerve & muscle to faradism & interrupted direct current

- Changes in electrical reaction in
  - Upper motor neurons, Lower motor neurons & Muscular disease
- Methods of electrical test
  - Faradic & I.D.C test,
  - Strength duration curve
  - Accomodity test
  - Electromyography
  - Definition, method, value, uses of E.M.G, Electromyography & temperature , feedback technique

Transcutaneous Electrical Stimulation (Tens)

Definition, Theoretical basis of pain, Equipment selection, Electrode placement and Clinical indications

MEDIUM FREQUENCY CURRENT:

Interferential Current, Introduction, physical principles, electro-physiological effects, Clinical applications, methods of application and Treatment consideration & contraindications

Physics of Head and Radiation

Definition of heat and temperature, Physical effects, Transmission of heat, Radiant energy electromagnetic spectrum its production & properties and Laws governing radiation

Infra-Red Rays

Definition, Production, luminous & non-luminous generators, Physiological effects, Therapeutic effects, Uses, Techniques of application and Dangers and contraindications

Ultra Violet Rays

Production, U.V. rays, Mercury Vapor Lamp: Air cooled mercury vapor lamp &Kromayer lamp, Fluorescent Tubes and Penetration of rays into the skin, Physiological effects (local & general), Therapeutic effects and Sensitizers, Assessment of doses, Test dose, Techniques of local and general radiation with special techniques of treatment of wounds, Techniques with compression, Dangers & precautions and Contraindications

Heliotherapy

Introduction, Effects, Uses and dangers and contraindications

Ultrasonic Therapy

Introduction, Production, Physiological & therapeutic effects, Uses, dangers, precautions & contraindications and Techniques and application of treatment

Cryotherapy

Definition, Methods, Physiological & therapeutic effects and Dangers, indications and precautions

Hydrotherapy

Physiological principles of hydrotherapy, Application of heat & cold, Outline of methods of applying moist heat, Medium used, contrast bath, paraffin baths, whirlpool baths,

techniques, effects, uses, dangers, contraindications of each, The use of water as medium of each, the use of water as a medium of movement pool therapy, Immersion baths, full, plain and medicated, partial baths, packs, general local methods of application, Hot air, vapors, the car of patients in hydrological department and Detailed description of indication of hydrotherapy

Traction

Effects of spinal traction, Clinical indications for the use of spinal traction, Contraindications and precautions for spinal traction, adverse effects of spinal traction and Application technique

Compression

Effects of External Compressions, Clinical indications for the Use of External Compression, Contraindications and Precautions of External Compression, Contraindications for the Use of Intermittent or Sequential Compression Pumps, Precautions for the Use of Intermittent or Sequential Compression Pumps, Adverse Effects of External Compression and Application Techniques

Laser therapy:

Definition, Properties of laser, Production of Lasers, Types of Lasers, Techniques of application, Dosage parameters, Interaction of laser with body tissues, Physiological and therapeutic effects of lasers, Dangers and contraindications and Methods of Treatment

ii. MEDICAL PHYSICS

Electricity and Magnetism:

Structure of an atom, Electron Theory, Conductors & Insulations, Conduction & Convection, Displacement Current.

Static Electricity

Charging by conduction and Induction, Electrostatic Fields, Gold leaf Electroscope, Capacitors, types of capacitors, Construction, Units, Arrangement of Capacitors in series and parallel, Charging and discharging of capacitors, Oscillating Discharge of Capacitors.

Current Electricity

Ohm's Law. Electrical Components and their unit, Resistance, Types of Resistance, Units, Chemical effects of a Current, Types of Current, Cell and Batteries, Combination of Cells in series and parallel, Thermal effects of current, Electrolysis and Electrolytic burns, Ionization of gases and Thermionic emission, Electronic tubes, Diodes and Triodes

Electromagnetism:

Molecular theory of magnetism, Magnetic effect of an electric current, Moving coil volt meter and Ammeter, Moving iron type, Electromagnetic induction, Faradays law and Lenses law, Mutual and self Induction, Eddy currents, Transformer, Construction and types, Static and auto Transformer, Dynamo, construction and A.C & D.C Dynamo.

Electro mechanics:

Current for treatment, Rectification, Rectification of A.C, Half wave and full wave Rectification, Valve Rectification Circuits and Metal Rectifier,.

Classification of currents (overview)

Low frequency current

Sinusoidal current. Faradic current, Galvanic current (constant and interrupted), Diadynamic current TENS, Smart Bristow faradic coil.

Medium Frequency Current

Interferential current and Russian current

High Frequency Current Waves

Waves, Transistors and Long waves, medium waves short waves micro waves

Sound Waves
Heat Waves
Electromagnetic Radiation
Safety in Biomedical Instruments
Radiation Protection

Practicals:

The practical training will be practiced in Physical Therapy treatment ward under the supervision of qualified physiotherapists

Location of motor points, Faradic & I.D.C test, Strength duration curve, determination of Rheobase and Chronaxie, Accomodity test, Electromyography, Definition, method, value, uses of E.M.G, Electromyography & temperature, feedback technique, Practical application of TENS in physical therapy treatment ward, Reflective clinical case studies, Iontophorosis, Practical application of Infra red rays, Practical application of ultrasound including Phonophoresis, Supervised application of Ultraviolet rays including determination of test dosage, Practical application of cold packs, Practical application of traction, Paraffin Wax bath applicationDemonstration of techniques during practical classes, later on techniques practiced by students on patients attending the department under supervision of trained

Note: The students are expected to make a record of his/her achievements in the log book. The log book is a collection of evidence that learning has taken place. It is a reflective record of achievements.

The log book shall also contain a record of the procedures which student would have performed/observed.

Recommended Text Books:

1. Clayton's Electrotherapy and Actinotherapy, 10th edition by PM Scott
2. Electrotherapy: Evidence based Practice, 11th edition by Shelia Kitchen
3. Michelle H Cameron's Physical Agent in Rehabilitation: From research to Practice
4. Electrotherapy and Electrodiagnosis by S. Lient
5. Applications of Shortwave Diathermy by P.M. Scott
6. Practical Electrotherapy by Savage
7. Clayton's Electrotherapy and actinotherapy by: PM Scott
8. Medical physics for physical therapists by: AD Moore
9. Preliminary Electricity for Physiothrapists by B. Savage.
10. Basic Electronics by Grob.
11. Principles of Bio-instrumention by Richard A. Normann.
12. Hand book of Biomedical Instrumentation by R.S. Khanpur.
13. Basic Radiation Protection Technology by Gollnick

4. THERAPEUTIC EXERCISES AND TECHNIQUES & MANUAL THERAPY

i. THERAPEUTIC EXERCISES AND TECHNIQUES

Therapeutic Exercise: Foundational Concepts

Therapeutic exercise: impact on physical function, Process and models of disablement, Patient management and clinical decision making: an, Interactive relationship:, Strategies for effective exercise and task-specific and Instruction:

Prevention, Health, and Wellness

Role of physical therapy in healthy people

Applied Science of Exercise and Techniques

Range of Motion

Types of ROM exercises, Indications and goals for ROM, Limitations of ROM exercises, Precautions and contraindications to ROM exercises, Principles and procedures for

applying ROM Techniques, ROM techniques, Self-assisted ROM,Continuous passive motion and ROM through functional patterns

Stretching for Impaired Mobility

Definitions of terms related to mobility and stretching, Properties of soft tissue–response to immobilization and stretch, Determinants, types, and effects of stretching interventions, Procedural guidelines for application of stretching interventions, Precautions for stretching, Adjuncts to stretching interventions, Manual stretching techniques in anatomical planes of motion.

Peripheral Joint Mobilization

Definitions of terms; mobilization/manipulation, self-mobilization (auto-mobilization), mobilization with movement, physiological movements, accessory movements, thrust, manipulation under anesthesia, muscle energy, Basic concepts of joint motion: arthrokinematics, Indications for joint mobilization, Limitations of joint mobilization techniques contraindications and precautions, Procedures for applying passive joint mobilization techniques, Mobilization with movement: principles of application and Peripheral joint mobilization techniques including Shoulder Girdle Complex, Elbow and Forearm Complex, Wrist Complex, Hand and Finger Joints, Hip Joint, Knee and Leg, Ankle and Foot Joint

Resistance Exercise for Impairedmuscle Performance

Muscle performance and resistance exercise–definitions and guiding principles, Skeletal muscle function and adaptation to resistance exercise, Determinants of an exercise program , Exercise program, Physiological changes that occur with training, Determinants of resistance exercise, Types of resistance exercise, General Principles Of Resistance Training, Precautions For Resistance Exercise, Contraindications to resistance exercise, Manual resistance exercise; definition and use, guidelines and special considerations, techniques–general background, upper extremity, lower extremity, Proprioceptive neuromuscular facilitation–principles and Techniques, Diagonal patterns, basic procedures with PNF patterns, upper extremity diagonal patterns, lower extremity diagonal patterns, specific techniques with PNF, Mechanical resistance exercise; use in rehabilitation, use in conditioning programs, special considerations for children and older adults, Selected resistance training regimens and Equipment for resistance training.

Principles of Aerobic Exercise

- Application of principles of an aerobic conditioning program for the patient with coronary disease; inpatient phase
  - (phase i) outpatient phase
  - (phase ii) outpatient program
  - (phase iii) special considerations, adaptive changes
- Applications of aerobic training for the de-conditioned individual and the patient with chronic illness
- Age differences; children, young adults, older adults

Aquatic Exercise

Background and principles for aquatic exercise, Definition of aquatic exercise, Goals and indications for aquatic exercise, Precautions and contraindications to aquatic exercise, Properties of water, Aquatic temperature and therapeutic exercise, Special equipment for aquatic exercise, Exercise interventions using an aquatic environment stretching exercises, Strengthening Exercises and Aerobic Conditioning.

Practicals:

Practical demonstration of ROM techniques, Practical demonstration of stretching techniques, Practical demonstration of resisted exercise techniques, Practical demonstration of peripheral joint mobilization techniques, Aerobic exercises, Balance

training, Hydrotherapy. Reflective clinical case studies and Supervised and independent Practical application of therapeutic techniques on patients in outdoor and indoor Physical Therapy treatment settings.

*Note:*The students are expected to make a record of his/her achievements in the log book. The log book is a collection of evidence that learning has taken place. It is a reflective record of achievements.

The log book shall also contain a record of the procedures which student would have performed/observed.

Recommended Text Books

1. Therapeutics Exercises and Technique, By: Carolyn Kisner& Lynn Allen Colby 4th 5th edition.
2. Therapeutics Exercises: Techniques for Intervention By: WillimD.Banddy
3. Clinical decision making in therapeutic exercise By: Patricia e. Sullivan & prudence d. Markos, Appleton & Lange Norwalk, Connecticut

ii. MANUAL THERAPY

Course description:

Through the utilization of instruction, demonstration, practical exercises, research article critical review and case study discussions and presentations this course will provide the best evidence in state of the art advanced manual therapy A detailed overall review of all Manual Therapy techniques, along with manual therapy techniques covering spine and Temporo-Mandibular joint, will take place. Techniques covered are: advanced myofascial trigger point therapy, Proprioceptive training, muscle energy combination techniques, strain counter strain, neuromobilization combination techniques and mobilization, manipulation techniques with emphasis on thrust manipulation. Thorough evaluation, assessment and technique selection training will take place utilizing evidence based models such as APTAs “Open Door” and “Hooked in Evidence” programs All skills will be introduced through on-site demonstration and hands-on practice Students will also get significant exposure in critical review of research articles pertaining to application of manual therapy techniques Case review, discussion and case presentations are an important component of this course

Introduction to Manual Therapy

OMT (Orthopedic Manual Therapy) Kaltenborn-Evjenth Concept

History, Special features and Overview.

Principles

Spinal Movement

The mobile segment, Spinal range of movement, Joint positioning for evaluation and treatment, Three-dimensional joint positioning

- Resting position, Actual resting position &Nonresting positions
- Joint locking
- Bone and joint movement
- Rotations of a vertebral bone
  - Standard bone movements, Combined bone movements, Coupled movements & Noncoupled movements
- Joint roll-gliding associated with bone rotations
  - Joint roll-gliding & Abnormal roll-gliding
- Translation of vertebral bone
- Joint play associated with bone translation

Translatoric Joint Play

The Kaltenbom Treatment Plane, Translatoric Joint Play Movements, Determining the direction of restricted gliding, Glide test, Kaltenbom Convex-Concave Rule, Grades of translatoric movement, Normal grades of translatoric movement (Grades I - III)

- Palpating resistance to normal movement

Pathological grades of translatoric movement and Using translatoric grades of movement

Tests of Function

- Principles of function testing

- Assessing quantity of movement
  - Measuring rotatoric movement with a device &
  - Manual grading of rotatoric movement
- Assessing quality of movement
  - Quality of movement to the first stop
  - End-feel: Quality of movement after the first stop
- Elements of function testing
- Active and passive rotatoric movements
  - Testing rotatoric movement
  - Localization tests
  - Differentiating articular from extra-articular dysfunction
  - Differentiating muscle shortening from muscle spasm
- Translatoric joint play tests
- Resisted movements
- Passive soft tissue movements
- Additional tests

OMT Evaluation

- Goals of the OMT evaluation, Physical diagnosis, Indications and contraindications, Measuring progress, Elements of the OMT evaluation, Screening exam
- Detailed exam
  - History, inspection, Tests of function, Palpation & Neurologic and vascular tests
- Medical diagnostic studies & Diagnosis and trial treatment

Spinal Joint Mobilization

- Goals of joint mobilization
- Mobilization techniques
- Pain relief mobilization
  - Pain-relief traction mobilization (Grade I -IISZ), Vibrations and oscillations
- Relaxation mobilization
  - Relaxation-traction mobilization (Grade I -II)
- Stretch mobilization
  - Stretch-traction mobilization (Grade III), Stretch-glide mobilization (Grade /)
- Manipulation
- If traction exacerbates symptoms
- A voiding high-risk manual treatment
  - Rotation mobilization, Joint compression

OMT Treatment

- Elements of OMT
- Treatment to relieve symptoms
  - Immobilization, Thermo-Hydro-Electric (T-H-E) therapy, Pain-relief mobilization & Special procedures for pain relief
- Treatment to increase mobility
  - Soft tissue mobilization, Passive soft tissue mobilization, Active-facilitated soft tissue mobilization, Muscle stretching principles, Joint mobilization to increase mobility & Neural tissue mobilization
- Specialized exercise to increase mobility
- Treatment to limit movement
- To inform, instruct and train
- Research

Spinal Syndromes

Introduction of keltenborn spinal syndromes with neurological evaluation through key muscles, upper & lower cross syndromes and Mackenze's three syndromes.

Manual Therapy Assessment

The Maitland's and Mulligan concept, Subjective examination, Physical examination, Examination of the temporomandibular joint, Examination of the upper cervical spine,

Examination of the cervicothoracic spine, Examination of the thoracic spine and Examination of the lumbar spine

The Subjective Examination Step by Step

Introduction, Body chart, Behavior of symptoms, Special questions, History of the present condition (HPC), Past medical history (PM H), Social and family history (SH, FH), Plan of the physical examination, Case scenarios, Counterfeit clinical presentations

Physical Examination Step by Step

Introduction, Observation, Joint tests, Muscle tests, Neurological tests, Special tests, Functional ability, Palpation, Accessory movements, Completion of the physical examination.

Techniques used in Manual Therapy

Principles

Learning manual techniques, Applying manual techniques, Objective

- Starting position
  - Patient's position & Therapist's position
- Hand placement and fixation/stabilization
  - Grip, Therapist 's stable hand & Therapist's moving hand
- Procedure
  - Joint pre-positioning, Mobilization technique & Symbols
- Recording
- Identifying an intervertebral segment
- The Star Diagram

Physiotherapy related with following Joints

1. Sacroilliac Joint
2. Lumber Spine;
3. Thoracic Spine;
4. Cervical Spine;
5. Upper Cervical Spine;

Jaw Tests and Mobilization;

Spinal Mobilizations Mulligan

The Cervical and Upper Thoracic Spines

Nags, Reverse Nags, Snags, Self Snags, Spinal Mobilization with arm movement the Upper Cervical Spine Special Techniques

The acute Wry Neck, Headaches, Vertigo, Nausea and Other Vertebral Artery Signs

The Lumbar Spine

Snags and Self Snags

Integrative Manual Therapy

Postural Compensations of the spine, Muscle Energy and 'Beyond' Technique for the spine, Treatment of spine Hypertonicity for Synergic Pattern, Release with Strain and Counter strain Technique, Myofascial Release, Tendon Release Therapy for Treatment of Tendon Tissue Tension with Advanced Strain and Counter strain Technique, Ligaments: a Tensile Force Guidance System: Treatment with Ligament Fiber Therapy and Procedures and Protocols to correct spinal Dysfunction with Integrative Manual Therapy

Practicals:

In the laboratory sessions, Supervised evaluation and manual therapy treatment techniques will be demonstrated and practiced, including joint and soft-tissue mobilization, manipulations, and posture and movement retraining in the physiotherapy clinic/Ward and Orthopaedic clinic/Ward, Indoor as well as outdoor. Various reflective case studies related to manual therapy of the spine and TM joint will be assigned to the students.

Note:The students are expected to make a record of his/her achievements in the log book. The log book is a collection of evidence that learning has taken place.

It is a reflective record of achievements. The log book shall also contain a record of the procedures which student would have performed/observed.

Recommended Text Books

1. Manual Mobilization of the Joints The Kaltenborn Method ofJoint Examination and Treatment Volume I The ExtremitiesBy: Freddy M. Kaltenbomin collaboration withOlafEvjenth,TraudiBaldaufKaltenbom,Dennis Morgan, and Eileen Vollowitz,OPTPMinneapolis, Minnesota, USA.
2. Manual Therapy By: Ola Grimsby, the Ola Grimsby institute San Diego.
3. Integrative Manual therapy for the upper and lower extremities By: Sharon weiselfish, North Atlantic books Berkeley, California.
4. Orthopedic manual therapy an evidence-based approach by: Chad Cook
5. Orthopaedic Manual Therapy Diagnosis Spine and Temporomandibular Joints By: Aad van der
6. Translatoric Spinal Manipulation By: John R. Krauss, Olaf Evjenth, and Doug Creighton John R. Krauss A Lakeview Media L. L.C. Publication
7. Neuromusculoskeletal Examination and Assessment A Handbook for Therapists
8. By: Nicola J Petty, Ann P Moore &G D Maitland, Second Edition Churchill Livingstone
9. Myofascial Manipulation Theory and Clinical Application, Second Edition By: Robert I. Cantu, Alan J. Grodin an Aspen Publication Aspen Publishers, Inc. Gaithersburg, Maryland 2001
10. Maitland's Vertebral Manipulation Seventh Edition By: Geoffrey D. Maitland
11. Musculoskeletal manual medicine, diagnosis and treatment by Jiri Dovark, Vaclav Dovark, Werneir Schneider etc

4th Year

1. Community Health, Research Methodology, Social & Behavioral Sciences	100 Marks
2. Special Pathology	200 Marks
3. Physical Therapy in Medicine	200 Marks
4. Physical Therapy In Surgery Including Radiology & Diagnostic Imaging	200 Marks
5. Clinical Decision Making & Differential Diagnosis	100 Marks
6. Physical Therapy Treatment & Techniques-I *(Musculoskeletal, Sports, Gerontology including Geriatric, Paediatric Physical Therapy and Supervised Clinical Practices I)*	200 Marks
Total Marks	**1000 Marks**

1. COMMUNITY HEALTH, RESEARCH METHODOLOGY, SOCIAL & BEHAVIORAL SCIENCES

i. Community Health

Introduction; History of Community Medicine, Definition, concept of Health & illness of diseases and Natural History of diseases, levels & prevention

Environmental Sanitation & Medical Entomology; Water, waste disposal and Environmental problems & pollution

Genetics; Prevention of genetic diseases and Genetic counseling

General and Descriptive Epidemiology; Time, Place and Person

Analytical Epidemiology; Case control and Cohort studies

Experimental Epidemiology Randomized Control Trial.

Systemic Epidemiology; Vector borne diseases, Water borne diseases, Air born diseases, Contact diseases and Diseases of major public health and its importance along with national health programs wherever Applicable.

Non-Communicable Diseases; Diabetes, Hypertension, Heart diseases, Blindness, Accidents, Geriatric problems

Occupational Health Problems; M.C.H. and family welfare Programs, Health care delivery in the community, National Health Policy, National Health programs including, Rehabilitation, Evaluation of Health, Programs, Health Planning Organization,

Community Nutrition; Foundation and status in Pakistan masses. Community nutrition programs: key features, benefits, planning, implementation, evaluation. Nutritional status assessment: Anthropometric, Dietary, Biochemical, Clinical measurements. Community Nutrition and Dietetics profession. Steps of nutritional epidemiological study, Testing and Piloting of nutritional epidemiological study, Questionnaire design. Evaluation, sources of variation in the dietary intake, Methodological studies on dietary questionnaires.

Structure of Health Care System In The Country; P.H.C. district level, State level and central level. P.H.C. Organization and Function and Role of Non Governmental Organization

Health Education; Principles of Health Promotion, Methods, approaches and media for, I.E.C (Information, Education & Communication), Medical and Health/Information system, Mental Health and Nutrition.

Teaching Methodology; Types of health services, public, private, scientific, traditional health system, Organization of public services in health, central, provincial and local levels, Levels of health care, primary, secondary and tertiary, Planning and Organization of health services, Implementation, Evaluation of health services, Management of resources in health services, Financial management, Health education and social cultural concept Ethics in Health Services, Theories of learning facilitations.

ii. Research Methodology

Research Fundamentals; Research, Theory in Research, Research Ethics

Research Design; Research Problems, Questions, and Hypotheses, Research Paradigms, Design Overview and Research Validity

Experimental Designs; Group Designs and Single-System Design

Non Experimental Research; Overview of Non experimental Research, Clinical Case Reports, Qualitative Research, Epidemiology, Outcomes Research and Survey Research.

Measurement; Measurement Theory and Methodological Research.

Data Analysis; Statistical Reasoning, Statistical Analysis of Differences; The basics, Statistical Analysis of Differences; Advanced and special Techniques, Statistical Analysis of Relationships; The basics and Statistical Analysis of Relationships; Advanced and special Techniques

Implementing Research; Implementing a Research Project and Publishing and Presenting Research

iii. Social & Behavioural Sciences

Introduction of Sociology

Social Action And Interaction; Social processes, Co-operation, Competition, Conflict and Accommodation.

Social Groups; Primary-Secondary, In and Out Group and Reference group

Culture; Values, Beliefs, Sanctions, Cultural relativism and Ethnocentrism, Norms, Folk ways, Conflict, Deviancy and Social control.

Socialization and Personality formation

Social Institution; Meanings, Social stratification and Meanings and Forms (Classes and Castes)

Social and Cultural Change; Factors promoting and resisting social change

The Field Of Medical Sociology; Contribution of Sociology in Health. Environmental pollution and Health, Patient, Healthcare provider relationship. Role of Healthcare provider and attendants in the managements of patient.

Introduction of Behavioural Sciences; Understanding Behaviour. Sensation, sense organs / special organs, Perception and factors affecting it, Attention, concentration, Memory, types and methods to improve it, Types and theories of thinking, Cognition and levels of cognition, Problem solving and decision making strategies, Communication Its types.

Personality and Intelligence; Psychological growth and development, Personality, theories and Factors affecting personality development, Assessment of personality Influence of personality in health, disease, hospitalization, stress, etc, Intelligence and its types Relevance of IQ and EQ Methods of enhancing EQ and IQ Factors affecting intelligence and their assessment

Stress Management

Doctor – Patient Relationship; Concept of boundaries and psychological reactions in doctor – patient relationship.

Pain, Sleep and Consciousness; Concept of pain, sleep and consciousness, Attend states of consciousness, Psychological influence on sleep and consciousness, Non-pharmacological methods of inducing sleep, Changes in consciousness.

Communication Skills; Principles of effective communication. A practical method of communication between the doctor and patient about disease, drugs, prognosis etc

Interviewing; Types of interview and Skills of interviewing
Health Psychology
Psychology in clinical management of patients, Psychological therapies, child's social and cognitive development, Psychological changes during adolescence, old age and their clinical management, Impact of illness on a patient's psychological well being. Association between psychological stress and physical well being, Role of doctor in patient reassurance.
Social And Community Perspective; Inequalities Ethnicity, culture and racism, Gender and Healthcare and Influence of health. Illness on behaviour
Application of Behavioural Principles In Health and Disease; Mentally / emotionally and physically handicapped, Homebound and medically compromised.
Recommended Text Books:

1. Text book of Community Medicine by: Park J E. Latest Edition
2. Horton, Paul B. and Chester L. Hunt, 1984 Sociology, Singapore: Megraw Hill Book Co.
3. Moon, Graham, 1995. Society and Health; An introduction to Social Science for Processionals, London: Routledge.
4. Rehabilitation Research (Principles and Applications) 3rd Edition By Elizabeth Domholdt
5. Textbooks of Community Medicine, by Prof. H. A. Siddique (2nd Edition).
6. A Handbook of Behavioural Sciences for Medical and Dental StudentsBy: M H Rana, S Ali and M Mustafa, , University of Health Sciences Lahore
7. Developmental Psychology for Healthcare ProfessionsBy: Katherine A Billingham

2. SPECIAL PATHOLOGY

Theory:
The course outline is as follows:-
1. Blood Vessels & Heart,
2. Hematopoietic and Lymphoid Systems
3. Respiratory System
4. The Urinary System
5. Musculoskeletal System
6. Endocrine System
7. Nervous System

Practicals:

Basic principles of lab works, Hematopoietic System (ALL, CLL,AML, CML), Musculoskeletal System (Osteogenic sarcoma & Giant cell tumor), The Skin (Squamous cell carcinoma & Basal cell carcinoma), Endocrine System (Thyroid tumors, Colloid goiter, Follicular adenoma & Papillary carcinoma thyroid, Pituitary, Causes of hyperpituitrism& lab. Diagnosis, Causes of biliary, bitarism& lab. Diagnosis, Thyroid, Thyroid function test, Causes of hyperthyroidism & lab. Diagnosis, Causes of hypothyroidism & lab. Diagnosis, Parathyroid, Hyperparathyroidism, Hypoparathyroidism, Hypercalcemia, Hypocalcemia, Diabetes mellitus, Lab. Diagnosis & GTT, Diabetic ketoacidosis), Liver, gall bladder and biliary tract, Chronic cholecystitis, Hepatocellualr carcinoma & Liver cirrhosis), Nervous System (Meningioma etc), Basics of Histopathology / tissue Processing, Bone Marrow Biopsy
Recommended Books:
1. Pathological Basis of Disease by Kumar, Cotran, Robbins. 7th. Ed.
2. Medical Microbiology and Immunology by Levinson and Jawetz, 9th Ed. Mc Graw-Hill
3. Clinical Pathology Interpretations by A.H. Nagi

3. PHYSICAL THERAPY IN MEDICINE

Cardiac Diseases:

Chest pain, Dyspnoea, Palpitation, Peripheral edema, Syncope, Cardiac failure, Acute pulmonary edema, Cardiogenic shock, Systemic hypertension, Ischemic heart disease, Angina pectoris, Unstable angina, Myocardial infarction, Rheumatic fever, Valvular heart diseases, Congenital heart diseases, Ventricular septic defect , Atrial septal defect, pulmonary heart disease, Pericardial disease, Pulmonary hypertension and Cardiac arrhythmias and heart in pregnancy.

Vascular Diseases:
Arteriosclerosis, Acute & Chronic ischemia of leg, Aortic aneurysm, Buerger's disease, Raynaud's disease, Varicose veins and Venous thrombosis.
Rheumatology and Bone Diseases
Arthritis
Osteoarthritis, Rheumatoid arthritis, Connective tissue diseases, Arthritis in elderly, Arthritis in children, Seronegative spondyloarthropathies, Crystals deposition disease, Arthritis associated with other diseases
Back Pain
Back Pain due to serious disease, Inflammatory Back Pain, Disc disease, Mechanical problems, Soft tissues problems, Psychogenic Back Pain, Nonspecific Back Pain and Neck pain.
Soft Tissue Rheumatism
Bone Diseases
Paget's disease, Infections of bones, Neoplastic disease, Skeletal dysplasia and Other hereditary diseases
Respiratory Diseases
Diseases of Upper Respiratory Tract
Common cold, Sinusitis. Rhinitis, Pharangitis, Acute laryngeo-trcheobronchitis, Influenza, Inhalation of the foreign bodies
Disease of Lower Respiratory Tract
Acute & chronic Bronchitis, Bronchiectasis, Cystic fibrosis, Asthma, Emphysema, Pneumonias, Tuberculosis, Pulmonary fibrosis, Radiation damage, Common tumors of the lungs, Respiratory failure, Adult distress respiratory syndrome, Disorders of chest wall and pleura, Chest trauma, Deformities of rib cage, Dry pleurisy, Pleural effusion, Empyema and Pneumothorax
Dermatology
Introduction to disorders and diseases, Acne vulgaris, Psoriasis, Boils, Carbuncles, Alopecia, Mycosis fungoides, Polymorphic light eruptions, Vitilogo, Pityriasis and Hyperhydrosis
Diseases of Brain and Spinal Cord:
Common neurological symptoms, Neurological examination, The brain death, Stroke, types of stroke, Parkinson's disease, Epilepsy, Multiple Sclerosis, Infective and Inflammatory diseases, Intracranial tumors, Hydrocephalus, Headache, Migraine, Facial pain, Head injury, Motor neuron disease, Diseases of spinal cord, Diseases of Cranial nerves, Peripheral nerve lesions, Diseases of voluntary muscles and of neuromuscular junction, Sleep and Unconsciousness and Comma
Renal Diseases
Glomerulonephritis, Acute nephritic syndrome, Nephrotic syndrome, Urinary tract infection, Renal hypertension, Renal failure, Benign enlargement of prostate gland and Prostatic carcinoma
Diseases of the Blood:
Anaemia, Brief description of types of Anaemia and Brief description of Bleeding and Coagulation, only Haemophilia and Thrombosis is described in detail
Miscellaneous Diseases:
Brief description of Diabetes Mellitus and its complications, Detailed description of Diabetic Neuropathy and Diabetic foot, Steroid induced Myopathy

Practicals

The students are expected to make a record of his/her achievements in the log book. The logbook is a collection of evidence that learning has taken place. It is a reflective record of achievements. The log book shall also contain a record of the procedures which student would have performed/observed.

Evaluation pattern of Practical Training for Final Examination shall comprise of the following pattern:

1. OSCE: 04 static and 02 Interactive
2. Short Cases : 02
3. Long Case :01

Recommended Text Books:

1. Practice of medicine by: Davidson
2. Clinical medicine by: Parveen j Kumar & Michael Clark
3. Short text book by medicine by: M. Inam Danish
4. Hutchison's clinical methodsby: Michael swash. 21st edition
5. Bed side techniques
6. Looking Within (How X-ray, CT, MRI, Ultrasound and Other Medical Images Created and How They Help Physicians Save Lives) By Anthony Brinton Wolbarst
7. A–Z of Musculoskeletal and Trauma Radiology By: James R. D. Murray
8. Essentials of Radiology by Fred. A. Mettler, 2nd edition.
9. Imaging in rehabilitation, By: Terry. R. Malone, Charles Hazle & Michael L. Grey. McGraw Hill Publishers.

4. PHYSICAL THERAPY IN SURGERYINCLUDING RADIOLOGY & DIAGNOSTIC IMAGING

i. Surgery

Orthopedic surgery

Fractures

Dislocations & Subluxations

Definition, Traumatic dislocation, General description

Principles of general description and management of traumatic dislocation and subluxation of

- Shoulder joint, Acromioclavicular joint, Elbow joint, Hip joint and Knee joint

Soft Tissue Injuries

General Orthopedic Disorders

Carpel tunnel syndrome, Compartment syndromes, Muscular dystrophies, Neuropathies, Avascular necrosis of bone in adult and children, Ischemic contracture, Gangrene, Rickets, Osteoporosis and osteomalacia, Shoulder pain, Neck pain, Knee pain, Backache, Painful conditions around elbow

- Detailed description of : Orthotics, Prosthetics, Splintage, Traction & POP

Tumors:

Deformities and Anomalies

Deformities of the Spine:

Torticolis, Scoliosis, Kyphosis, Lordosis and flat back

Deformities of the Lower Limb:

CDH, coxa vera, coxa valga, anteversion, Retroversion, Genuvalgum, Genuvarum, Genurecurvatum, CDK, Talipes calcaneousequines, varus&valgus, Talipes calcaneovarus, Talipes calcaneovalgus, Talipes equinovarus, Pes cavus, Pes planus. Hallux valgus &varuma and Hallux rigidus and hammer toe

Deformities of Shoulder and Upper Limb:

Sprengels shoulder, Cubitus varum, Cubitus valgum and Deputryn’s contracture

General Surgery

Introduction, Indications for surgery and Types of incisions, Wounds, types of wounds, factors affecting wounds healing, care of wounds, Bandages and dressing, Trauma and metabolic response to trauma, Detailed description of chest and abdominal trauma, Hemorrhage, hemostasis and blood transfusion, Classification and brief description of shock, Fluid and electrolyte balance, Classification of body fluid changes, Pre, intra and post operative fluid therapy, Surgery and diabetes, Burns and grafts, Neoplasia, Preoperative assessment & preparation, Post operative treatment, complications and their management

Types of Anaesthesia

Local anaesthetic agents and Regional anaesthesia (spinal and epidural)

Intravenous anaesthetic agents, Muscle relaxants, Inhalational anaesthetic agents, Anaesthesia and associated diseases, Complications of anaesthesia, Perioperative management, Cardiopulmonary Resuscitation. CPR, Recovery from anaesthesia, Pain management and postoperative care, Ulcers, sinuses and fistulas, Transplantation and Brief description of operation performed on: oesophagus, stomach, intestine gall bladder, bile duct, spleen, pancreas, liver, abdominal wall, hernias, breast, kidneys, ureters, prostate, peritoneum, mesentery and retroperitoneal space

Thoracic Surgery

i. Pulmonary Surgery

Introduction, types of incision, types of operation, complications of pulmonary surgery, drains , tubes, pneumonectomy, lobectomy , thoracoplasty, Operations on pleura. Chest injuries, Brief description of indication for pulmonary surgery, Diseases of chest wall and pleura, Diseases of bronchi, Tumors of lung, Lung abscess, Hydatid disease of lung, Pulmonary embolism, Mediastinal masses and Problems related to diaphragm

ii. Cardiac Surgery

Introduction, Cardiorespiratory resuscitation, Special investigation procedures in cardiac surgery, Basic techniques in cardiac surgery, Types of incision, Types of operation, Complications of cardiac surgery, Lines, drains and tubes, Brief description of indications for cardiac surgery, Congenital heart disease, Acquired heart diseases, Diseases of the pericardium, Cardiac transplantation

iii. Vascular Surgery

Introduction, Investigation in vascular disease types of operation, Indication for vascular surgery, Complication of vascular surgery, Brief description of arterial occlusion, Gangrene, Detailed description of amputation, Aneurysm, Burgers disease, Raynaud's disease and syndrome, Varicose veins, Superficial and deep venous thrombosis, Venous hemorrhage, Lymph edema, Lymph adenitis and lymphomas

NEUROSURGERY

i. Cranial Surgery

Introduction, Special investigation in brain diseases and traumas, Types of operations, indications and complications of cranial surgery, Head injuries to the brain, Acute intracranial hematomas, Fractures of the skull, Intra cranial abscess, Intracranial tumors and Intra cranial aneurysm and hydrocephalus

ii. Surgery of Vertebral Column Spinal Cord and Peripheral Nerves

Dislocation and management of dislocation of vertebral column, Tumors of vertebral column, Prolapse intervertebral disc, Disc protrusion, Spondylosis and spondylolisthesis, Spinal cord injuries and their management, Tumors of spinal cord types of operations performed on nerves, Nerve injuries and their surgical management and Brief description of lesions of cranial and spinal nerves and their management.

ii. RADIOLOGY & DIAGNOSTIC IMAGING

This course component covers the study of common diagnostic and therapeutic imaging tests. At the end of the course students will be aware of the indications and implications of commonly used diagnostic imaging tests as they pertain to patient's management. The course will cover that how X-Ray, CT, MRI, Ultrasound and Other Medical Images are created and how they help the health professionals to save lives.

History, A New Kind of Ray, How a Medical Image Helps, What Imaging Studies Reveal, Radiography(x-rays), Fluoroscopy, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Ultrasound, Endoscopy

Radiography and Mammography:

Fluoroscopy:

Computed Tomography (CT):

Magnetic Resonance Imaging (MRI)

Ultrasound:

Endoscopy:

Nuclear Medicine:

Interventional Radiology

Practicals:

In the laboratory/ Clinical sessions, clinical evaluation of Physical Therapy related surgical cases including orthopedic and General Surgery skills shall be taught/ demonstrated/ practiced. Various reflective case studies related to diagnosis and management of orthopedic and general Surgery cases will be assigned to the students. Practical training will mainly focus on the following:

- Communication skills including history taking and counseling
- Vitals determination (Measurement)
- Systemic Examination including Chest Examination and Practical Joints Examination
- Basic Life Support training
- Evaluation of Orthopedic deformities
- Observation of Various orthopedic procedures performed for correction of deformities

*Note:*The students are expected to make a record of his/her achievements in the log book. The log book is a collection of evidence that learning has taken place. It is a reflective record of achievements. The log book shall also contain a record of the procedures which student would have performed/observed.

In the laboratory sessions, clinical evaluation of Physical Therapy related medical cases including Radiology and Diagnostic Imaging skills shall be taught, demonstrated and practiced. Various reflective case studies related to diagnosis and management will be assigned to the students. Practical will focus on the following:

- Communication skills including history taking and counseling
- Vitals determination (Measurement)
- Systemic Examination including Chest Examination
- Basic Life Support training
- Radiography(x-rays)
- Fluoroscopy
- Computed Tomography (CT)
- Magnetic Resonance Imaging (MRI)
- Ultrasound
- Endoscopy
- Interventional Radiology
- Nuclear Medicine

Evaluation pattern of Practical Training for Final Examination shall comprise of the following pattern:

1. OSCE : 04 static and 02 Interactive
2. Short Cases : 02
3. Long Case :01

Recommended Text Books

1. Short practice of surgery by Baily and Love's
2. Text Book of Surgery by Ijaz Ahsan
3. Outline of Fractures
4. Wound Care Essentials, practice principles, By Sharon Baranoski& Elizabeth A. Ayello
5. APTA. Guide to Physical Therapy Practice: Revised second edition. Alexandria, VA: American Physical Therapy Association; 2003. ISBN: 978-1-887759-85-

5. CLINICAL DECISION MAKING & DIFFERENTIAL DIAGNOSIS

Screening and Interviewing, the Pt Scope of Practice: to refer or Treat?

Introduction to Screening for Referral in Physical Therapy,

Reasons to Screen, Screenings and Surveillance, Diagnosis by the Physical Therapist, Differential Diagnosis Versus Screening, Direct Access, Decision-Making Process, Case Examples and Case Studies

Introduction to the Interviewing Process

Concepts in Communication, Cultural Competence, The Screening Interview, Subjective Examination, Core Interview, Hospital Inpatient Information and Physician Referral

Overview of the Physiology of Pain and Systemic Causes of Pain

Mechanisms of Referred Visceral Pain, Multisegmental Innervations, Assessment of Pain and Symptoms, Sources of Pain, Types of Pain, Comparison of Systemic Versus Musculoskeletal Pain, Patterns, Characteristics of Viscerogenic Pain, Screening for Emotional and Psychologic Overlay, Screening for Systemic Versus Psychogenic, Symptoms and Physician Referral.

Physical Assessment as a Screening Tool

General Survey, Techniques of Physical Examination, Integumentary Screening Examination, Nail Bed Assessment, Lymph Node Palpation, Musculoskeletal Screening Examination, Neurologic Screening Examination, Regional Screening Examination, Systems Review and Physician Referral.

Screening for Hematologic Disease

Signs and Symptoms of Hematologic Disorders, Classification of Blood Disorders and Physician Referral

Screening for Cardiovascular Disease

Signs and Symptoms of Cardiovascular Disease, Cardiac Pathophysiology, Cardiovascular Disorders and Laboratory Values

Screening for the Effects of Cardiovascular Medications

Physician Referral

Screening for Pulmonary Disease

Signs and Symptoms of Pulmonary Disorders, Inflammatory/Infectious Disease, Genetic Disease of the Lung, Occupational Lung Diseases, Pleuropulmonary Disorders, Physician Referral

Screening for Hepatic and Biliary Disease

Hepatic and Biliary Signs and Symptoms, Hepatic and Biliary Pathophysiology, Gallbladder and Duct Diseases, Physician Referral

Screening the Head, Neck, and Back

Using the Screening Model to Evaluate the Head, Neck, or Back, Location of Pain and Symptoms, Sources of Pain and Symptoms, Screening for Oncologic Causes of Back Pain, Screening for Cardiac Causes of Neck and Back Pain, Screening for Peripheral Vascular Causes of Back Pain, Screening for Pulmonary Causes of Neck and Back Pain, Screening for Renal and Urologic Causes of Back Pain, Screening for Gastrointestinal Causes of Back Pain, Screening for Liver and Biliary Causes of Back

Pain, Screening for Gynecologic Causes of Back Pain, Screening for Male Reproductive Causes of Back Pain, Screening for Infectious Causes of Back Pain and Physician Referral.

Screening the Sacrum, Sacroiliac, and Pelvis

The Sacrum and Sacroiliac Joint, The Coccyx, The Pelvis and Physician Referral

Screening the Lower Quadrant: Buttock, Hip, Groin, Thigh, and Leg

Using the Screening Model to Evaluate the Lower Quadrant, Trauma as a Cause of Hip, Groin, or Lower Quadrant Pain, Screening for Systemic Causes of Sciatica, Screening for Oncologic Causes of Lower Quadrant Pain, Screening for Urologic Causes of Buttock, Hip, Groin, or Thigh Pain. Screening for Male Reproductive Causes of Groin Pain, Screening for Infectious and Inflammatory Causes of Lower Quadrant Pain, Screening for Gastrointestinal Causes of Lower Quadrant Pain, Screening for Vascular Causes of Lower Quadrant Pain, Screening for Other Causes of Lower Quadrant Pain and Physician Referral

Screening the Chest, Breasts, and Ribs

Using the Screening Model to Evaluate the Chest, Breasts, or Ribs, Screening for Oncologic Causes of Chest or Rib Pain, Screening for Cardiovascular Causes of Chest, Breast, or Rib Pain, Screening for Pleuropulmonary Causes of Chest, Breast, or Rib Pain, Screening for Gastrointestinal Causes of Chest, Breast, or Rib Pain, Screening for Breast Conditions that Cause Chest or Breast Pain, Screening for Other Conditions as a Cause of Chest, Breast, or Rib Pain, Screening for Musculoskeletal Causes of Chest, Breast, or Rib Pain, Screening for Neuromuscular or Neurologic Causes of Chest, Breast, or Rib Pain and Physician Referral

Screening the Shoulder and Upper Extremity

Using the Screening Model to Evaluate Shoulder and Upper Extremity, Screening for Pulmonary Causes of Shoulder Pain, Screening for Cardiac Causes of Shoulder Pain, Screening for Gastrointestinal Causes of Shoulder Pain, Screening for Liver and Biliary Causes of Shoulder Pain, Screening for Rheumatic Causes of Shoulder Pain, Screening for Infectious Causes of Shoulder Pain, Screening for Oncologic Causes of Shoulder Pain, Screening for Gynecologic Causes of Shoulder Pain and Physician Referral

Recommended Text Books

1. Goodman CC, Snyder TEK. Differential Diagnostics for Physical Therapists: Screening for Referral. Saint Louis, MO: Saunders: Elsevier; 2006. ISBN: 978-0-7216-0619-4
2. APTA. Guide to Physical Therapy Practice: Revised second edition. Alexandria, VA: American Physical Therapy Association; 2003. ISBN: 978-1-887759-85-
3. Additional readings as assigned by the instructors

6. PHYSICAL THERAPY TREATMENT & TECHNIQUES-I *(Musculoskeletal, Sports, Gerontology including Geriatric, Pediatric Physical Therapy and Supervised Clinical Practices I)*

i. MUSCULOSKELETAL PHYSICAL THERAPY

Medical Terminology

Principles and Concepts of Musculoskeletal Evaluation & Assessment

Principles of Intervention

Soft tissue Injury, Repair, and Management

Joint, Connective Tissue, and Bone Disorders and Management

Arthritis–arthrosis, Fibromyalgia and myofascial pain syndrome, Osteoporosis, Fractures–post-traumatic immobilization

Surgical Interventions and Postoperative Management

Peripheral Nerve Disorders and Management

Exercise Interventions by Body Region

The spine and posture: structure, function, postural impairments & management guidelines
Posture and biomechanical influences
Impaired posture
Etiology of pain and Common faulty postures: characteristics and Impairments
Management of Impaired Posture
General management guidelines and Tension headache/cervical headache
The Spine: Impairments, Diagnoses, & Management Guidelines
Review of the structure and function of the spine
Spinal Pathologies and Impaired Spinal Function
Management Guidelines Based on Impairments
The Spine: Exercise Interventions
The Shoulder and Shoulder Girdle
The Elbow & Forearm Complex
The Wrist & Hand
The Hip
The knee
The Ankle & Foot

Practicals:

- The practical training will be sought in Physical Therapy treatment-based settings. Keeping in view therapeutic principles, management of various pre and post-operative conditions will be practiced under supervision and later independently by the students, the practical work might include:
- Therapeutic Management of conditions of spine, Therapeutic Management of conditions of extremities, Therapeutic Management of vascular disorders, Therapeutic Management of pulmonary conditions, Therapeutic Management of gynecological conditions, Reflective clinical case studies & Supervised and independent Practical application of therapeutic techniques on patients in outdoor and indoor Physical Therapy treatment settings.

Note: The students are expected to make a record of his/her achievements in the log book. The log book is a collection of evidence that learning has taken place. It is a reflective record of achievements. The log book shall also contain a record of the procedures which student would have performed/observed

ii. SPORTS PHYSICAL THERAPY

Medical Terminology Related to Sports Physical Therapy
Introduction to Sports Rehabilitation
Introduction to Sport injury management
Injury Screening and Assessment of Performance
Injury prevention and screening and Assessment and needs analysis
Pathophysiology of Musculoskeletal Injuries
Pathophysiology of skeletal muscle injuries, Pathophysiology of tendon injuries, Pathophysiology of ligament injuries, Pathophysiology of skeletal injuries and Peripheral nerve injuries
Effective Clinical Decision Making
Joint Specific Sport Injuries and Pathologies
Traveling with a team
Drugs and the Athlete
Ethics and Sports Medicine
Case Histories

iii. GERONTOLOGY & GERIATRIC PHYSICAL THERAPY

Gerontology

Geriatric Physical Therapy
Medical Terminology Regarding Geriatrics
Attitudes and Ageism
Ageism, Myths and Facts about Older Adults, Age Bias in Healthcare, Geriatric Training and Role of Physical Therapist
Normal Physical Changes in Older Adults
Psychological Changes:
The 3 Ds and Suicide in Older Adults, Delirium, Dementia and Depression
Older Adult Abuse and Neglect:
Scope of Older Adult Abuse and Neglect and Clues to Abuse and Interventions
Triage and Assessment:
ABCs of Geriatric Assessment and Assessment Techniques and Atypical Presentations
Pain
Pain in Older Adults, Pain Assessment and Challenges, Impact of Physiological Changes, Medication and Pain Management, Medication Interactions, Medication and Food
Effects of age:
Task Complexity, Exercise, Ambulation.
Physical Therapy for Geriatrics in Various Neuromuscular Disorders:
Alzheimer's disease, Parkinsonism, Cerebro vascular accident (C.V.A) and Poly neuropathies
Pre-operative and post-Operative Physical Therapy for Geriatrics in Various Musculoskeletal Disorders:
Hip & Knee Joint replacements, Soft tissue injuries.
Balance and Fall in Elderly: Issues in Evaluation and Treatment
Medications
Nutritional Deficiencies:

- Primary nutritional problems, limited fixed incomes, severely limited food choices and availability.

Case Histories:
Principles of assessment and outcome measures, Documentation in SOAP notes format and Evidence based geriatric Physical Therapy Treatment protocols

iv. PAEDIATRIC PHYSICAL THERAPY

This course addresses both the medical and rehabilitation management of the pediatric patient. Foundation lectures on normal development provide the students with a model to use when learning about pediatric pathologies, assessments and interventions. This course also involves the examination and treatment of the pediatric population using an interdisciplinary approach.
The etiology and clinical features of common diseases/ disorders observed in the pediatric population will be emphasized. Lab: methods for examination, goal setting, and intervention are emphasized. Students will participate in interdisciplinary case studies and an interdisciplinary evaluation project. Topics will focus on medical terminology, clinical examination, evaluation, comparing contemporary, traditional interventions and the impact of evolving technology in this area.
Detailed Course Outline:
History and examination / pediatric examination, assessment and outcome measurement, theories of development, approaches to working with children, normal developmental milestones, sports and recreation, orthotic and assistive devices, motor learning& principles of motor learning, the child parents and physiotherapist, aging with pediatric onset disability and diseases, the assessment of human gait, motion, and motor function, duchene muscular, hemophilia, lower limb deformities, orthopedics and musculoskeletal conditions, talipes equino varus, torticolis, pediatric limb deficiencies, neuromuscular diseases, myopathies, traumatic brain injury, cerebral palsy, spinal cord injuries, spina bifida and oncology and palliative care.

case histories
principles of assessment and outcome measures, documentation in soap notes format and evidence based pediatric physical therapy treatment protocols

v. SUPERVISED CLINICAL PRACTICE I

a. HISTORY TAKING

PROFESSIONAL YEAR	SUPERVISION	FOCUS	WARDS	COMPETENCIES
4th	Supervised by trained PT	History Taking	All wards	As listed below

Clinical Competencies:

Review pertinent medical records and conduct an interview which collects the following data: Past and current patient/client history, Demographics, General health status, Chief complaint, Medications, Medical/surgical history, Social history, Present and pre-morbid functional status/activity, Social/health habits, Living environment, Employment, Growth and development, Lab values, Imaging, Consultations and Documentation of the history

b. SYSTEM REVIEW

PROFESSIONAL YEAR	SUPERVISION	FOCUS	WARDS	COMPETENCIES
4th	SUPERVISED BY TRAINED PT	SYSTEMS REVIEW	All wards	AS LISTED BELOW

CLINICAL COMPETENCIES:

Perform review of systems to determine the need for referral or for physical therapy services and Systems review screening includes the following:

General Health Condition (GHC) ,Cardiovascular System (CVS) Gastrointestinal System (GIS) Urinary System (US) Genital Reproductive System (GRS) Integumentary System, Musculoskeletal System, Neurological System

c. MUSCULOSKELETAL

PROFESSIONAL YEAR	SUPERVISION	FOCUS	WARDS	COMPETENCIES
4th	Supervised by trained PT	Evaluation, Examination, and Intervention	MSK (IPD/OPD; surgical & non-surgical)	Listed below

Clinical Competencies:

- Based on best available evidence select examination tests and measures that are appropriate for the patient/client.
- Perform posture tests and measures of postural alignment and positioning.
- Perform gait, locomotion and balance tests including quantitative and qualitative measures

Perform Musculoskeletal System Tests and Measures, Perform Orthotic Tests and Measures, Evaluation, Diagnosis, Prognosis: Plan of Care, Interventions, Body Mechanics and Positioning

Practicals:

In the laboratory sessions, supervised clinical training shall be given to the students related to the physical therapy. Various reflective case studies related to physical therapy will be assigned to the students.

*NOTE:*The students are expected to make a record of his/her achievements in the log book. The log book is a collection of evidence that learning has taken place.

It is a reflective record of achievements. The log book shall also contain a record of the procedures which student would have performed/observed.

Recommended Text Books:

1. *physical therapy for children* by, suzann k. campbell, robert j. palisano & darl w. vander linden.
2. *paediatric rehabilitation principles and practice* (fourth edition) by, michael a alexander &dennis j. matthews.
3. *additional reading material as assigned by the teacher concerned.*

5th (Final) Year

1.	Evidence based physical therapy &Professional Practice	100 Marks
2.	Emergency Procedures & Primary Care in Physical Therapy	200 Marks
3.	Physical Therapy Treatment & Techniques-II*(Cardiopulmonary, Neurological, Gynecological & Obstetrics,Integumentary Physical Therapy, and Supervised Clinical Practices II)*	200 Marks
4.	Prosthetics, Orthotics, Human Development & Community Based Rehabilitation	100 Marks
5.	Exercise Physiology& Health and Wellness	200 Marks
	Total Marks	**800 Marks**
	Report Writing	Qualifying

1. EVIDENCE BASED PHYSICAL THERAPY & PROFESSIONAL PRACTICE

i. Evidence-Based Physical Therapy

An introduction about evidence-based Physical Therapy:

- What do we mean by 'high quality clinical research'? , What do we mean by 'patient preferences'? , What do we mean by 'practice knowledge'? , Additional factors and The process of clinical decision-making

Importance of evidence-based Physical Therapy:

- For patients, For physiotherapists and the profession, For funders of Physical Therapy services, History of Evidence-Based Health Care and Steps for practicing evidence-based Physical Therapy.

What do we need to know?

Relevant clinical questions, Refining your question, Effects of intervention, Experiences, Prognosis and Diagnosis.

What Constitutes Evidence?

Evidence about effects of interventions, Different forms of evidence, Different sources of evidence, Hierarchy of evidence and Research study design.

Finding the Evidence

- Search Strategies
  - The World Wide Web & Selecting search terms AND and OR
- Finding Evidence of Effects of Interventions
  - PEDro
  - The Cochrane Library
- Finding Evidence of Prognosis and Diagnostic Tests
- Finding Evidence of Experiences
  - CINAHL & Pub Med
- Getting full text
- Finding evidence of advances in clinical
- Practice (Browsing)

Trust upon Evidence

- A process for critical appraisal of evidence
- Critical appraisal of evidence about the Effects of intervention
  - Randomized trials & Systematic reviews of randomized trials
- Critical appraisal of evidence about experiences
- Critical appraisal of evidence about prognosis
  - Individual studies of prognosis & Systematic reviews of prognosis

- Critical Appraisal of Evidence about Diagnostic Tests
  - Individual studies of diagnostic tests & Systematic reviews of diagnostic tests

Clinical Guidelines as a Resource for Evidence-Based Physical Therapy

- What are clinical guidelines?
- History of clinical guidelines and why they are important
- Where can I find clinical guidelines?
- How do I know if I can trust the recommendations in a clinical Guideline?
  - Scope and purpose, Stakeholder involvement, Rigor of development, Clarity and presentation, Applicability, Editorial independence & what do the results of the critical appraisal mean for my practice?
- Legal Implications of Clinical Guidelines
  - Clinical guidelines or 'reasonable care': which do the courts consider more important?
  - Documenting the use of a clinical guideline in practice: legal implications
- Reflections on the Future of Guideline Development
  - Who should develop clinical guidelines?
  - Collaboration in guideline development
  - Uniprofessional or multiprofessional guideline development?

Critical Thinking

The Benefit of Asking the Right Questions, What Are the Issue and the Conclusion?, What Are the Reasons?, What Words or Phrases Are Ambiguous?, What Are the Value Conflicts and Assumptions?, What Are the Descriptive Assumptions?, Are There Any Fallacies in the Reasoning?, How Good Is the Evidence: Intuition, Personal Experience?, Testimonials, and Appeals to Authority?, How Good Is the Evidence: Personal Observation, Research?, Studies, Case Examples, and Analogies, Are There Rival Causes?, Are the Statistics Deceptive?, What Significant Information Is Omitted?, What Reasonable Conclusions Are Possible?, Practice and Review, The Tone of Your Critical Thinking and Strategies for Effective Critical Thinking.

ii. Professional Practice (Law, Ethics & Administration)

The Physical Therapist as Professional

What does professional mean?, Preliminary definitions of profession and professional, Sociological perspective, Structural approach, Processual approach, Characteristics of professions cited in the literature, Power approach, Dimensions of occupation & profession, Autonomy, self-regulation of ethical standards, and accountability, Privileges of autonomous practice in 2020, Self-regulation of ethical standards, Accountability of professionals, Individual professionalism—professionalism without professions?, The history of a profession and Professional recognition.

Contemporary Practice Issues

A vision for the future, The doctorate in physical therapy, Perspective of the profession, Perspective of the practitioner, Direct access issue, Selected curriculum requirements from evaluative criteria for physical therapist, Plan of care, Social responsibility, Career development, Physical therapy practice patterns, Components of a practice pattern, Important factors that affect health

The Five Roles of the Physical Therapist

The Physical Therapist as Patient/Client Manager

Evaluation and diagnosis, Diagnosis as clinical decision making, Prognosis, Discharge planning and discontinuance of care, Discontinuance of care, Outcomes, Clinical decision making, Referral relationships, Interpersonal relationships, Ethical and legal issues, Informed consent and Managed care and fidelity.

The Physical Therapist as Consultant

Physical therapy consultation, Building a consulting business, The consulting process, The skills of a good consultant, Trust in the consultant/client relationship, Ethical and legal issues in consultation and Components of a consulting agreement

The Physical Therapist as Critical Inquirer

History of critical inquiry, Evidence-based medicine, Outcomes research, Whose responsibility is research? Roles of the staff physical therapist in critical inquiry, Collaboration in clinical research, Ethical and legal issues in critical inquiry

The Physical Therapist as Educator

History of physical therapy education, Contemporary educational roles of the physical therapist, Teaching opportunities in continuing education, Academic teaching opportunities, Theories of teaching and learning in professional education, Ethical and legal issues in physical therapy education

The Physical Therapist as Administrator

History of physical therapy administration, Contemporary physical therapy administration, Patient/client management, First-line management, Midlevel managers and chief executive officers, Leadership and Ethical and legal issues.

Professional Development, Competence and expertise

Lifelong process of skill enhancement, the professional development continuum: from competence to expertise, Activities that promote professional development, Evaluation of competence and professional development, Professional development planning, Possible evaluators of professional achievement, Career advancement and Organizational impact on professional development.

Future Challenges in Physical Therapy

Physical therapy's moral mission, The future in three realms, individual, institutional& societal, Professionalism and the physical therapist

Recommended text books:

1. Professionalism in Physical Therapy: History, Practice, & Development, Lisa L. Dutton, PT, PhD
2. APTA. Guide to Physical Therapy Practice: Revised second edition. Alexandria, VA: American Physical Therapy Association; 2003. ISBN: 978-1-887759-85-
3. Practical Evidence based Physical Therapy By, Rob Herbert, Gro Jamtdvedt, Judy Mead& Kare Birger Hagen.

Asking the right question-A guide to critical thinking, 8th Edition By, M.Neil.Browne& Stuart M Keeley

2. EMERGENCY PROCEDURES & PRIMARY CARE IN PHYSICAL THERAPY

Organization and Administration of Emergency Care

Develop and implement emergency action plan, Emergency team, Initial patient assessment and care, Emergency communication, Emergency equipment and supplies, Venue location, Emergency transportation, Emergency care facilities and Legal need and documentation

Physical Examination of the Critically Injured Patient/Athlete

Scene assessment and safety, Body substance isolation precautions, Primary survey, Secondary survey and Vital signs

Airway Management

Air way anatomy, Air way compromise, Oxygen therapy and Advanced airway devices

Sudden Cardiac Death

Incidence and etiology of sudden death in general population, Sudden cardiac arrest in athletes, Screening and recognition of cardiac warning signs, Preparation for cardiac emergencies and Management of sudden cardiac arrest

Head Injuries

Pathomechanics of brain injuries, Types of pathology, Classification of cerebral concussion, Cerebral contusion, Cerebral hematoma, Second impact syndrome, Initial on site assessment, Sideline assessment, Special tests for assessment of coordination, Special tests for assessment of cognition, Other tests, Medications and Wake ups and rest.

Emergency Care of Cervical Spine Injuries

Anatomy, Mechanism of injuries, Injuries to the spinal cord, Assessment and Management

Emergent General Medical Conditions

Sudden death, Exercise induced anaphylaxis, Acute asthma, Diabetes mellitus, Mononucleosis, Sickle cell traits and Hypertension.

Environment-Related Conditions

Heat related emergencies and their prevention, Cold related injuries, Lightning and Altitude related emergencies

Orthopedic Injuries

Basic emergency medical care, Fundamentals of skeletal fractures, Splinting techniques, Fractures and dislocations of upper extremity, Fractures and dislocations of lower extremity and Fractures and dislocations of spine

Abdominal Injuries

Initial evaluation, Specific injuries: abdominal wall contusions, splenic injuries, liver injuries, renal injuries, intestinal injuries, pancreatic injuries and Non-traumatic abdominal injuries: Appendicitis, ectopic pregnancy.

Thoracic Injuries

Assessment and Management of different Types of injuries: fractures, Pneumothorax, hemothorax, pulmonary embolism.

Spine Boarding in Challenging Environments

The soft foam pit in gymnastics, The pole vault pit, The swimming pole and diving well and The ice hockey rink

The Psychological and Emotional Impact of Emergency Situations

Defining psychological trauma, Psychological interventions in crisis situations, Psychological trauma in athletic environment, the psychological emergency response team, Internal team members, External team members and the psychological interventions recommendations.

Primary Care

Primary care: physical therapy modles1, Evidence - Based examination of diagnostic information, Cultural competence: An essential of primary health care, Pharmacologic considerations for the physical therapist and the patient interview: the science behind the art

Examination and Evaluation

Prologue, Symptoms investigation, Part I: Chief complaint by body region, Symptoms investigation, Part II: Chief complaint by symptom, Patient health history including identifying health risk factor, Review of systems, Patient interview: the physical examination begins, Review of cardiovascular and pulmonary systems and vital signs, Upper quadrant screening examination, Lower quadrant screening examination, Diagnostic imaging and Laboratory tests and values

Disorders and Management

Acute Care Physical Therapy Examination and Discharge Planning, Clinical Laboratory Values and Diagnostic Testing, Physiologic Monitors and Patient Support Equipment, Bed Rest, Deconditioning, and Hospital-Acquired Neuromuscular Disorders The Immune System and Infectious Diseases and Disorders, Cardiovascular Diseases and Disorders, Pulmonary Diseases and Disorders, Musculoskeletal/Orthopedic Diseases

and Disorders, Neurologic and Neurosurgical Diseases and Disorders, Endocrine Diseases and Disorders, Gastrointestinal Diseases and Disorders. Genitourinary Diseases and Disorders, Oncological Diseases and Disorders, Transplantation, Integumentary Diseases and Disorders and Wound Management.

Special Populations

The Pediatric and adolescent population, the obstetric client, the geriatric population and Health and wellness perspective in primary care.

Practicals:

The practical training regarding the emergency evaluation/management of the following will be practiced in the Physical Therapy treatment ward/ available facility under the supervision of qualified physiotherapists

- Airway management
- Head injuries
- Emergent general medical conditions
- Emergency care of cervical spine injuries
- Orthopedic injuries
- Abdominal injuries
- Thoracic injuries
- Spine boarding in challenging environments

Note: The students are expected to make a record of his/her achievements in the log book. The log book shall also contain a record of the procedures which student would have performed/observed.

RECOMMENDED TEXT BOOKS

1. Emergency Care in Athletic Training by: Keith M.Gorse, Robert O. Blanc, Francis Feld, Matthew Radelet, 1st edition, 2010, FA Davis Company
2. Acute care hand book for Physical Therapists by: Jaime C paz, Michelle P West, 2nd edition, 2002,Butterworth Heinemann

3. PHYSICAL THERAPY TREATMENT & TECHNIQUES-II (Cardiopulmonary, Neurological, Gynecological & Obstetrics, Integumentary Physical Therapy, and Supervised Clinical Practices II)

ii. Cardiopulmonary Physical Therapy

Medical Terminology Regarding Cardiopulmonary System

Introduction

Anatomy and Physiology

Anatomy of the Cardiovascular and Respiratory Systems and Physiology of the Cardiovascular and Respiratory Systems

Patho-physiologyRestrictive Lung Dysfunction, Chronic Obstructive Pulmonary Diseases and Cardiopulmonary Implications of Specific Diseases

Diagnostic Tests and Procedures

Cardiovascular Diagnostic Tests and procedures, Pulmonary Diagnostic Tests and Procedures

Surgical Interventions, Monitoring and Support

Cardiovascular and Thoracic interventions,

PHARMACOLOGY

Cardiovascular Medications and Pulmonary Medications

Cardiopulmonary Assessment and Intervention

Assessment Procedures, Treatment of Acute Cardiopulmonary Conditions, Therapeutic Interventions in Cardiac Rehabilitation and Prevention, Pulmonary Rehabilitation, Outcome Measures

The needs of Specific Patients

Intensive Care for the Critically Ill Adult

Pulmonary Rehabilitation

Cardiac Rehabilitation

- Introduction
- Goals of cardiac rehabilitation
- Cardiac rehabilitation team
- Role of the physiotherapist
- Rationale for cardiac rehabilitation
  - Early ambulation, Exercise training, Secondary prevention & Education
- Manifestations of ischaemic heart disease
  - Cardiac arrest, Angina pectoris & Myocardial infarction
- Cardiac surgery
- Drugs to control the cardiovascular system
- Physical Therapy
  - Assessment, Recording, Treatment, Outcome evaluation & Complications of exercise
- Other considerations

Cardiopulmonary Transplantation

Introduction, Assessment, The transplantation process, Donors, Operative procedures, Postoperative care, Rejection of the transplanted organs, Immunosuppression, Infections, Special considerations for the physiotherapist, Denervation of the heart/lungs, Immunosuppression, Infection/rejection, Physical Therapy management

Hyperventilation

Introduction, Signs and symptoms, Causes of hyperventilation, Personality, Diagnostic tests, Breathing patterns, Treatment, The assessment, Treatment plan, Breathing education, Breathing pattern re-education, Compensatory procedures in the short term, Planned rebreathing, Speech, Home programme, Exercise and fitness programmes and Group therapy.

Bronchiectasis, Primary Ciliary Dyskinesia and Cystic Fibrosis

- Bronchiectasis
  - Medical management, Physical Therapy & Evaluation of Physical Therapy
- Primary ciliary dyskinesia
  - Medical management, Physical Therapy & Evaluation of Physical Therapy
- Cystic fibrosis
  - Medical management, Physical Therapy, Evaluation of Physical Therapy & Continuity of care

Case Histories

- Principles of assessment and outcome measures
- Documentation in SOAP notes format
- Evidence based cardiopulmonary Physical Therapy Treatment protocols

ii. Neurological Physical Therapy

Medical Terminology Regarding Neurological System

Anatomy and Physiology of the Nervous System

Brain, Spinal cord, CNS Support Structures, Neurons, PNS and Spinal Level Reflexes

Neurological Examination:

History, System review and Test and measures

Interventions:

Introduction to Theories of Neurological Rehabilitation

- Remediation & facilitation approaches
  - Bobath-NDT
  - Motor relearning program(MRP)
  - Kabat, Knott, Voss (PNF)
  - Constraint induced movement therapy (CIMT)

Motor Control / Motor Learning Approach, Neural plasticity/ adoptability, Balance, Role of sensory system, Skill acquisition, Postural Control, Mobility Function, Task-Related Training Approach, Compensatory Training Approach and Normal Reach, Grasp and Manipulation

Neurological Dysfunctions

CVA (Stroke), Traumatic Brain Injury (TBI), Spinal Cord Injury (SCI), Degenerative Diseases (Progressive CNS disorders), Multiple Sclerosis (MS), Parkinson's Disease (PD), Post Polio Syndrome (PPS), Cerebellar Disorders, Vestibular Disorders, Cranial Nerves Disorders and Poly Neuropathies

Neuromuscular Disorders

Case Histories

Principles of assessment and outcome measures, Documentation in SOAP notes format, Evidence based neurological Physical Therapy Treatment protocols

iii. Gynaecological& Obstetric Physical Therapy

medical Terminology regarding Gynecology, Obstetrics and Women's Health

Anatomy, Physiology of pregnancy, Physical and physiological changes of labour and the peurperium, The antenatal period, Relieving the discomforts of pregnancy, Preparation of labour, Postnatal period, The climacteric, Common gynecological conditions, Gynecological surgery, Urinary function and dysfunction, Bowel and anorectal function and dysfunction

Oncological Issue with Women's Health

Management of breast cancer, Management of lymphedema

Special Topic in Women's Health

Female athletes, Exercise issues and aging, aquatic therapy services in women health, Physical therapy management for women with long term physical disabilities

Case Histories

Principles of assessment and outcome measures, Documentation in SOAP notes format, Evidence based obstetrics and gynecological Physical Therapy Treatment protocols

iv. Integumentary Physical Therapy

Wound Care Concepts

Quality of Life and Ethical Issues, Regulation and wound Care, Skin, an Essential Organ, Acute and Chronic Wound Healing, Wound assessment, Wound Bioburden, Wound Debridement. Wound Treatment Options, Nutrition and wound care, Seating, Positioning and support surfaces, Pain Management and wounds

Wound Classifications and Management Strategies

Pressure Ulcers, Vascular Ulcers, Diabetic Foot Ulcers, Sickle Cell Ulcers, Wounds in special Populations, Complex wounds, Atypical Wounds and Wound Care; where we were, where we are, and where we are going

Case Histories

Principles of assessment and outcome measures, Documentation in SOAP notes format and Evidence based integumentary Physical Therapy Treatment protocols

v. SUPERVISED CLINICAL PRACTICE II

a. NEUROLOGICAL

PROFESSIONAL YEAR	SUPERVISION	FOCUS	WARDS	COMPETENCIES
5th	Supervised by trained PT	Evaluation, Examination, and Intervention	Neurological (IPD/OPD; surgical & non-surgical)	Listed below

CLINICAL COMPETENCIES:

During this supervised clinical practice, students are responsible for successful execution of examination, evaluation, and interventions relating to neurological disorders. Student is required to keep a performance record of all listed competencies and successfully perform on real patients during the final evaluation of the course.

Evaluation, Diagnosis, Prognosis, Plan of Care, Interventions

b. CARDIOVASCULAR AND PULMONARY

PROFESSIONAL YEAR	SUPERVISION	FOCUS	WARDS	COMPETENCIES
5th	Supervised by trained PT	Evaluation, Examination, and Intervention	Cardiovascular and pulmonary (IPD/OPD; surgical & non-surgical)	Listed below

CLINICAL COMPETENCIES:

During this supervised clinical practice, students are responsible for successful execution of examination, evaluation, and interventions relating to cardiovascular and pulmonary disorders. Students learn to objectively perform these skills under the supervision of trained physical therapists. Student is required to keep a performance record of all listed competencies and successfully perform on real patients during the final evaluation of the course. It will include Evaluation, Diagnosis, Plan of Care and Interventions relevant to wards mentioned above.

c. INTEGUMENTARY

Professional	Supervision	Focus	Wards	Competencies

Year				
5th	Supervised by trained PT	Evaluation, Examination, and Intervention	Integumentary, gynecology& obstetrics, sports and metabolic disorders (IPD/OPD; surgical & non-surgical)	Listed below

CLINICAL COMPETENCIES:

During this supervised clinical practice, students are responsible for successful execution of examination, evaluation, and interventions relating to Integumentary, gynecology and obstetrics, sports and metabolic disorders. Students learn to objectively perform these skills under the supervision of trained physical therapists. Student is required to keep a performance record of all listed competencies and successfully perform on real patients during the final evaluation of the course. It will include Evaluation, Diagnosis, Plan of Care and Interventions relevant to wards mentioned above.

Practicals:

1. In the laboratory sessions, Cardiopulmonary and neurological Physical Therapy skills will be demonstrated and practiced. Various reflective case studies related to the neurological rehabilitation will be assigned to the students.
2. In the laboratory sessions, Supervised Clinical Training shall be given to the students related to the Physical Therapy in Gynae & Obstetrics. Various reflective case studies related to Physical Therapy in Gynae & Obstetrics will be assigned to the students.

Note: The students are expected to make a record of his/her achievements in the log book. The log book is a collection of evidence that learning has taken place.

It is a reflective record of achievements. The log book shall also contain a record of the procedures which student would have performed/observed.

Recommended Text Books:

1. Essentials of Cardiopulmonary Physical Therapy (2nd Edition)By Hillegass and Sadowsky
2. Physical Therapy for respiratory and cardiac problems, By: Jennifer A. Pryor & Barbara A. Webber, 2nd edition, Churchill Livingstone.
3. Tidy's Physical Therapy by Thomas A Skinner & Piercy
4. Therapeutics Exercises and Technique by Carolyn Kisner&Laynn Allen Colby 4th 5th edition
5. Cash's Text book of General Medical & Surgical Condition for Physiotherapists by Patrica A. Downie
6. Cash's Textbook of chest , heart and vascular condition for physiotherapist by Patrica A. Downie
7. Neurological Physical Therapy Bases of evidence for practice Treatment and management of patients described by specialist clinicians by Cecily Partridge
8. Neurological Physical Therapy A problem-solving approach By Susan Edwards, second edition.
9. Neurologic examination By Robert j. Schwartzman , first edition
10. Physical Therapy in Obstetrics and Gynecology By: Jill Mantle, Jeanette Haslam, Sue Barton, 2nd edition.
11. Textbook of Physical Therapy for Obstetric and Gynecological Conditions (Paperback) By (author) G.B. Madhur.
12. Short practice of surgery by Baily and Love's

13. Text Book of Surgery by Ijaz Ahsan
14. Outline of Fractures
15. Wound Care Essentials, practice principles, By Sharon Baranoski& Elizabeth A. Ayello
16. APTA. Guide to Physical Therapy Practice: Revised second edition. Alexandria, VA: American Physical Therapy Association; 2003. ISBN: 978-1-887759-85-

4. PROSTHETICS & ORTHOTICS, HUMAN DEVELOPMENT& COMMUNITY BASED REHABILITATION

i. PROSTHETICS & ORTHOTICS

Orthotics

Introduction to Orthotics

Basic Terminology, Historical Background, Factors In Prescription Orthotics, Nomenclature of Orthotics, Biomechanical Principles, Materials Used in Orthotics Manufacturing and Methods of Construction

Foot Orthoses

Shoe Style, Parts of Shoes, Special Purpose Shoes, Foot Examination, Orthotics Interventions, Fabrication Options, Pediatric Foot Orthoses and Guideline for Prescription Foot Orthoses

Ankle Foot Orthoses

Plastic Ankle Foot Orthoses, Lather Metal Ankle Foot Orthoses, Composite Materials, Weight Relieving Ankle Foot Orthoses, Support (Fabric , Leather, Gel And Air), Contracture Reducing Ankle Foot Orthoses and Guidelines for Prescription Ankle Foot Orthoses.

Knee Ankle Foot Orthoses and Knee Orthoses

Plastic Metal Knee Ankle Foot Orthoses, Knee Immobilizer, Supra- Condylar Knee Ankle Foot Orthoses, Weight Relieving Orthoses, Fracture Orthoses, Lather Metal Knee Ankle Foot Orthoses, Knee Orthoses and Guidelines For Prescription Knee Ankle Foot Orthoses.

Orthoses for Paraplegia and Hip Disorders

Paraplegia, Standing Frames, Orthoses Designed For Ambulation, Functional Electrical Stimulation, Specific Devices for Paraplegia, Hip Orthoses, Guidelines for Prescription

Evaluation Procedures for Lower Limb Orthoses

Need of Evaluation, Static Evaluation, Dynamic Evaluation, Gait Disorders with Orthoses Usage

Trunk and Cervical Orthoses

Trunk Orthoses, Trunk Orthoses Evaluation, Scoliosis and Kyphosis Orthoses, Scoliosis and Kyphosis Orthoses Evaluation, Cervical Orthoses, Cervical Orthoses Evaluation and Guideline for Prescription.

Upper Limb Orthoses

Hand And Wrist Hand Orthoses, Forearm and Elbow Orthoses, Shoulder Orthoses, Fabrication Option, Upper limb Orthoses Evaluation (Hand, Wrist, Fingers, Shoulder and Elbow) and Guideline for Prescription

Orthoses for Burns and Other Soft Tissue Disorders

Importance of Orthoses for Burns and Other Soft Tissue Disorders, Orthoses for Burn Management and Orthoses for Patients with Soft Tissues Problem Associated With Neuromuscular Disorders.

Goal Setting and Treatment Plan

Long Term Goals, Short Term Goals, Treatment Planning, Criteria for Discharge and Care of Orthoses

Prosthetics

Early Management

Clinic Team Approach to Rehabilitation, Amputation Surgery: Osteomyoplastic Reconstructive Technique, Postoperative Management, Pain Management, Skin Disorders and Their Management and Psychological Consequences of Amputation

Rehabilitation of Adults with Lower-Limb Amputations

Partial Foot and Syme's Amputations and Prosthetic Designs, Transtibial Prosthetic Designs, Transfemoral Prosthetic Designs, Hip Disarticulations and Transpelvic Prosthetic Designs, Basic Lower-Limb Prosthetic Training

Rehabilitation of Adults with Upper-Limb Amputations

Body-Powered Upper-Limb Prosthetic Designs, Upper-Limb Externally Powered Prosthetic Designs, Training Patients with Upper-Limb Amputations

Beyond the Basics

Special Considerations with Children, Rehabilitation Outcomes, Adaptive Prostheses for Recreation, Future Prosthetic Advances and Challenges and Future Surgical and Educational Advances and Challenges.

ii. HUMAN DEVELOPMENT& COMMUNITY BASED REHABILITATION

This course component intends to give the Physical Therapy students basic knowledge about the human development from new life to adulthood. It deals with scientific study of processes of change in stability throughout the human life span; it focuses on the physical, psychosocial and cognitive development from conception to late adulthood

Introduction

Forming a New Life, The Study of Human Development, Theory and Research, Physical Development during the First Three Years, Cognitive Development during the First Three Years and Psychosocial Development during the First Three Years.

Early Childhood

Physical and Cognitive Development in Early Childhood, Psychosocial Development in Early Childhood, Physical and Cognitive Development in Middle Childhood, Psychosocial Development in Middle Childhood

Adolescence

Physical and Cognitive Development in Adolescence, Psychosocial Development in Adolescence, Physical and Cognitive Development in Young Adulthood and Psychosocial Development in Young Adulthood

Middle Adulthood

Physical and Cognitive Development in Middle Adulthood, Psychosocial Development in Middle Adulthood, Physical and Cognitive Development in Late Adulthood, Psychosocial Development in Late Adulthood and Dealing with Death and Bereavement

Health in the Community

Handicap and the community, Nutrition and mal nutrition, Breast feeding, Immunization and Oral rehydration

Normal Body Function

Normal development and Growth and weight of children

Conditions and Treatments

Cerebral palsy in children, Down syndrome, Mental handicap, Hydro-cephalus, Spin bifida, Poliomyelitis, Blindness, Deafness, Strokes, Spinal cord injuries, Amputation

Management of Patients

Assessment and recoding, Fits, Contractures, Pressure sores, Urine and bowel management, Chest infection, Feeding children with cerebral palsy, Toy making workshop and Welfare assistance.

Recommended Text Books:

1. Prosthetics and Patient Management: A Comprehensive Clinical Approach By: Kevin Carroll ; Joan Edelstein

2. Orthotics a comprehensive clinical approach By: Joan E Eldestein& Jan Bruckner
3. Introduction to Special Education By: Allen and Beacon,(1992), A Simon &SuperterComp.Needham Heights
4. Exceptional Children, Howard, W.l. (1988); Columbus, Merill.
5. Exceptional Children and Adults, Patton, J.R. (1991); Boston Scott Foresmen and Co.
6. Exceptional Children in Focus by: Patton J.R. (1991); New York, Macmillan pub. Co
7. Community based rehabilitation worker manual, marion loveday, global health publication

5. EXERCISE PHYSIOLOGY & HEALTH AND WELLNESS

i. EXERCISE PHYSIOLOGY

Control of Internal Environment

Homeostasis, Control systems of the body, Nature of the control system, Examples of homeostatic control and Exercise: A test of homeostatic control.

Hormonal Responses to Exercise (Brief Revision)

Hormonal Regulation of Metabolism During Exercise

Measurement of Work, Power & Energy Expenditure

Units of measure, Work and power defined, Measurement of work and power, Measurement of energy expenditure, Estimation of energy expenditure and Calculation of exercise efficiency.

Circulatory Responses to Exercise:

Organization of the circulatory system, Heart: myocardium and cardiac cycle, Cardiac output, Hemodynamics, Changes in oxygen delivery to muscle during exercise, Circulatory responses to exercise, Regulation of cardiovascular adjustments to exercise.

Respiration During Exercise Brief Revision)

Ventilatory and blood-gas responses to exercise, Control of ventilation.

Temperature Regulation

Overview of heat balance during exercise, Overview of heat production/heat loss, Body's thermostat-hypothalamus, Thermal events during exercise, Exercise in the heat, Exercise in cold environment

The Physiology of Training: Effect on Vo2 Max, Performance, Homeostasis and Strength

Principles of training, Endurance training and VO2 max, Detraining and VO2 max, effects on performance and homeostasis, Endurance training: links between muscle and system physiology, Physiological effects of strength training, Physiological mechanisms causing increased strength.

Physiology of Health and Fitness

Work Tests to Evaluate Cardio Respiratory Fitness

Cardio respiratory fitness, FIELD Tests for estimating CRF, Graded exercise testing protocols

Exercise Prescription for Health and Fitness

Prescription of exercise, General guidelines for improving fitness

Exercise for Special Populations

Diabetes, Asthma, Chronic obstructive pulmonary disease, Hypertension, Cardiac rehabilitation

Physiology of Performance

Factors Affecting Performance:

Sites of fatigue, Factors limiting All-out anaerobic performances and Factors limiting All-out aerobic performances

Laboratory Assessment of Human Performance:

Laboratory assessment of physical performance, Direct testing of maximal aerobic power, Laboratory tests to predict endurance performance, Determination of anaerobic power, Evaluation of muscular strength

Training of Performance

Training principles, Components of a training session: warm-up, workout and cool down, Training to improve aerobic power, Injuries and endurance training, Training for improved anaerobic power, Training to improve muscular strength, Training for improved flexibility, Common training mistakes

Training for the female athlete, children and special population

Factors important to women involved in vigorous training, Sports conditioning for children, Competitive training for diabetics, Training for asthmatics and Epilepsy and physical training

ii. HEALTH AND WELLNESS

Prevention Practice: a Holistic Perspective for Physical Therapy:

Defining Health, Predictions of Health Care, Comparing Holistic Medicine and Conventional Medicine, Distinguishing Three Types of Prevention Practice.

Healthy People:

Definition of healthy people, Health education Resources, Physical Therapist role for a healthy community.

Health, Fitness, and Wellness Issues during Childhood and Adolescence:

Recognizing and Reporting Child abuse, Denver II Developmental Screening, Special Concerns in Pediatrics and Program for Prevention of Obesity

Health, Fitness, and Wellness during Adulthood:

Tasks of Adulthood, Adult Health and Wellness Risks, Screening Tools for Adulthood and Adult Educational Materials

Resources to Optimize Health and Wellness:

Chronic Illness, Nutrition, Progressive Relaxation, Time management and Spirituality.

Health Protection:

Infection Control, Injury Prevention during Childhood, Injury prevention during Adolescence, Injury Prevention during Adulthood, Injury Prevention during Older Adulthood.

Practicals:

Measurement of work, power and energy expenditure by using

Bench step, Ergometer, Treadmill

Testing aerobic endurance:

Predicting VO2 max using the Harvard step test, Astrand Treadmill Test, Balke Treadmill Test, Time limit test, Astrand Cycle Test, The effects of endurance and strength exercise on CV response, Lactate testing

Testing anaerobic capacity:

Wingate test, Jumping power tests, Quebec 10-second test

Assessing muscular efficiency:

Muscle Length Testing:

Muscle Length Assessment techniques (Lower-Quarter Muscles, Upper-Quarter Muscles) Hypermobility

Muscle strength, speed and power:

Quantitative muscle strength assessment, Core Muscle Strength and Stability Test, Grip Strength Test, Wall Squat Test, 10 Stride Test, Kosmin Test, The LAS (Lactic vs. Speed) Test

Physiological testing protocols for flexibility, Balance and Agility:

Modified Sit & Reach Test, Static Flexibility Test, Standing Stork Test, Hexagonal Obstacle Test, Static balance, quantitative and qualitative assessment of balance, Janda's perturbation test

Body Composition analysis:

Body Mass index, Skin fold caliper Testing, Bioimpedance testing

Physiological Protocols for the Assessment of Athletes in Specific Sports:

Cricket, hockey, football, volleyball, Runners, Rugby, cyclist, Tennis

Monitoring during Training and exercise:

Heart rate measurement, Body weight maintenance and hydration status, Fluid loss evaluation, Evaluation of external and internal trainingload, perceptual wellbeing and physical readiness, stroop test and stretch reflex

Recommended Text Book

1. Exercise Physiology- Theory and Application to Fitness and Performance by: Scott K. Powers, Edward T. Howley.

2. Exercise physiology, A thematic Approach By: Tudor Hale, University College Chichester, UK
3. A Physical Therapist's Guide to Health, Fitness, and Wellness by Catherine R Thompson, PhD, MS, PT
4. ACSM's guidelines for exercise testing and prescription by Linda S. Pescatello
5. 101 Performance Evaluation tests by Brain McKenzie
6. Physiological Tests for Elite Athletes by Rebecca K. Tanner and Christopher J. Gore
7. Assessment and Treatment of Muscle Imbalance by Phil page, Frank, Clark and Lardner, Robert
8. Additional study material as assigned by the tutor

REPORT WRITING

In Final Year the students will be given a particular topic for research report writing. A Supervisor shall be allotted by the Incharge / Chairperson and approved by the concerned Dean, to a group of up to 10-25 students in one group. The Supervisor shall allot a specific topic for research. The group of students shall prepare a research report and submit it to the Incharge / Chairperson of department through allotted Supervisor for approval. This report shall be evaluated by a committee notified by the Dean after recommendation by the Incharge / Chairperson, comprising of 03 senior most teachers of the department. If approved the group of students shall be confirmed for award of degree. The details of the report are given below.

- Title page
- Names of students
- Students I.D number
- Supervisor's name
- Program name
- Name of the department
- Project title
- Abstract

Abstract

A maximum of one page (200 words) on the work performed and your main conclusions. Abstract should be single line spacing, should not contain any figures, contain a maximum of 2 references, and written in Arial / New Times Roman font size II. The title of the project should be on the first line (Arial / New Times Roman size 11, bold). The name of the student and their supervisor should appear on the next line (Arial / New Times Roman size 11, italic).The abstract should be then be included as a single paragraph. References (if required) should be included at the end (Arial / New Times Roman, size 9).

Points into account while writing Abstract

Explain the purpose of your study/paper. This should optimally be only one sentence long. State the primary objectives and scope of the study or the reasons why the document was written (unless these things are already clear from the title of the document or can be derived from the rest of the abstract). Also state the rationale for your research. Why did you do the research? Is the topic you are researching an ignored or newly discovered one? In terms of Methodology (research methods), clearly states the techniques or approaches used in your study. If you want to introduce new methods or approaches in your abstract, keep in mind the need for clarity.

Describe your results (the findings of your experimentation), the data collected, and effects observed as informatively and concisely as possible. These results of course may be experimental or theoretical, but remember the difference between conjecture and fact and note them in your abstract. Give special priority in your abstract to new and verified events and findings that contradict previous theories. Mention any limits to the accuracy or reliability of your findings.

By stating your conclusions, you are in essence describing the implications of the results: why are the results of your study important to your field and how do they relate to the purpose of your

Investigation? Often conclusions are associated with recommendations, suggestions and both rejected and accepted hypotheses. You may wish to include information that is

incidental to the main purpose of your paper, but is valuable to those outside your area of study. If you choose to include such information, be careful not to exaggerate its relative importance to the abstracted document

Declaration of Originality

Place on a separate page;

"We hereby declare that this project is entirely our own work other than the counsel of our supervisor and that it has not been submitted for any academic award, or part thereof, at this or any other Educational Institution"

Signed: Authors

Counter signed: Supervisor

Acknowledgements (Optional)

To include those individuals or groups of individuals you would like to thank in relation to the support you received.

Table of Contents

You should list all of the sections and sub-sections, together with their corresponding page numbers

List of Tables

List of Figures

List of Appendices

Suggested Chapter Structure

The following outlines a chapter structure suitable to a project, which involved a distinct component of data collection. The structure of the main body is flexible and you should discuss an appropriate structure with your supervisor. The content and importance of each section will depend on the type of project you are undertaking and again should be discussed with your supervisor before submission.

Chapter 1. Introduction

i) Introduction (Very brief review of literature and indicate significance of study)

ii) Statement of Problem (Should include clear purpose of study)

iii) Questions/Hypothesis

iv) Outline Methodology

v) Definition of Terms

The introduction should 'set the scene' for the examiners and enable them to appreciate the relevance of your work in a particular research area.

Chapter 2. Literature Review

A literature review is an extended essay, which is based on source material. In simple terms, the merit of your literature review is proportional to the comprehensive nature and originality of your sources. Your writing should be confined to the questions/hypothesis being examined. A literature review is more than a listing of references. You should attempt to synthesize a new understanding of your topic, and provide a critique of what other commentators have had to say on the subject.

Chapter 3. Methodology

i) Participant Selection (Including ethical considerations)

ii) Experimental Design

iii) Measurement Procedures

- Data collection procedures
- Rationale for selecting these procedures/questions

iv) Analysis of Data

The methodology should describe the characteristics of the subjects, award of ethical approval, and where appropriate the apparatus, calibration procedures, reliability of the methods used, experimental protocols and the statistical treatments of the data. Diagrams and photographs may be appropriate to illustrate procedures.

Chapter 4. Analysis of Results

Your results should consist of tables of your findings, illustrated with graphs where appropriate. The results section should contain text, which takes the reader through your graphs and tables, pointing out the salient features. Tables should wherever possible summarize the data from several subjects in the form of means and standard deviations. You do not need to give tables of every piece of original data. If you feel it is essential to include these put them in an appendix.

Chapter 5. Discussion of Results

It is good practice to begin with a summary of your findings. This is your opportunity to interpret your data in the context of what is already known from existing literature. However, make every effort to explain your findings first, justifying the arguments by reference to previously published work, NOT the other way around. The discussion is the place for explanations and opinions. Link your findings with the purpose/questions/hypothesis of your project. Include critical appraisal of your own work and that of others. Address what you would do differently with hindsight?

Chapter 6. Conclusion

- Summary of main findings
- Recommendations (Impact of findings and future research)
- Conclusion

This section should summarize main findings, highlight areas where more work is needed and suggest avenues for future development of this work. An overall conclusion from the study should be included to complete the project.

References: A list of references must be included at the end of the project document and appropriately referenced within the text according to a recognized standard of the University.

Appendices: In this section, if required, include any raw data, interview transcript, computer program listings, and questionnaires etc., which were not in the results section, but which may need to be consulted.

REVISED SYLLABUS & CURRICULA (Revised 2019)
w.e.f. 2019-20

FOR

BS ALLIED HEALTH SCIENCES (BS AHS)

04 Year Degree Program

Department of Allied Health Sciences

Sargodha Medical College Campus

BS AHSCurricula/Syllabi (General Scheme applicable to all sciences)

1stYEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	ANATOMY I	150	50	200
2	PHYSIOLOGY I	150	50	200
3	BIOCHEMISTRY I	150	50	200
4	INTRODUCTION TO ALLIED HEALTH SCIENCES	150	50	200
5	ENGLISH	100	Not Applicable	100
6	INTRODUCTION TO COMPUTER	100	Not Applicable	100
	TOTAL	**800**	**200**	**1000**

2nd YEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	ANATOMY II	150	50	200
2	PHYSIOLOGY II	150	50	200
3	BIOCHEMISTRY II	150	50	200
4	MEDICAL INSTRUMENTS AND CHEMICALS I (GENERAL)	100	Not applicable	100
5	ISLAMIC STUDIES	100	Not applicable	100
6	PAKISTAN STUDIES	100	Not applicable	100
	TOTAL	**750**	**150**	**900**

3rdYEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	MEDICAL LAB ESTABLISHMENT	150	50	200
2	MEDICAL INSTRUMENTS AND CHEMICALS II (SPECIFIC)	100	Not applicable	100
3	GENERAL PATHOLOGY & MICROBIOLOGY	150	50	200
4	RELEVANT LAB SCIENCES I	150	50	200
	TOTAL	**550**	**150**	**700**

4thYEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	COMMUNITY HEALTH, RESEARCH METHODOLOGY, SOCIAL AND BEHAVIORAL SCIENCES	100	Not applicable	100
2	SPECIAL PATHOLOGY	150	50	200
3	RELEVANT LAB SCIENCES II	150	50	200
4	MEDICAL LAB REPORTING & EVALUATION	150	50	200
	TOTAL	**550**	**150**	**700**
	REPORT WRITING	Qualifying		

I-A: BS AHS (Pathology Lab Sciences)

1st YEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	ANATOMY I	150	50	200
2	PHYSIOLOGY I	150	50	200
3	BIOCHEMISTRY I	150	50	200
4	INTRODUCTION TO ALLIED HEALTH SCIENCES	150	50	200
5	ENGLISH	100	Not Applicable	100
6	INTRODUCTION TO COMPUTER	100	Not Applicable	100
	TOTAL	**800**	**200**	**1000**

2nd YEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	ANATOMY II	150	50	200
2	PHYSIOLOGY II	150	50	200
3	BIOCHEMISTRY II	150	50	200
4	MEDICAL INSTRUMENTS AND CHEMICALS I (GENERAL)	100	Not applicable	100
5	ISLAMIC STUDIES	100	Not applicable	100
6	PAKISTAN STUDIES	100	Not applicable	100
	TOTAL	**750**	**150**	**900**

3rdYEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	MEDICAL LAB ESTABLISHMENT	150	50	200
2	MEDICAL INSTRUMENTS AND CHEMICALS II (SPECIFIC)	100	Not applicable	100
3	GENERAL PATHOLOGY & MICROBIOLOGY	150	50	200
4	PATHOLOGY LAB SCIENCES I (Hematology & Blood Banking)	150	50	200
	TOTAL	**550**	**150**	**700**

4thYEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical &	Total Marks

			G.Viva Marks	
1	COMMUNITY HEALTH, RESEARCH METHODOLOGY, SOCIAL AND BEHAVIORAL SCIENCES	100	Not applicable	100
2	SPECIAL PATHOLOGY	150	50	200
3	PATHOLOGY LAB SCIENCES II (Chemical Pathology and Immunology)	150	50	200
4	MEDICAL LAB REPORTING & EVALUATION	150	50	200
	TOTAL	**550**	**150**	**700**
	REPORT WRITING	Qualifying		

I-B: BS AHS (Surgery/ OT Lab Sciences)

1st YEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	ANATOMY I	150	50	200
2	PHYSIOLOGY I	150	50	200
3	BIOCHEMISTRY I	150	50	200
4	INTRODUCTION TO ALLIED HEALTH SCIENCES	150	50	200
5	ENGLISH	100	Not Applicable	100
6	INTRODUCTION TO COMPUTER	100	Not Applicable	100
	TOTAL	**800**	**200**	**1000**

2nd YEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	ANATOMY II	150	50	200
2	PHYSIOLOGY II	150	50	200
3	BIOCHEMISTRY II	150	50	200
4	MEDICAL INSTRUMENTS AND CHEMICALS I (GENERAL)	100	Not applicable	100
5	ISLAMIC STUDIES	100	Not applicable	100
6	PAKISTAN STUDIES	100	Not applicable	100
	TOTAL	**750**	**150**	**900**

3rdYEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	MEDICAL LAB ESTABLISHMENT	150	50	200
2	MEDICAL INSTRUMENTS AND CHEMICALS II (SPECIFIC)	100	Not applicable	100
3	GENERAL PATHOLOGY & MICROBIOLOGY	150	50	200
4	SURGERY / OT LAB SCIENCES I	150	50	200
	TOTAL	**550**	**150**	**700**

4thYEAR

Sr.	Subject Title	Theory	Practical / Clinical &	Total

No.		Marks	G.Viva Marks	Marks
1	COMMUNITY HEALTH, RESEARCH METHODOLOGY, SOCIAL AND BEHAVIORAL SCIENCES	100	Not applicable	100
2	SPECIAL PATHOLOGY	150	50	200
3	SURGERY / OT LAB SCIENCES II	150	50	200
4	MEDICAL LAB REPORTING & EVALUATION	150	50	200
	TOTAL	**550**	**150**	**700**
	REPORT WRITING	Qualifying		

I-C: BS AHS (Radiology Lab Sciences)

1st YEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	ANATOMY I	150	50	200
2	PHYSIOLOGY I	150	50	200
3	BIOCHEMISTRY I	150	50	200
4	INTRODUCTION TO ALLIED HEALTH SCIENCES	150	50	200
5	ENGLISH	100	Not Applicable	100
6	INTRODUCTION TO COMPUTER	100	Not Applicable	100
	TOTAL	**800**	**200**	**1000**

2nd YEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	ANATOMY II	150	50	200
2	PHYSIOLOGY II	150	50	200
3	BIOCHEMISTRY II	150	50	200
4	MEDICAL INSTRUMENTS AND CHEMICALS I (GENERAL)	100	Not applicable	100
5	ISLAMIC STUDIES	100	Not applicable	100
6	PAKISTAN STUDIES	100	Not applicable	100
	TOTAL	**750**	**150**	**900**

3rdYEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	MEDICAL LAB ESTABLISHMENT	150	50	200
2	MEDICAL INSTRUMENTS AND CHEMICALS II (SPECIFIC)	100	Not applicable	100
3	GENERAL PATHOLOGY & MICROBIOLOGY	150	50	200
4	RADIOLOGY LAB SCIENCES I (General Radiology and Radiation Physics)	150	50	200
	TOTAL	**550**	**150**	**700**

4thYEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	COMMUNITY HEALTH, RESEARCH METHODOLOGY, SOCIAL AND BEHAVIORAL SCIENCES	100	Not applicable	100
2	SPECIAL PATHOLOGY	150	50	200
3	RADIOLOGY LAB SCIENCES II(Nuclear Medicine and Surgery)	150	50	200
4	MEDICAL LAB REPORTING & EVALUATION	150	50	200
	TOTAL	**550**	**150**	**700**
	REPORT WRITING	Qualifying		

I-E: BS AHS (Public Health Lab Sciences)

1st YEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	ANATOMY I	150	50	200
2	PHYSIOLOGY I	150	50	200
3	BIOCHEMISTRY I	150	50	200
4	INTRODUCTION TO ALLIED HEALTH SCIENCES	150	50	200
5	ENGLISH	100	Not Applicable	100
6	INTRODUCTION TO COMPUTER	100	Not Applicable	100
	TOTAL	**800**	**200**	**1000**

2nd YEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	ANATOMY II	150	50	200
2	PHYSIOLOGY II	150	50	200
3	BIOCHEMISTRY II	150	50	200
4	MEDICAL INSTRUMENTS AND CHEMICALS I (GENERAL)	100	Not applicable	100
5	ISLAMIC STUDIES	100	Not applicable	100
6	PAKISTAN STUDIES	100	Not applicable	100
	TOTAL	**750**	**150**	**900**

3rdYEAR

Sr. No.	Subject Title	Theory Marks	Practical / Clinical & G.Viva Marks	Total Marks
1	MEDICAL LAB ESTABLISHMENT	150	50	200
2	MEDICAL INSTRUMENTS AND CHEMICALS II (SPECIFIC)	100	Not applicable	100
3	GENERAL PATHOLOGY & MICROBIOLOGY	150	50	200
4	PUBLIC HEALTH LAB SCIENCES I	150	50	200
	TOTAL	**550**	**150**	**700**

4thYEAR

Sr.	Subject Title	Theory	Practical / Clinical &	Total

No.		Marks	G.Viva Marks	Marks
1	COMMUNITY HEALTH, RESEARCH METHODOLOGY, SOCIAL AND BEHAVIORAL SCIENCES	100	Not applicable	100
2	SPECIAL PATHOLOGY	150	50	200
3	PUBLIC HEALTH LAB SCIENCES II	150	50	200
4	MEDICAL LAB REPORTING & EVALUATION	150	50	200
	TOTAL	**550**	**150**	**700**
	REPORT WRITING	Qualifying		

CREDIT ACCUMULATION AND TRANSFER SYSTEM (CAT)

A Credit accumulation and transfer system is a systematic way of describing an educational program based upon its components. Credit hour or credit unit is basically the academic currency of the academic activities.

Title	Recommended	Actual		
		Teaching	Clinical	Total
1. Contact hours 1500-1800 hrs/year 2. 25-30 Contact hours = 01 credit point 3. Number of credit points in a year = 55-60	1500-1800 hours/year	1500+1300+1300+1300 +300(R.W.)=5700	300+600= 900	6600/4=1650 hours/year

DIVISION OF STUDY HOURS

1st YEAR

Sr	Subject Title	Contact Hours
1	Anatomy I	300
2	Physiology I	300
3	Biochemistry I	300
5	Introduction to Allied Health Sciences	400
6	English	100
7	Introduction To Computers	100
`	**TOTAL**	**1500**

2nd YEAR

Sr	Subject Title	Contact Hours
1	Anatomy II	300
2	Physiology II	300
3	Biochemistry II	300
5	Medical Instruments and Chemicals I (General)	200
6	Islamic Studies	100
7	Pakistan Studies	100
	TOTAL	**1300**

3rd YEAR

Sr	Subject Title	Contact Hours
1	Medical Lab Establishment	400
2	Medical Instruments and Chemicals II (Specific)	200
3	General Pathology & Microbiology	300

4	Relevant LabSciences I	400
	TOTAL	**1300**

4th YEAR

Sr	Subject Title	Contact Hours
1	Community Health, Research Methodology, Social and Behavioral Sciences	200
2	Special Pathology	300
3	Relevant Lab Sciences II	400
4	Medical Lab Reporting & Evaluation	400
5	Report Writing	300
	TOTAL	**1600**

BREAK DOWN OF HOURS OF CLINICAL PRACTICE

Year	Ward/Clinic	Hours	Period
3rdYear	Laboratory Rotation	300	06 Months
4th Year	Laboratory Rotation	600	06 Months
	G. TOTAL	**900**	

Note:

*2/3rd of the clinical training shall be provided in the morning whereas 1/3rd shall be provided in the evening. There shall be 02 months of summer vacations in an academic session.

DETAILED CURRICULA/ SYLLABI BS AHS

A- COMMON CORE COURSES (1st& 2nd Year applicable to all sciences):

1. BS AHS (Pathology Lab Sciences)
2. BS AHS (Surgery/ OT Lab Sciences)
3. BS AHS (Radiology Lab Sciences)
4. BS AHS (Public Health Lab Sciences)

1st Year:

1.	Anatomy I	200 Marks
2.	Physiology I	200 Marks
3.	Biochemistry I	200 Marks
4.	Introduction to Allied Health Sciences	200 Marks
5.	English	100 Marks
6.	Introduction to Computer	100 Marks
	Total Marks	**1000 Marks**

1. ANATOMY I

CELL BIOLOGY

GENERAL ANATOMY

Terms related to position and movements, the skin and subcutaneous tissues, Layers of skin, Integuments of skin, Glands associated with hair follicle, Microscopic picture of skin

BONES AND CARTILAGES

Osteology, Functions of Bones, Classification of bones, Parts of developing long bones, Blood supply of bones, Lymphatic vessels & nerve supply, Rule of direction of nutrient foramen, Gross structure of long bone, Surface markings, Cartilage, Development of bone and cartilage and Microscopic picture of cartilage and bone

THE MUSCLE

Introduction, Histological Classification, Functions of muscles in general, Type of skeletal muscles, Parts of skeletal muscle and their action and Nomenclature and Microscopic picture of muscle

STRUCTURES RELATED TO MUSCLES & BONES

Tendons, Aponeurosis, Fasciae, Synovial bursae, Tendon Synovial sheaths, Raphaes, Ligaments, Condyle, Epicongyle, Ridge, Tuberosity, Tubercle, Foramen, Canal, Groove, Process and Spur

THE JOINTS

Introduction, Functional classifications, Structural classification, Structures comprising a Synovial joint, Movements of joints, Blood supply of Synovial joints, their nerve supply and lymphatic drainage and Factors responsible for joint stability and Development of joints

CARDIOVASCULAR SYSTEM

Definition, Division of circulatory system into pulmonary & systemic, Classification of blood vessels and their microscopic picture and Heart and its histology and Function of the Heart and Anastomosis

NERVOUS SYSTEM

Definition, Outline of cellular architecture, Classification of nervous system, Parts of the central nervous system, Microscopic picture of cerebrum, cerebellum, spinal cord, Functional components of a nerve, Typical spinal nerve and Microscopic picture of nerve and Introduction of autonomic nervous system and Anatomy of neuromuscular junction

UPPER LIMB

OSTEOLOGY:

Detailed description of all bones of upper limb and shoulder girdle along their musculature and ligamentous attachments

MYOLOGY

Muscles connecting upper limb to the axial skeletal, Muscles around shoulder joint, Walls and contents of axilla, Muscles in brachial region, Muscles of forearm, Muscles of hand, Retinacula and Palmar apouenrosis and Flexor tendon dorsal digital expansion

NEUROLOGY

Course, distribution and functions of all nerves of upper limb and Brachial plexus

ANGIOLOGY (CIRCULATION).

Course and distribution of all arteries and veins of upper limb, Lymphatic drainage of the upper limb and Axillary lymph node and Cubital fossa

ARTHROLOGY

Acromioclavicular and sternoclavicular joints, Shoulder joint, Elbow joint, Wrist joint, Radioulnar joints, Inter carpal joints, Joints MCP and IP and Surface Anatomy of upper limb, and Surface marking of upper limb

DEMONSTARIONS:

Demonstration on Shoulder joint, attached muscles and articulating surfaces, Demonstration on Elbow joint, Demonstration on Wrist joint, Demonstration on Radioulnar joint, Demonstration on MCP and IP joints, Demonstration on acromioclavicular joint, Demonstration on sternoclavicular joint and Demonstration on Brachial plexus and Demonstration on Structure of bones

THORAX

STRUCTURES OF THE THORACIC WALL:

Dorsal spine (Vertebrae), Sternum, Costal Cartilages & Ribs, Intercostal Muscles, Intercostal Nerves, Diaphragm, Blood supply of thoracic wall and Lymphatic drainage of thoracic wall and Joints of thorax

THORACIC CAVITY:

Mediastinum, Pleura, Trachea, Lungs, Bronchopulmonary segments, Pericardium, Heart – Its blood supply, venous drainage & nerve supply, Large veins of thorax, superior and in-ferior vena cava., pulmonary veins brachiocephalic veins and Large Arteries – Aorta & its branches

LOWER LIMB

OSTEOLOGY

Detailed description of all bones of lower limb and pelvis along their musculature and ligamentous attachments.

MYOLOGY

Muscles of gluteal region, Muscles around hip joint, Muscles of thigh (anteriorly, posteriorly, laterally and medially) and Muscles of lower leg and foot

NEUROLOGY

Course, distribution, supply of all nerves of lower limb and gluteal region and Lumbosacral plexus.

ANGIOLOGY

Course and distribution of all arteries, veins and lymphatic drainage of lower limb

ARTHROLOGY

Pelvis, Hip joint, Knee joint, Ankle joint, Joints of the foot, Surface Anatomy of lower limb and Surface marking of lower limb

GENERAL HISTOLOGY

Cell, Epithelium, Connective tissue, Bone, Muscles tissue, Nervous tissues, Blood vessels, Skin and appendages and Lymphatic organs

GENERAL EMBRYOLOGY:

Male and female reproductive organs, Cell division and Gametogenesis, Fertilization, cleavage, blastocyst formation and implantation of the embryo. Stages of early embryonic development in second and third week of intrauterine life, Foetal membrane (amniotic cavity, yolk sac, allantois, umbilical cord and Placenta) and Developmental defects

Practicals:

During study of Gross Anatomy, emphasis should be given on applied aspect, radiological anatomy, surface anatomy and cross-sectional anatomy of the region covered in the respective year.

RECOMMENDED TEXT BOOKS:

8. *Gray's Anatomy* by Prof. Susan Standring 39th Ed.,
9. Elsevier, *Clinical Anatomy for, Medical Students* by Richard S.Snell,
10. *Clinically Oriented Anatomy* by Keith Moore,
11. *Clinical Anatomy* by R.J. Last, Latest Ed,
12. *Cunningham's Manual of Practical Anatomy* by G.J. Romanes, 15th Ed., Vol-I
13. *The Developing Human. Clinically Oriented Embryology* by Keith L. Moore, 6th Ed, *Wheater's Functional Histology* by Young and Heath,
14. Latest Ed, *Medical Histology* by Prof. Laiq Hussain, *Neuroanatomy*by Richard S.Snell.

2. PHYSIOLOGY I

BASIC AND CELL PHYSIOLOGY

Functional organization of human body, Homeostasis, Control systems in the body, Cell membrane and its functions, Cell organelles and their functions and Genes: control and function

NERVE AND MUSCLE

Structure and function of neuron, Physiological properties of nerve fibers, Physiology of action potential, Conduction of nerve impulse, Nerve degeneration and regeneration. Synapses, Physiological structure of muscle, Skeletal muscle contraction, Skeletal, smooth and cardiac muscle contraction, Neuromuscular junction and transmission, Excitation contraction coupling, Structure and function of motor unit

Clinical Module

Perform nerve conduction studies and explain their clinical importance. Myopathies and neuropathies. Peripheral nerve injuries

CARDIOVASCULAR SYSTEM

Heart and circulation, Function of cardiac muscle, Cardiac pacemaker and cardiac muscle contraction, Cardiac cycle, ECG: recording and interpretation. Common arrhythmias and its mechanism of development, Types of blood vessels and their function, Haemodynamics of blood flow (local control systemic circulation its regulation and control). Peripheral resistance its regulation and effect on circulation, Arterial pulse, Blood pressure and its regulation, Cardiac output and its control, Heart sounds and murmurs Importance in circulation and control of venous return., Coronary circulation, Splanchnic, pulmonary and cerebral circulation , Clinical Module

Clinical significance of cardiac cycle, correlation of ECG and heart sounds to cardiac cycle. Clinical significance of cardiac cycle, interpretation of ischemia and arrhythmias. Effects of hypertension. Clinical significance of heart sounds. Effects of ischemia. Shock

RESPIRATORY SYSTEM

Function of respiratory tract, Respiratory and non-respiratory function of the lungs, Mechanics of breathing, Production & function of surfactant and compliance of lungs, Protective reflexes, Lung volumes and capacities including dead space, Diffusion of gases across the alveolar membrane, Relationship between ventilation and perfusion. Mechanism of transport of oxygen and carbon dioxide in blood, Nervous and chemical regulation of respiration, Abnormal breathing, Hypoxia, its causes and effects, Cyanosis, its causes and effects

Clinical Module

Clinical importance of lung function tests. Causes of abnormal ventilation and perfusion. Effects on pneumothoax, pleural effusion, and pneumonia. Respiratory failure. Artificial respiration and uses & effects of O2 therapy. Clinical significance of hypoxia, cyanosis, and dyspnoea

BLOOD

Composition and general functions of blood, Plasma proteins their production and function, Erythropoiesis and red blood cell function, Structure, function, production and different types of haemoglobin, Iron absorption storage and metabolism, Blood indices, Function, production and type of white blood cells, Function and production of platelets, Clotting mechanism of blood, Blood groups and their role in blood transfusion, Complications of blood transfusion with reference to ABO & RH incompatibility, Components of reticuloendothelial systems, gross and microscopic structure including tonsil, lymph node and spleen, Development and function of reticuloendothelial system

Clinical Module

Anemia and its different types. Blood indices in various disorders. Clotting disorders. Blood grouping and cross matching. Immunity

SKIN AND BODY TEMPERATURE REGULATION + SPORT PHYSIOLOGY

Practicals:

HEMATOLOGY

Use of the microscope. Determination of haemoglobin. Determination of erythrocyte sedimentation rate. Determining packed cell volume. Measuring bleeding and clotting time. RBC count. Red cell indices. WBC count. Leukocyte count. Prothrombin and thrombin time

RESPIRATORY SYSTEM

Clinical examination of chest. Pulmonary volume, their capacities and clinical interpretation. Stethography

CARDIOVASCULAR SYSTEM

Cardiopulmonary resuscitation (to be coordinated with the department of medicine), Examination of arterial pulse, ECG recording and interpretation, Arterial blood pressure, Effects of exercise and posture on blood pressure, Apex beat and normal heart sounds

RECOMMENDED TEXT BOOKS

6. Textbook of Physiology by Guyton and Hall, Latest Ed.
7. Review of Medical Physiology by William F. Ganong, Latest Ed.
8. Physiology by Berne and Levy, Latest Ed.

9. Human Physiology: The Basis of Medicine by Gillian Pocock, Christopher D. Richards
10. Physiological Basis of Medical Practice by John B. West and Taylor, 12th Ed.

3. BIOCHEMISTRY I

CELL

Introduction to Biochemistry, Cell: (Biochemical Aspects), Cell Membrane Structure, Membrane Proteins, Receptors & Signal Molecules

BODY FLUIDS

Structure and properties of Water, Weak Acids & Bases, Concept of pH & pK, Buffers, their mechanism of action, Body buffers

BIOMOLECULES

Amino Acids, Peptides & Proteins

Amino acids: Classification, Acid-Base Properties, Functions & Significance, Protein Structure, Primary, Secondary & Super secondary. &, Structural Motifs, Tertiary & Quaternary Structures of Proteins, Protein Domains, Classification of Proteins, Fibrous proteins (collagens and elastins) & Globular proteins

ENZYMES

Introduction, Classification & Properties of Enzymes, Coenzymes, Isozymes & Proenzymes, Regulation & Inhibition of Enzyme activity & enzymes inhibitors, Clinical Diagnostic Enzymology

CARBOHYDRATES

Definition, Classification, Biochemical Functions & Significance of Carbohydrates, Structure & Properties of Monosaccharides & Oligosaccharides, Structure & Properties of Polysaccharides, Bacterial cell Wall, Heteropolysaccharides, GAGS

LIPIDS

Classification of Lipids, Fatty Acids: Chemistry, Classification occurrence & Functions, Structure & Properties of Triacylglycerols and Complex Lipids, Classification & Functions of Eicosanoids, Cholesterol: Chemistry, Functions & Clinical Significance, Bile acids/salts

NUCLEIC ACIDS

Structure, Functions & Biochemical Role of Nucleotides. Structure & Functions of DNA, Structure & Functions of RNA

MINERALS & TRACE ELEMENTS

Sources, RDA, Biochemical Functions & Clinical Significance of Calcium & Phosphorus, Sources, RDA, Biochemical Functions & Clinical Significance of Ca, Na, K, Cl, Mg, S, &P, Biochemical Functions & Clinical Significance of Fe, Cu, Zn, Mn, Mb, Se, Co, I,F etc.

VITAMINS

Sources, RDA& Biochemical Functions & Clinical Significance of Fat Soluble Vitamins, Sources, RDA& Biochemical Functions & Clinical Significance of Water Soluble, Vitamins

NUTRITION

Dietary Importance of Carbohydrates, Lipids & Proteins and other dietary Ingredients. Balanced Diet. Diet in specialized conditions

MOLECULAR BIOLOGY

Nitrogenous basis, Nucleosides and Nucleotides, Structure & Role of Nucleotide.

TISSUE BIOCHEMISTRY

Extracellular Matrix, Collagen, Elastin and Extracellular Matrix Components, Biochemistry of Proteoglycans, Bone & Teeth, Muscle & Cytoskeleton

Practicals:

Introduction to Biochemistry

Working SOPs for a Biochemistry Practical Laboratory. Introduction to Laboratory Equipments and Techniques. Preparation of solution (Normal, Molar Equivalent solution).

Physical Biochemistry

Surface Tension. Process of adsorption. Buffer Action. Practical application of Henderson-Hasselbalch's equation

Carbohydrate

Molisch's Test & Iodine Test. Benedict's Test & Barfoed's Test. Selivanoff's Test & Phenylhydrazine Test. Sucrose Hydrolysis. Starch Hydrolysis. Schematic Identification of an unknown carbohydrate

Proteins

Biuret Test, Heat Coagulation Test & Salt Saturation Test. Ninhydrin Test, Xanthoproteic Test & Millon-Nasse's Test. Aldehyde Test, Sakaguchi's Test & Lead Sulphide Test. Determination of Isoelectric pH of casein Protein. Schematic Identification of unknown protein

Lipids

Emulsification of natural fat & Solubility of soap. Acrolein Test & Test for Cholesterol

19. Iodine & Peroxide value calculation. Saponification value calculation

Biochemical analysis of different body fluid

Sample Collection & Physical Evaluation of Urine. Analysis of Normal Urine. Analysis of Abnormal Urine

RECOMMENDED BOOKS

7. *Harper's Biochemistry by Robbert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwel (Latest Edition).*
8. *Lippincott's Illustrated Review of Biochemistry by Pamela C. Champe and Richard A. Harvey (Latest Edition).*
9. *Practical Clinical Biochemistry by Varley (Latest Edition).*
10. *Textbook of Biochemistry by Devlin (Latest Edition).*
11. *Textbook of Medical Biochemistry by M.A. Hashmi (Latest Edition).*
12. *Biochemistry by Stryer (Latest Edition).*

4.INTRODUCTION TO ALLIED HEALTH SCIENCES

Introduction to different sub-disciplines of Allied Health Sciences including Pathology Lab Sciences, Surgery / OT Lab Sciences, Radiology Lab Sciences, Cardio Pulmonary Lab Sciences, MCH Lab Sciences, Public Health Lab Sciences, Dental Lab Sciences, Urology Lab Sciences, Anesthesia Lab Sciences, Emergency Care & ICU Lab Sciences, Ophthalmology Lab Sciences. Introduction to equipments, chemicals, kits and glass wares etc used in various sub disciplines of Allied Health Sciences.

1. **Pathology Lab Sciences**
- Gen. Introduction
- Importance in the field
- Infrastructure & related
- Problems related in the field
- Solutions of problems

2. **Surgery / OT Lab Sciences**
- Gen. Introduction
- Importance in the field
- Infrastructure & related
- Problems related in the field
- Solutions of problems

3. **Radiology Lab Sciences**
- Gen. Introduction
- Importance in the field
- Infrastructure & related
- Problems related in the field
- Solutions of problems

4. **MCH Lab Sciences**
- Gen. Introduction
- Importance in the field
- Infrastructure & related
- Problems related in the field
- Solutions of problems

5. **Public Health Lab Sciences**
- Gen. Introduction
- Importance in the field
- Infrastructure & related
- Problems related in the field
- Solutions of problems

6. **Uro-Dialysis Lab Sciences**
- Gen. Introduction
- Importance in the field
- Infrastructure & related
- Problems related in the field
- Solutions of problems

7. **Cardio Pulmonary Lab Sciences**
- Gen. Introduction
- Importance in the field
- Infrastructure & related
- Problems related in the field
- Solutions of problems

8. **Emergency Care & ICU Lab Sciences**
- Gen. Introduction
- Importance in the field
- Infrastructure & related
- Problems related in the field

- Solutions of problems

9. Anesthesia Lab Sciences

- Gen. Introduction
- Importance in the field
- Infrastructure & related
- Problems related in the field
- Solutions of problems

10. Dental Lab Sciences

- Gen. Introduction
- Importance in the field
- Infrastructure & related
- Problems related in the field
- Solutions of problems

11. Ophthalmology Lab Sciences

- Gen. Introduction
- Importance in the field
- Infrastructure & related
- Problems related in the field
- Solutions of problems

Practical: Use of PPEs, Preparation of solutions, Measurements of volume, Pipetting and dispensing practice, Handling of laboratory equipments, chemicals, reagents, Preparation of standards and control solutions, Preparing sample layout for laboratory record keeping, Sterilization of laboratory items. Collection, transport and storage of different types of specimens for laboratory investigations.

Recommended Books

1. Medical laboratory Manual for Tropical Countries by Monica Cheesbrough Volume:1 Second Edition.
2. Baker & Silverton's Introduction to Medical Laboratory Technology Seventh Edition
3. Manual of Laboratory Medicine by AFIP

7. ENGLISH

Comprehension; Answers to questions on a given text

Translation skills; Urdu to English

Paragraph writing; Topics to be chosen at the discretion of the teacher

Paragraph writing; Practice in writing a good, unified and coherent paragraph

Essay writing; Introduction

CV and job application; Translation skills, Urdu to English

Study skills; Skimming and scanning, intensive and extensive, and speed reading, summary and précis writing and comprehension

Academic skills; Letter/memo writing, minutes of meetings, use of library and internet

How to write a proposal for research paper/term paper

How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency). Technical report writing, Progress Report writing

RECOMMENDED TEXT BOOKS:

8. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 1. Third edition. Oxford University Press. 1997. ISBN 0194313492
9. Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press. 1997. ISBN 0194313506
10. Writing. Intermediate by Marie-Christine Boutin, Suzanne Brinand and Francoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0 19 435405 7 Pages 20-27 and 35-41 45-53.
11. Reading. Upper Intermediate. Brain Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 453402 2.
12. Writing. Upper-Intermediate by Rob Nolasco. Oxford Supplementary Skills. Fourth Impression 1992. ISBN 0 19 435406 5 (particularly good for writing memos, introduction to presentations, descriptive and argumentative writing).
13. Reading. Advanced. Brian Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1991. ISBN 0 19 453403 0.
14. Reading and Study Skills by John Langan

8. INTRODUCTION TO COMPUTER

Basic Definitions & Concepts

Hardware: Computer Systems & Components

Storage Devices, Number Systems

Software: Operating Systems, Programming and Application Software

Introduction to Programming, Databases and Information Systems

Networks

Data Communication

The Internet, Browsers and Search Engines

The Internet: Email, Collaborative Computing and Social Networking

The Internet: E-Commerce

IT Security and other issues

RECOMMENDED TEXT BOOKS

5. Introduction to Computers by Peter Norton, 6th International Edition (McGraw HILL)
6. Using Information Technology: A Practical Introduction to Computer & Communications by Williams Sawyer, 6th Edition (McGraw HILL)
7. Computers, Communications & information: A user's introduction by Sarah E. Hutchinson, Stacey C. Swayer
8. Fundamentals of Information Technology by Alexis Leon, Mathewsleon Leon press

2nd Year:

1.	Anatomy II	200 Marks
2.	Physiology II	200 Marks
3.	Biochemistry II	200 Marks
4.	Medical Instruments and Chemicals I	100 Marks
5.	Islamic Studies	100 Marks
6.	Pak Studies	100 Marks
	Total Marks	**900 Marks**

1. ANATOMY II

EMBRYOLOGY:

SPECIAL; Musculoskeletal system, cardiovascular system, CNS

THE HEAD AND NECK

THE NECK:

Muscles around the neck, Triangles of the neck, Main arteries of the neck, Main veins of the neck, Cervical part of sympathetic trunk, cervical plexus, cervical spine (Vertebrae), Joint of neck

THE FACE:

Sensory nerves of the face, Bones of the face, Muscles of the face, Facial nerve, Muscles of mastication, Mandible, Hyoid bone, Temporomandibular joint, Brief description of orbit and nasal cavity

THE SKULL:

Bones of skull, Anterior cranial fossa, Middle cranial fossa, Posterior cranial fossa, Base of skull and Structures passing through foramina

NEURO ANATOMY

Central Nervous System: Disposition, Parts and Functions, Brain stem (Pons, Medulla, and Mid Brain), Cerebrum, Cerebellum, Thalamus, Hypothalamus, Internal Capsule, Blood Supply of Brain, Stroke and its types, Ventricles of Brain, CSF circulation and Hydrocephalus, Meninges of Brain, Neural pathways (Neural Tracts), Pyramidal and Extra pyramidal System (Ascending and Descending tracts), Functional significance of Spinal cord level, Cranial Nerves with special emphasis upon IV, V, VII, XI, XII (their course, distribution, and palsies), Autonomic nervous system, its components and Nerve receptors

SPINAL CORD

Gross appearance, Structure of spinal cord, Grey and white matter (brief description), Meninges of spinal cord, Blood supply of spinal cord and Autonomic Nervous system

ABDOME; ABDOMINAL WALL:

Structures of anterior abdominal wall: superficial and deep muscles, Structure of rectus sheath, Structures of Posterior abdominal wall, Lumbar spine (vertebrae), Brief description of viscera.

PELVIS

Brief description of anterior, posterior and lateral walls of the pelvis, Inferior pelvic wall or pelvic floor muscles, Sacrum, Brief description of perineum and Nerves of perineum.

Practicals:

During study, emphasis should be given on applied aspect, radiological anatomy, surface anatomy and cross-sectional anatomy of the region covered in the respective semester /year

RECOMMENDED TEXT BOOKS:

10. *Gray's Anatomy* by Prof. Susan Standring 39th Ed., Elsevier.
11. *Clinical Anatomy for Medical Students* by Richard S.Snell.

12. *Clinically Oriented Anatomy* by Keith Moore.
13. *Clinical Anatomy* by R.J. Last, Latest Ed.
14. *Cunningham's Manual of Practical Anatomy* by G.J. Romanes, 15th Ed., Vol-I, II and III.
15. *The Developing Human. Clinically Oriented Embryology* by Keith L. Moore, 6th Ed.
16. *Wheater's Functional Histology* by Young and Heath, Latest Ed.
17. *Medical Histology* by Prof. Laiq Hussain.
18. *Neuroanatomy*by Richard S.Snell

2. PHYSIOLOGY II

NERVOUS SYSTEM

General organization of the nervous system, Classification of nerve fibers, Properties of synaptic transmission, Function of neurotransmitters and neuropeptides, Type and function of sensory receptors, Function of the spinal cord and ascending tracts, Reflex action and reflexes, Muscle spindle and muscle tone, Mechanism of touch, temperature and pain., Functions of the cerebral cortex, Difference between the sensory and motor cortex and their functions, Motor pathways including pyramidal and extrapyramidal, Basal Ganglia and its functions, Cerebellum and its function, Control of posture and equilibrium, Physiology of sleep, Physiology of memory, Mechanism and control of speech, Function of the thalamus, Function of the hypothalamus and limbic system, Production of CSF.

Clinical Module

Significance of dermatomes. Injuries of the spinal cord. Hemiplegia and paraplegia. Parkinsonism. Effects of cerebellar dysfunction.

REPRODUCTION

Production and function of testosterone and Physiological changes during male puberty, Function of the female reproductive system, Production and function of oestrogen, and progesterone, Menstrual cycle, Physiological changes during female puberty and menopause.

Clinical Module

Male infertility. Female infertility. Basis for pregnancy tests.

GASTROINTESTINAL TRACT

General function of gastrointestinal tract, Enteric nervous system, control of gastrointestinal motility and secretion, Mastication, Swallowing: mechanism and control, Function, motility and secretions of stomach, Function, motility and secretions of small intestine, Function, motility and secretions of large intestine, Function of GIT hormones, Mechanism of vomiting and its control pathway, Defecation and its control pathway, Functions of liver, Functions of, gallbladder and bile in digestion and Endocrine & exocrine pancreas and functions of pancreas in digestion

Clinical Module

Dysphagia. Physiological basis of acid peptic disease. Causes of vomiting. Diarrhea and constipation in clinical settings. Jaundice and liver function tests in clinical settings

ENDOCRINOLOGY

Classification of endocrine glands, Mechanism of action, feedback and control of hormonal secretion, Functions of the hypothalamus, Hormones secreted by the anterior and posterior pituitary and their mechanism of action and function.. Function of the thyroid gland, Function of the parathyroid gland, Calcium metabolism and its regulation, Secretion and function of

calcitonin, Hormones secreted by the adrenal cortex and medulla, and their function and mechanism of action, Endocrine functions of the pancreas, Control of blood sugar. Hormones secreted by the gastrointestinal system and their function, Function of the thymus and The endocrine functions of the kidney and Physiology of growth.

Clinical Module

Acromegaly, gigantism and dwarfism. Effects of panhypopitutiarism. Diabetes insipidus. Thyrotoxicosis and myxoedema. Pheochromocytoma. Cushing's disease. Adrenogenital syndrome. Diabetes mellitus and hypoglycemia.

BODY FLUIDS AND KIDNEY

Components and quantitative measurements of body fluids, Fluid compartments, tissue and lymph fluid, Structure of the kidney and nephron, General function of the kidney, GFR and its regulation, Formation of urine including filtration, re-absorption and secretion, Plasma clearance., Mechanism of concentration and dilution of urine, Water and electrolyte balance with reference to the kidney, Role of the kidney in blood pressure regulation, Hormonal functions of the kidney, Acidification of urine and its importance, Acid base balance with reference to the kidney and Micturition and its control.

Clinical Module

Renal function tests and their clinical importance. Fluid excess and depletion. Renal failure and dialysis. Metabolic acidosis and alkalosis. Abnormalities of micturition.

Practicals:

Nervous System

Examination of superficial and deep reflexes. Brief examination of the motor and sensory system. Examination of the cranial nerves.

RECOMMENDED TEXT BOOKS

6. Textbook of Physiology by Guyton and Hall, Latest Ed.
7. Review of Medical Physiology by William F. Ganong, Latest Ed.
8. Physiology by Berne and Levy, Latest Ed.
9. Human Physiology: The Basis of Medicine by Gillian Pocock, Christopher D. Richards
10. Physiological Basis of Medical Practice by John B. West and Taylor,12th Ed

4. BIOCHEMISTRY II

BIOENERGETICS

Introduction to Bioenergetics, Biological Oxidations and Electron Transport Chain and Oxidative Phosphorylation

METABOLISM OF CARBOHYDRATES

Digestion & Absorption of Carbohydrates, Glycolysis & its Regulation, Citric Acid Cycle, Metabolism of Glycogen, Gluconeogenesis and regulation of blood glucose and Pentose Phosphate Pathway & its Significance.

METABOLISM OF LIPIDS

Digestion & Absorption of Lipids, Metabolism & Clinical Significance of Lipoproteins, Fatty acid oxidation biosynthesis and metabolism of Triacylglycerols, Metabolism & clinical Significance of Cholesterol and Metabolism of Eicosanoids

METABOLISM OF PROTEINS & AMINO ACIDS

Digestion of Proteins & Absorption of Amino Acids, Transamination & Deamination of Amino Acids and urea cycle and Specialized products formed from Amino Acids

Metabolisium of Nucleic Acids

MOLECULAR BIOLOGY

Structural Organization of Chromosome and Genes. Replication, Transcription in Prokaryotes & Eukaryotes, Translation: (Genetic Code) in Prokaryotes & Eukaryotes, Translation Inhibition by Antibiotics, Regulation of Gene Expression and Recombinant DNA Technology & Polymerase Chain Reaction, Blotting Techniques.

HORMONES

Classification & Mechanism of Action of Hormones, Signal Transduction, Second Messengers and Receptors, Hypothalmic & Pituitary Hormones, Steroid Hormones: Glucocorticoids and Mineralocorticoids, Insulin & Glucagon and Disease related to hormones abnormalities

Practicals:

Techniques of Instruments in Clinical Biochemistry with examples.

Visible Spectrophotometry. Flame photometry. UV & IR spectrophotometry. Atomic Absorption spectrophotometry. pH Metry. Chromatography and determination of Amino Acids in Urine by pape chromatography

Clinical quantative analysis in Biochemistry

Sample Collection Blood, Faces and body fluids. Serum Glucose Estimation. Glucose tolerance Test (GTT). Serum Cholesterol estimation (Total, HDL and HDL cholesterol). Serum Bilirubin Estimation (Total, Direct and Indirect bilirubins). Serum Amylase Estimation. Serum AST Estimation. Serum ALT Estimation. Serum ALP Estimation. Serum Creatine Kinase(CK) Estimation. Serum Ascorbic acid Estimation. Serum LDH Estimation. Serum Proteins Estimation (Total, Albumin & Globulin). Serum Total lipids Estimation. Serum calcium Estimation (total, ionized & unionized). Serum Uric acid Estimation. Serum Magnesium Estimation. Serum Urea Estimation. Serum Creatinine Estimation

RECOMMENDED TEXT BOOKS:

6. *Harper's Biochemistry by Robbert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwel (Latest Edition).*
7. *Lippincott's Illustrated Review of Biochemistry by Pamela C. Champe and Richard A. Harvey (Latest Edition).*
8. *Practical Clinical Biochemistry by Varley (Latest Edition).*
9. *Textbook of Biochemistry by Devlin (Latest Edition).*
10. *Biochemistry by Stryer (Latest Edition).*by Stryer, Lubert, Latest Ed

5. **MEDICAL INSTRUMENTS AND CHEMICALS- I**

Different relevant Techniques used in Medical fields. The names of instruments used, based upon different Techniques for working and evaluation of different parameters in Medical fields. Normal functioning of these instrument, parts of these instruments & individual functions of these parts. Their trouble shootings and routine manipulations to obtain correct results. Maintenance of Sensitivity & Specificity of these instruments. The general study of following Medical Instruments available in Medical fields.

Introduction all the basic equipments, chemicals, glass wares, plastic wares used in medical field.

General concepts of Microscopy: Microscopes; Definitions, Types, functions, uses, limitations

Water Bath: Working principle, component parts and their uses

Water Distillation unit: Procedure for preparing distilled water.

Incubators: operating principle, types, operation

Centrifuge Machines; types, functions, uses, limitations.

Pipettes; Different types, uses and pipetting techniques,

Biosafety and Biosecurity: Biosafety cabinets: classification, uses, airflow (HEPA filters) in biosafety cabinets. Biosafety levels, biosafety controls, culture vs climate, emergency evacuation etc.

Different types of hazards encountered in medical fields including Biological, electrical, mechanical hazards

Sterilization and disinfection – classification and methods of sterilization

- Principle and Methods of sterilization by heat.
  - By Dry Heat - Flaming, Red Heat, Hot air oven, incineration.
  - By Moist heat-Pasteurization, Inspissation, Tyndallisation & autoclave.
- Filtration Methods – in brief.
- Ionizing Radiations
- Disinfection – Mode of action and uses of important chemical disinfectants – phenol and phenolic compounds, alcohols, aldehydes halogens, dyes, acids and alkalies.
- Gaseous methods of sterilization

Autoclave; Principle, Types, component parts and operations, Uses etc.

Micro Wave Ovens.

Cleaning, drying & Sterilization of Glassware, disposal of contaminated material i.e. Clinical infective material and inoculated culture media

Refrigerators and Freezers; introduction, working principle and uses

Glucometers: Types, working principle, operation and uses

Balances: types of balancing equipments, Weighing Machines: Types, operating principles, calibration, maintenance and uses

Hot plate and its uses,

Bunsen burner and its uses in different section in the laboratory,

Fume hood: Procedure for use

Shaker: Types and uses

B.P Apparatus: Types, working principle and operation

Pulse Meters. Procedure for use

Scientific Calculators etc

Units of Measurements and laboratory calculations:
Making the Glass Equipments: Making a Pasteur pipette, stirrer, bending a glass tubing, making a wash bottle
Forceps: Different types and their uses in different specialties in medical fields

Needles

Scissors – different types of scissors used in medical labs in different specialty sections.

Different types of chemicals used in medical fields like antiseptics, disinfectants, anesthetics etc.

Different types of solutions used in medical fields. Standard solutions, calibrators, controls, Buffer solutions, Reagent solutions, Staining solutions etc.

Recommended Books

1. Medical laboratory Manual for Tropical Countries by Monica Cheesbrough Volume:1 Second Edition.
2. Baker & Silverton's Introduction to Medical Laboratory Technology Seventh Edition
3. Manual of Laboratory Medicine by AFIP
4. Good Clinical Laboratory Practices in Pakistan. Editors: 2019 Aamir Ikram, Rita Guenther and Benjamin Rusek.
5. Clinical Chemistry techniques, principles, correlations sixth edition Michael L. Bishop, MS, CLS, MT (ASCP)
6. Introduction to Medical Laboratory Technology Seventh Edition by F.J Baker.
7. Tietz Fundamental of clinical chemistry 7th edition

5. ISLAMIC STUDIES

FUNDAMENTAL BELIEFS AND PRACTICES OF ISLAM.

Tauheed (Unity of Allah), Risalat (Finality of the Prophet-hood). Akhirat (Day of Judgement).,Salat, Soum, Zakat, Hajj and Jehad

NEED OF RELIGION AND ITS ROLE IN HUMAN LIFE.

MORALITY IN ISLAM.

Concept of morality, Concept of morality and Faith., Islamic principles and methods of character building., Moral values in Islam.

RIGHTS OF THE INDIVIDUAL IN ISLAM.

QURAN AS A GUIDE FOR THE MODERN SOCIETY AND SCIENTIFIC DEVELOPMENT.

HOLY PROPHET (PEACE BE UPON HIM) AND HIS LIFE.

ISLAMIC CONCEPT OF STATE.

ISLAM AND SOCIETY.

Role of man and women in society, Rights of women children in Islam. Concept of woman's freedom in Islam., Hukook-ul-Ibad.

IMPORTANCE OF RIZK-E-HILAL.

CONTRIBUTION OF ISLAMIC SCHOLARS IN SCIENCE AND MEDICINE.

RECOMMENDED BOOKS

3. Introduction to Islam by Dr. Hamidullah.
4. Islam: Its meaning and message by Khurshid Ahmad
5. اسلام یک نظر میں مولانا صدر الدین اصلاحی

6. قرآن اور تعمیر سیرت ڈاکٹر میر ولی الدین

6. PAKISTANSTUDIES

IDEOLOGY OF PAKISTAN.

Definition and elucidation. Historical aspect. Ideology of Pakistan in the light of speeches and sayings of Allama Iqbal and Quaide-Azam.

PAKISTAN MOVEMENT

Basis for the creation of Pakistan. Historical developments: 1857-1947

POLITICAL DEVELOPMENTS IN PAKISTAN SINCE 1947

LAND AND PEOPLE OF PAKISTAN

Geography, Society,Culture, Natural resources, Health and education with reference to characteristics trends and problems.

RECOMMENDED BOOKS

4. Ideological Orientations of Pakistan by Sharif Al Mujahid.
5. Struggle for Pakistan by I.H. Qureshi.
6. The Making of Pakistan by Richard Symond

BS AHS 3rd& 4thYear (Relevant Sciences Specific Courses)

I-A: BS AHS Pathology Lab Sciences

3rd Year

1.	Medical Lab Establishment	200 Marks
2.	Medical Instruments And Chemicals II (Specific)	100 Marks
3.	General Pathology & Microbiology	200 Marks
4.	Pathology Lab Sciences I (Hematology & Blood Banking)	200 Marks
	Total Marks	**700 Marks**

1. MEDICAL LAB ESTABLISHMENT

LEADERSHIP AND MANAGEMENT; Operation management, Human Resource Management, Financial Management, Marketing Management, Quality Systems Management. **STRATEGIC PLANNING**

LABORATORY DESIGN AND SERVICE MODELS; Assessment, Physical Design, Identify Space for offices, Personal Facilities, Storage, Conference/Library area, Students Area, Fume Hoods and Biological safety cabinets, Furniture, Noise control, Eye wash station, Laboratory counters.

REGULATIONS, ACCREDITATION AND LEGISLATION; Prospective Payment System, Deficit Reduction Act, Clinical Laboratory Improvement Act of 1988 (CLIA ’88), Physician Self-referral Ban, Ergonomic Safety and Health Program Management Guidelines, Three-Day Rule, Occupational Exposure to Hazardous Chemicals in Laboratories, Occupational Exposure to Blood-Borne Pathogens, Health Insurance Portability and Accountability Act: OIG Compliance Guidelines, CMS National Coverage Determinations: Hazardous Material Regulations, Laboratory-Related Governmental Agencies, Safety, Biological Hazard, Chemical Hazard, Ergonomic Hazard, Waste Disposal.

Practicals:

Recruitment of Staff

Documentation

Equipments

Test methods

Test Report design/ Certificates

Design of Lab

Size of Lab

Building requirement

Specified areas in lab

Safety

Hygiene

Disposal of Waste

RECOMMENDED BOOKS

1. Basic Pathology by Robbins Latest Edition
2. Clinical Pathology Interpretations by A.H. Nagi
3. Pocket Companion to Robbins, Pathologic basis of disease Cotran, Kumar
4. Theory and Practice of Histological Techniques by John D Bancrof

2.MEDICAL INSTRUMENTS AND CHEMICALS- II

Different relevant Techniques used in Medical fields. The names of instruments used, based upon different Techniques for working and evaluation of different parameters in Medical fields. Normal functioning of these instruments, parts of these instruments & individual functions of these parts. Their trouble shootings and routine manipulations to obtain correct results. Maintenance of Sensitivity & Specificity of these instruments. The general study of following Medical Instruments available in Medical fields

Microscopes; Types, functions, uses, limitations etc. Advanced Microscopy techniques.

Colorimeters & Photometers: advanced UV visible & IR Spectrophotometers including different types of Chemistry Analyzers.

Amino Acid Analyzer.

Haematology Analyzers; its parts, scope, working, limitations & uses etc.

Flame Photometers. Component parts, working principle and uses

Turbidimetry, Component parts, working principle and uses

Nephelometry, Principle and operation, uses

ISE (Ion Selective Electrode). Their working principle, component parts, uses and applications.

ELISA Apparatus; its parts, scope, working, limitations and uses.

Chromatography; including Paper, Thin layer, Gel and other types of chromatographics & advanced chromatographic techniques e.g. Gas Chromatography, GLC, HPLC etc. **Electrophoresis Apparatus;** its types, functioning the Papers Gel electrophoresis and Iso-electric Focusing etc.

Microtomes; parts, working, limitations & uses,

PCR: types and applications.

Blotting techniques including Western blot, Southern blot and Northern blot.

Blood gas analyzer.

Cryofuge, Storage cabinet in blood banking, Plasma extractor, Platelet apheresis,

Calibrators: standards, low, normal, elevated control sera's and cells

Recommended Books

1. Medical laboratory Manual for Tropical Countries by Monica Cheesbrough Volume:1 Second Edition.
2. Baker & Silverton's Introduction to Medical Laboratory Technology Seventh Edition
3. Manual of Laboratory Medicine by AFIP
4. Good Clinical Laboratory Practices in Pakistan. Editors:2019 Aamir Ikram, Rita Guenther and Benjamin Rusek.
5. Clinical Chemistry techniques, principles, correlations sixth edition Michael L. Bishop, MS, CLS, MT (ASCP)
6. Introduction to Medical Laboratory Technology Seventh Edition by F.J Baker.
7. Tietz Fundamental of clinical chemistry 7th edition

3. GENERAL PATHOLOGY & MICROBIOLOGY

iii. GEN. PATHOLOGY

Cell Injury and Death: Causes of cell injury, Necrosis, Apoptosis and Sub cellular responses. Cell Adaptations: Hyperplasia, Hypertrophy, Atrophy, Metaplasia and Intracellular accumulation. Inflammation: Acute inflammation. Vascular events, Cellular events and Chemical mediators. Chronic Inflammation. General, Granulomatous and Morphologic patterns of acute and chronic inflammation. Healing and Repair:

Normal controls, Repair by connective tissue and Wound healing. Haemodynamic Disorders. Edema, Hyperemia / congestion, Hemorrhage, Thrombosis, Embolism, Infarction and Shock. Diseases of Immunity. General features, Hypersensitivity reactions, Immune deficiencies, Autoimmunity and Amyloidosis. Neoplasia**:** Nomenclature, Molecular basis, Carcinogenic agents and Clinical aspects

iv. MICROBIOLOGY

Basic Bacteriology

Bacteria Compared with Other Microorganisms, Structure of Bacterial Cells, Growth, Genetics, Classification of Medically Important Bacteria, Normal Flora, Pathogenesis,, Host Defenses, Laboratory Diagnosis, Antimicrobial Drugs: Mechanism of Action, Antimicrobial Drugs: Resistance, Bacterial Vaccines, Sterilization & Disinfection, Biosafety and bio risk management,

Clinical Bacteriology

Overview of the Major Pathogens & Introduction to Anaerobic Bacteria. **Gram-Positive Cocci**; *Staphylococcus aureus,Streptococcus pyogenes, Staphylococcus epidermidis, Staphylococcus saprophyticus,S.pyogenes, Streptococcus agalactiae, Enterococcus faecalis,*Viridansstreptococci, *Streptococcus bovi and S. pneumoniae*

Gram-Negative Cocci;*Neisseriameningitidis*and*Neisseria gonorrhoeae.*

Gram-Positive Rods;*Bacillusanthracis,Bacillus cereus, Clostridium tetani, Clostridium botulinum, Clostridium perfringens,Clostridiumdifficile, Corynebacteriumdiphtheriae*and*Listeria monocytogenes*.

Gram-Negative Rods Related to the Enteric Tract;*E. coli*, *Salmonella* species,*Shigella*species, *Vibrio cholerae*, *Vibrio parahaemolyticus,Vibriovulnificus, Campylobacter jejuni*, *Helicobacter pylori, Klebsiella, Enterobacter, Serratia, Proteus, Providencia, Morganella, Pseudomonas spp.,Bacteroides&Prevotella.*

Gram-Negative Rods Related to the Respiratory Tract;*Haemophilusinfluenzae, Bordetella pertussis,* and *Legionella pneumophila*

Gram-Negative Rods Related to Animal Sources (Zoonotic Organisms);*Brucella*species,*Francisellatularensis, Yersinia pestis,* and *Pasteurellamultocida*

Mycobacteria, Actinomycetes, Mycoplasmas, Spirochetes, Chlamydiae, Rickettsiae, Minor Bacterial Pathogens

Basic Virology

Structure, Replication, Genetics, Classification of Medically Important Viruses, Pathogenesis, Host Defenses, Laboratory Diagnosis, Viral Vaccines.

Clinical Virology

Herpes Viruses, Rabies Virus, Polio Virus, Hepatitis Viruses, Human Immunodeficiency Virus, Dengue Virus.

Mycology

Basic Mycology, Cutaneous & Subcutaneous Mycoses, Systemic Mycoses, Opportunistic Mycoses,

Parasitology

Intestinal & Urogenital Protozoa, Blood & Tissue Protozoa, Minor Protozoan Pathogens, Cestodes, Trematodes, Nematodes.

Sterilization

Laboratory Exercises:

Each lecture will be followed by two hour practical class where the student will apply their theoretical knowledge in the understanding of related microbiological investigations, which have been proved useful for the diagnosis of human diseases.
During the other laboratory sessions, the students will be engaged in the preparation of media, the sterilization of glass ware, Antigens, Antibodies, Vaccines – haemolysin, permanent slides, laboratory reagents and also to assisting postgraduate students in the isolation of micro – organisms from clinical materials.

Practicals:

- Acute Inflammation
- Chronic Inflammation
- Necrosis
- Gangrene
- Pigmentation
- Calcification
- Urine Examination
- Sterilization
- Culture Media
- Antibiotic Sensitivity testing
- Culturing bacterial pathogens
- Examination of different clinical specimens
- Blood Culture
- Anaerobic Culture
- Gram Staining
- ZN Staining
- Biochemical tests to identify bacteria (Conventional, API 20E, API 20NE, Automated systems)
- PCR
- KOH preparation for scraping
- Stool Examination
- ELISA

RECOMMENDED BOOKS

v. Basic Pathology by Robbins Latest Edition
vi. Clinical Pathology Interpretations by A.H. Nagi
vii. Pocket Companion to Robbins, Pathologic basis of disease Cotran, Kumar
viii. Theory and Practice of Histological Techniques by John D Bancrof

4. PATHOLOGY LAB SCIENCES I(Haematologyand Blood Banking)

i. Haematology

Orientation and introduction to study of Haematology. Origin and Development of Blood Cells. Maturation of Erythrocytes and erythrocyte count. Haemoglobin. Haematocrit, Erythrocyte sedimentation rate. Maturation of Leukocytes, Leukocyte Count. Maturation of Thromobocytes. Preparation of Blood Smears and Differential Blood Count. Total Eosinophil Count and Cerebrospinal fluid count. Pathology of Erythrocytic series, Including abnormal Haemoglobin syndromes and Indices. Reticulocytes, Haemostasis and Blood Coagulation. Laboratory Diagnosis of Coagulation defects. Special Stains in Haematology. L.E Phenomenon and Continuation of Bone Marrow study. Review of vascular system and Blood Constituents. Methods for Securing Blood. Method for securing Bone Marrow. Origin and Development of Blood cells, Maturation of Erythrocytes and erythrocyte count. Blood formation; Intrauterine & Extrauterine. Factors which govern Haematopoiesis. Principles of Normal cell Maturation. Erythrocytes; Definition, Maturation and Erythropoesis. Enumeration of Erythrocytes. Haemoglobin; Definitions of terms. Chemistry of Haemoglobin. Metabolism. Compounds of Haemoglobin. Haemoglobinometery. Correlation of Haemoglobin, Haematocrit, and Erythrocyte Count. Erythrocyte Sedimentation Rate. Maturation of Leukocytes, Leukocyte Count. Introduction: Definition, Origion & Functions and biological Properties. Maturation of Granulocytic Series. Maturation of Lymphocytic Series. Maturation of Monocytic Series. Enumeration of Leukocytes:- Maturation of Thrombocytes. Preparation of Blood Smears. Fixation &Staining. Examination of stained smears: Normal Values for the method used.

Cerebrospinal fluid: Definition. Sources. Functions. Collection:- The Lumbar puncture. Laboratory studies. Necessity of maintaining sterlity. Necessity of imidiate examination. Gross Observation. Cytologic studies. Principle of the cell count. Normal values and significance abnormal findings. Pathology of Erythrocytic series, Including abnormal Haemoglobin syndromes and Indices. Brief review of maturation of erythrocytes and haemoglobin metabolism. The Indices & Abnormal Forms: Reticulocyte Count, Fragility of Erythrocytes, Sickle cell studies: Reticulocyte Counts: Fragility of Erythrocytes: Sickle Cell studies: Principle of tests for sickle cell studies, Laboratory Diagnosis. Thrombocytes, Homeostasis, and Blood Coagulation: Thrombocytes: Haemostasis: Special stains in Haematology: Peroxidase stain. Sudan Black B. Periodic Acid Schiff (PAS) Stain. Feulgan reaction Histochemical techniques for alkaline phosphatase. Miscellaneous stains used in Haematology: Giemsa. Prussian blue reaction. L. E phenomenon and techniques of L.E cells preparation. Bone Marrow Examination. Bone marrow aspiration and trephine biopsy. Bone marrow differential count.

ii. Blood Banking

History of Blood Transfusion. Antigen – Antibody theory. Classification of antibodies. Blood Groups A.B.O systems. Rh – Hr typing, Agglutinogen-Agglutinin theory. Cross matching procedure. Other Blood group system. Transfusion Reactions. Antiglobulin tests. Rh antibody tests. Erythroblastosis foetalis (Review of clinical and Laboratory findings). Donors. History of Blood Transfusion. Antigen Antibody theory: Antigen, Antibody, Immunization. Classification of Antibodies: Preciptin, Lysin, Agglutinoid, Complete/Bivalent Antiglobulin test. Blood groups ABO systems: Agglutinogen, Agglutinin, Landsteiner's Postulates, Sub groups of "A" and "B". Techniques for blood grouping-slide test. Techniques for reverse blood grouping-tube test. Sources of error, controls in blood bank, general. Low titered groups "O" blood. Rh – Hr Typing: Agglutinogen Agglutinin theory: Agglutinogen definition, Agglutinin definition, Cause of sensitization to the Rh – Hr factor, Techniques for Rh typing, Sources of error Controls. Cross Matching prcocedures: Purpose of ccrossmatch. Methods of crossmatching. Crossmatching problems; Rouleaux. Cold Agglutinins. Hyperproteinemia and hyperglobulinemia. Other Blood Group Systems. Transfusion reactions. Antiglobulin tests: Direct Coomb's. Indirect Coomb's. Sources of error, controls. Rh Antibody tests: Screening tests using a cell panel; Slide test. Tube test. Titrations. Erythroblastosis Foetalis: Causes: Due to Rh incompatibility. Methods of testing. Due to ABO incompatibility. Methods of testing. Organization of Blood banking, Standard operating procedures in blood banking, blood products and blood component preparation, Apheresis.

Practicals:

- Malarial Parasites
- TLC, DLC
- Hb, ESR
- Coagulation studies
- Reticulocyte Counts
- Platelets count
- Fragility of Erythrocytes
- Peripheral blood film examination
- Blood Grouping and Cross Matching

RECOMMENDED BOOKS

1. Basic Pathology by Robbins Latest Edition
2. Clinical Pathology Interpretations by A.H. Nagi
3. Pocket Companion to Robbins, Pathologic basis of disease Cotran, Kumar
4. Theory and Practice of Histological Techniques by John D Bancrof

4th Year:

1.	Community Health, Research Methodology, Social and Behavioral Sciences	100 Marks
2.	Special Pathology	200 Marks
3.	Pathology Lab Sciences II(Chemical Pathology and Immunology)	200 Marks
4.	Medical Lab Reporting & Evaluation	200 Marks
	Report Writing	Qualifying
	Total Marks	**700 Marks**

3. COMMUNITY HEALTH, RESEARCH METHODOLOGY, SOCIAL & BEHAVIORAL SCIENCES

i. Community Health

Introduction; History of Community Medicine, Definition, concept of Health & illness of diseases and Natural History of diseases, levels & prevention

Environmental Sanitation & Medical Entomology; Water, waste disposal and Environmental problems & pollution

Genetics; Prevention of genetic diseases and Genetic counseling

General and Descriptive Epidemiology; Time, Place and Person

Analytical Epidemiology; Case control and Cohort studies

Experimental Epidemiology Randomized Control Trial.

Systemic Epidemiology; Vector borne diseases, Water borne diseases, Air born diseases, Contact diseases and Diseases of major public health and its importance along with national health programs wherever Applicable.

Non-Communicable Diseases; Diabetes, Hypertension, Heart diseases, Blindness, Accidents, Geriatric problems

Occupational Health Problems; M.C.H. and family welfare Programs, Health care delivery in the community, National Health Policy, National Health programs including, Rehabilitation, Evaluation of Health, Programs, Health Planning Organization,

Community Nutrition; Foundation and status in Pakistan masses. Community nutrition programs: key features, benefits, planning, implementation, evaluation. Nutritional status assessment: Anthropometric, Dietary, Biochemical, Clinical measurements. Community Nutrition and Dietetics profession. Steps of nutritional epidemiological study, Testing and Piloting of nutritional epidemiological study, Questionnaire design. Evaluation, sources of variation in the dietary intake, Methodological studies on dietary questionnaires.

Structure of Health Care System In The Country; P.H.C. district level, State level and central level. P.H.C. Organization and Function and Role of Non Governmental Organization

Health Education; Principles of Health Promotion, Methods, approaches and media for, I.E.C (Information, Education & Communication), Medical and Health/Information system, Mental Health and Nutrition.

Teaching Methodology; Types of health services, public, private, scientific, traditional health system, Organization of public services in health, central, provincial and local levels, Levels of health care, primary, secondary and tertiary, Planning and Organization of health services, Implementation, Evaluation of health services, Management of resources in health services, Financial management, Health education and social cultural concept Ethics in Health Services, Theories of learning facilitations.

ii. Research Methodology

Research Fundamentals; Research, Theory in Research, Research Ethics

Research Design; Research Problems, Questions, and Hypotheses, Research Paradigms, Design Overview and Research Validity

Experimental Designs; Group Designs and Single-System Design

Non Experimental Research; Overview of Non experimental Research, Clinical Case Reports, Qualitative Research, Epidemiology, Outcomes Research and Survey Research.

Measurement; Measurement Theory and Methodological Research.

Data Analysis; Statistical Reasoning, Statistical Analysis of Differences; The basics, Statistical Analysis of Differences; Advanced and special Techniques, Statistical Analysis of Relationships; The basics and Statistical Analysis of Relationships; Advanced and special Techniques

Implementing Research; Implementing a Research Project and Publishing and Presenting Research

iii. Social & Behavioural Sciences

Introduction of Sociology

Social Action And Interaction; Social processes, Co-operation, Competition, Conflict and Accommodation.

Social Groups; Primary-Secondary, In and Out Group and Reference group

Culture; Values, Beliefs, Sanctions, Cultural relativism and Ethnocentrism, Norms, Folk ways, Conflict, Deviancy and Social control.

Socialization and Personality formation

Social Institution; Meanings, Social stratification and Meanings and Forms (Classes and Castes)

Social and Cultural Change; Factors promoting and resisting social change

The Field Of Medical Sociology; Contribution of Sociology in Health. Environmental pollution and Health, Patient, Healthcare provider relationship. Role of Healthcare provider and attendants in the managements of patient.

Introduction of Behavioural Sciences; Understanding Behaviour. Sensation, sense organs / special organs, Perception and factors affecting it, Attention, concentration, Memory, types and methods to improve it, Types and theories of thinking, Cognition and levels of cognition, Problem solving and decision making strategies, Communication Its types.

Personality and Intelligence; Psychological growth and development, Personality, theories and Factors affecting personality development, Assessment of personality Influence of personality in health, disease, hospitalization, stress, etc, Intelligence and its types Relevance of IQ and EQ Methods of enhancing EQ and IQ Factors affecting intelligence and their assessment

Stress Management

Doctor – Patient Relationship; Concept of boundaries and psychological reactions in doctor – patient relationship.

Pain, Sleep and Consciousness; Concept of pain, sleep and consciousness, Attend states of consciousness, Psychological influence on sleep and consciousness, Non-pharmacological methods of inducing sleep, Changes in consciousness.

Communication Skills; Principles of effective communication. A practical method of communication between the doctor and patient about disease, drugs, prognosis etc

Interviewing; Types of interview and Skills of interviewing

Health Psychology

Psychology in clinical management of patients, Psychological therapies, child's social and cognitive development, Psychological changes during adolescence, old age and their clinical management, Impact of illness on a patient's psychological well being. Association between psychological stress and physical well being, Role of doctor in patient reassurance.

Social And Community Perspective; Inequalities Ethnicity, culture and racism, Gender and Healthcare and Influence of health. Illness on behaviour

Application of Behavioural Principles In Health and Disease; Mentally / emotionally and physically handicapped, Homebound and medically compromised.

Recommended Text Books:

8. Text book of Community Medicine by: Park J E. Latest Edition
9. Horton, Paul B. and Chester L. Hunt, 1984 Sociology, Singapore: Megraw Hill Book Co.
10. Moon, Graham, 1995. Society and Health; An introduction to Social Science for Processionals, London: Routledge.
11. Rehabilitation Research (Principles and Applications) 3rd Edition By Elizabeth Domholdt
12. Textbooks of Community Medicine, by Prof. H. A. Siddique (2nd Edition).
13. A Handbook of Behavioural Sciences for Medical and Dental Students By: M H Rana, S Ali and M Mustafa, , University of Health Sciences Lahore
14. Developmental Psychology for Healthcare Professions By: Katherine A Billingham

4. SPECIAL PATHOLOGY

Theory:

The course outline is as follows:-

1. Blood Vessels & Heart,
2. Hematopoietic and Lymphoid Systems
3. Respiratory System
4. The Urinary System
5. Musculoskeletal System
6. Endocrine System
7. Nervous System

Practicals:

Basic principles of lab works, Hematopoietic System (ALL, CLL,AML, CML), Musculoskeletal System (Osteogenic sarcoma & Giant cell tumor), The Skin (Squamous cell carcinoma & Basal cell carcinoma), Endocrine System (Thyroid tumors, Colloid goiter, Follicular adenoma & Papillary carcinoma thyroid, Pituitary, Causes of hyperpituitrism & lab. Diagnosis, Causes of biliary, bitarism & lab. Diagnosis, Thyroid, Thyroid function test, Causes of hyperthyroidism & lab. Diagnosis, Causes of hypothyroidism & lab. Diagnosis, Parathyroid, Hyperparathyroidism, Hypoparathyroidism, Hypercalcemia, Hypocalcemia, Diabetes mellitus, Lab. Diagnosis & GTT, Diabetic ketoacidosis), Liver, gall bladder and biliary tract, Chronic cholecystitis, Hepatocellualr carcinoma & Liver cirrhosis), Nervous System (Meningioma etc), Basics of Histopathology / tissue Processing, Bone Marrow Biopsy

Recommended Books:

1. Pathological Basis of Disease by Kumar, Cotran, Robbins. 7th. Ed.
2. Medical Microbiology and Immunology by Levinson and Jawetz, 9th Ed. Mc Graw-Hill

3. Clinical Pathology Interpretations by A.H. Nagi

3. PATHOLOGY LAB SCIENCES II(Chemical Pathology & Immunology)

i. Chemical Pathology

Chemical Changes in Gastrointestinal tract: Digestion and digestive enzymes, their control and mechanism of secretion, Absoprtion of water, Minerals, Fats, Carbohydrate and proteins. Blood glucose and diabetes mellitus Liver function tests, methods of determination, abnormal values, clinical significance Lipid profile tests, methods of determination, abnormal values, clinical significance. Minerals: Macro-mineral and micro-minerals/trace elements. Metabolism of Na, K, Ca, P, Mg, Fe, Zn, Cu, Se, Mn and Co, Electrolyte balance and imbalance. Water Balance: Distribution of body fluids, were intake and output, dehydration and edema. Acid Base balance and imbalance, Metabolic acidosis and alkalosis, Respiratory acidosis and alkalosis. Hormones: Parathyroid effects on Ca and phosphorus metabolism, Thryoid functions and chemistry, effects of hormones at metabolism. Gonadal and other steroid hormones. Abnormal values and their clinical significance. Urine: Composition of glomerular filtrate and change which occur in the tubules, normal urine, physical properties, and composition, pathological constituents and their determination, Quantitative Analysis of Urine: Amino acids, Bence-Jones proteins, Calcium, Coproporphyrins, creatinine, glactose, phosphates, nitrogen, PH, specific gravity, Ca, p, Oxalates and urates. Determination of Urea (qualitative and Quantitative) pathological Constituents: Sugar, Albumin, Ketone bodies, Blood, Bile pigments. Renal function tests: Renal function tests used in clinical investigation. Inulin and Creatinine clearance (GFR). Para-aminohippurate clearance (renal plasma flow). Maximum rate of tubular excretion of P-amino-hippurate (Tr-PAH) (measures excretory function of renal tubules). Maximum rate of reabsorption of glucose (Tmg) (measures reabsorption function of renal tubules). Classification of Renal Function Tests. Classification of renal function tests used in clinical assessment of renal function. Blood urea nitrogen. Serum Urea. The phenolsulfonphthalein (PSP) test. Serum creatinine. Creatinine Clearance. Serum Uric Acid. Electrolytes. Bile Pigments and Urobillinogen in urine.

Ketone bodies in urine, methods of detection, clinical significance. Haemoglobin, Myoglobin and Haemosiderin in Urine. Haematuria. Detection of Haemoglobin in urine. Spectroscopic examination. Banzidins test. Guaiac test. Tablet test. Myglobinuria. Haemosiderin; prussian blue reaction. Indicanuria. Phenylketonuria. Examination of Urinary Calculi. Lipid Profile. Liver Function Tests. Cardiac Profile. Tumor markers and their methods of determination.

ii. Immunology

General considerations. Agglutination reactions. Precipitation reactions. Immunodiffusion techniques. Double diffusion. Single radial immunodiffusion. Immunoelectrophoresis. Complement Fixation test. Immunoflourescence. Direct & Indirect Enzyme Immunoassay (EIA).Quantitation of IgG, IgA, IgM, IgD, and IgE in serum and other body fluids. Immunoelectrophoretic analysis of serum immunoglobulin abnormalities Detection/quantitation of Bence-Jones protein in the urine. Cryoglobulin determination and analysis. Tests for circulating immune complexes by immunochemical methods. Immunochemical and electrophoretic analysis of CSF. Measurement of overall complement function. Total haemolytic and alternative pathway titrations of complement components (especially C3, C4, Factor Band C1 esterase inhibitor). Electrophoretic examination for altered complement components**.** Other serum protein determinations including acute phase proteins (CRP etc.), Carcinoembryonic antigen, a-fetoprotein and protein clearance ratios. Pregnancy tests on urine.

Immuno histological Tests:

Detection of antigens, antibodies, Immunoglobulins and complement components deposited in pathological lesions, particularly in the kidney and skin; Characterization of plasma cells and lymphocyte types in relevant tissue biopsies, using immunofluorescent and enzyme-labelled techniques.

Practicals:

Practical work shall be related to the relevant sub section of this speciality. Quantitative Analysis of Blood: Use of the visual colorimeter and photoelectric colorimeters, instruction on calculation of the concentration of the substances determined. The following blood analytical procedures will be taught. Liver function tests, renal function tests, lipid profile, Serum electrolytes, OGTT, Creatinine, Fatty acids, Phosphates, iron, plasma protein, calcium Cholestrol, Glucose, Urea.

Serological Techniques

- Tests for circulating antibodies to autoantigens in tissue sections by indirect immunofluorescence and enzyme-labelled techniques
- Tests for antibodies to other autoantigens by agglutination, precipitation, complement fixation and radioimmunoassay
- Tests for antibodies to non-microbial environment and fool allergens
- Tests for antibodies to selected microbiological antigens
- Tissue Typing For HLA-Antigens: Serological And DNA Based

Principles of QUALITY CONTROL and the use of reference preparations as laboratory standards

1. Antigen-Antibody reaction techniques
2. ELISA Technique
3. Widal test:
4. Typhidot test
5. Brucella Agglutination test.
6. Antist reptolysin O titre.
7. Bacterial Haemagglutination test.
8. Paul Bunnel reaction.
9. RA Factor Test
10. CRP test.
11. RPR test
12. VDRL test.
13. Complement fixation test
14. PCR

RECOMMENDED BOOKS

1. Basic Pathology by Robbins Latest Edition
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3. Pocket Companion to Robbins, Pathologic basis of disease Cotran, Kumar
4. Theory and Practice of Histological Techniques by John D Bancrof

4. MEDICAL LABS REPORTING AND EVALUATION

Purpose of this subject to make technologist be responsible for the supervision and operation of a relevant clinical laboratory within the field of specialization indicated by the title within the group, to perform the most difficult and highly complex test, analyses and examinations within the assigned laboratory, and to do related work as required.

INTRODUCTION TO PRINCIPLES OF GOOD LAB PRACTICE: Introduction, The fundamental points of good lab practice, The good lab practice principles, Internal Audit, External Audit, Proficiency testing, Accreditation, Lab Record Keeping, Laboratory information system, Optimizing Laboratory workflow and performance Procurements of Lab Consumables and instruments, Budgeting of Labs Inspections of Labs

RESOURCES; Management, Personnel, Facilities : buildings and equipment

CHARACTERIZATION & THE TEST ITEM: Date of dispatch, Number of containers or items, type of contents and quantity, identity of the test item, batch numbers, identity of the person responsible for the dispatch, Name of the transporter and type of carrier.

QUALITY ASSURANCE: Protocol (or study plan) review, Sop review, Planning (master schedule, inspection plan), Audits and inspections, Quality assurance statement, Qa inspections of suppliers and contractors, Issuing and archiving of QA files and reports.

INTERPRETING AND CORRELATING ABNORMALLABORATORY VALUES:

General Considerations, Fundamental Principles in Interpretation of Values

REPORTING OF ABNORMALITIES IN THE HEMATOLOGY PROFILE:

Anemias, Microcytic Anemia, Normocytic Anemia, Macrocytic Anemia, Low White Cell Counts, Coagulation Disorders, Bleeding Time Measures Platelet Function, Major Causes of Increased PT or APTT, The Other Cause of Isolated PT or APTT is Coagulation, Factor Deficiency, The Major Cause of Elevated PT and APTT is DIC.

REPORTING OF ABNORMALITIES IN CLINICAL CHEMISTRY

Hyponatremia, Pseudohyponatremia, Hypernatremia, Hypokalemia, Hyperkalemia, Renal Disease, BUN, Creatinine, Calcium and Phosphate, Calcium and Albumin, Glucose Abnormalities, Other Abnormal Laboratory findings in Diabetes Mellitus, Liver Function Tests, Correlations of Liver Function Test Results With Other Laboratory Findings

Cardiac Function Tests, Diagnosis of Myocardial Infarction and Acute Coronary Syndrome, Diagnosis of Congestive Heart Failure, Markers for Inflammatory Conditions

Thyroid Function, Adrenal Function.

REPORTING OF INFECTIONS (MICROBIOLOGY REPORTING)

General consideration, Antibiotic sensitivity, Urine Complete examination, Faecal examination, Direct Microscopy, Staining, Reporting of bacterial culture, Reporting of fungal culture, Reporting of viral culture, Reporting of bacterial infection, Reporting of fungal infection, Reporting of viral infection, Reporting of PCR.

REPORTING OF ABNORMALITIES IN THE IMMUNE SYSTEM

Reporting ofAllergy, Reporting ofHypersensitivity reactions, Reporting of Immune deficiency

Reporting of Autoimmune diseases, Reporting Of Immunological Diseases; Acetylcholine receptor, Graves' disease, Insulin-resistant diabetes, Systemic lupus erythematosus, Rheumatoid arthritis, Rheumatic fever, Hemolyticanemia, Idiopathic thrombocytopenic purpura, Goodpasture's syndrome, Pernicious anemia, Hashimoto's thyroiditis, Insulin-dependent diabetes mellitus, Acute glomerulonephritis, Guillain-Barré syndrome,

IgA nephropathy, Allergic encephalomyelitis and multiple sclerosis.

Practicals:

General aspects of report

Components of report

General Pattern of lab report

Interpretation of Lab reports

Normal and abnormal values Hematology reports

Normal and abnormalvalues Chemical pathology reports

Normal and abnormalvalues Microbiological reports

Normal and abnormalvalues Immunological reports

Abnormal aspects of reports

RECOMMENDED BOOKS

1. Basic Pathology by Robbins Latest Edition
2. Clinical Pathology Interpretations by A.H. Nagi
3. Pocket Companion to Robbins, Pathologic basis of disease Cotran, Kumar
4. Theory and Practice of Histological Techniques by John D Bancrof

I-B: BS AHS (Surgery / OT Lab Sciences)

3rd Year

1.	Medical Lab Establishment	200 Marks
2.	Medical Instruments and Chemicals II (Specific)	100 Marks
3.	General Pathology & Microbiology	200 Marks
4.	Surgery/ OT Lab Sciences I	200 Marks
	Total Marks	**700 Marks**

1. MEDICAL LAB ESTABLISHMENT

LEADERSHIP AND MANAGEMENT; Operation management, Human Resource Management, Financial Management, Marketing Management, Quality Systems Management. **STRATEGIC PLANNING**

LABORATORY DESIGN AND SERVICE MODELS; Assessment, Physical Design, Identify Space for offices, Personal Facilities, Storage, Conference/Library area, Students Area, Fume Hoods and Biological safety cabinets, Furniture, Noise control, Eye wash station, Laboratory counters.

REGULATIONS, ACCREDITATION AND LEGISLATION; Prospective Payment System, Deficit Reduction Act, Clinical Laboratory Improvement Act of 1988 (CLIA '88), Physician Self-referral Ban, Ergonomic Safety and Health Program Management Guidelines, Three-Day Rule, Occupational Exposure to Hazardous Chemicals in Laboratories, Occupational Exposure to Blood-Borne Pathogens, Health Insurance Portability and Accountability Act: OIG Compliance Guidelines, CMS National Coverage Determinations: Hazardous Material Regulations, Laboratory-Related Governmental Agencies, Safety, Biological Hazard, Chemical Hazard, Ergonomic Hazard, Waste Disposal.

Practicals:

Recruitment of Staff

Documentation

Equipments

Test methods

Test Report design/ Certificates

Design of Lab

Size of Lab

Building requirement

Specified areas in lab

Safety

Hygiene

Disposal of Waste

RECOMMENDED BOOKS

1. Basic Pathology by Robbins Latest Edition
2. Clinical Pathology Interpretations by A.H. Nagi
3. Pocket Companion to Robbins, Pathologic basis of disease Cotran, Kumar
4. Theory and Practice of Histological Techniques by John D Bancrof

2.MEDICAL INSTRUMENTS AND CHEMICALS- II

Different relevant Techniques used in Medical fields. The names of instruments used, based upon different Techniques for working and evaluation of different parameters in Medical fields. Normal functioning of these instruments, parts of these instruments & individual functions of these parts. Their trouble shootings and routine manipulations to obtain correct results. Maintenance of Sensitivity & Specificity of these instruments. The general study of following Medical Instruments available in Medical fields

Surgical supplies; Surgical Sponges, Hemostatic Agents, Syringes, Surgical Wound Dressings, Drapes, Basins, Skin preparing Solutions, Other Supplies like Tube, Drains, Catheters and PostOpDrains, Gastrointestinal Tubes, Urethral Catheters, Splints, Suture and Suture Needles, Comparison of Suture, Materials, Components of Suture, Packaging, Suture Sizing, Suture, Surgical Needle Points, Individual Suture Needles, Solutions, Normal Saline, Ringer's Lactate, Dextrose Water, Pediatric Solution.Intravenous anaesthesia agents, Inhalational anaesthetic agents.

Endotracheal intubation, Maintenance, Monitoring.

Electromedical/electrosurgical equipments used in O.T. Usage and care of electronic equipments-grounding system.

O.T Lights: Uses, types, lamps etc; shadow less lighting- features, Types; direct, semi direct, indirect lighting; emergency lighting

Operating Microscopes: Principle, parts, use and care

Gas Cylinders; Medical gas pipeline systems & manifold room

Suctions Machines: Principle, component parts, use and applications

Anesthesia Machine with ventilator: Accessories, function of each parts, procedure for use

BP Apparatus: Types, Procedure for use

Cautery machine: Principle components and functions

Diathermy machine: Principle, types, constructions, applications, Care and maintenance

Monitoring equipments: Cardiac monitor, Pulse oxymeter

Defibrillators: principle, types, component parts, functions etc

Electrosurgery: Structure, Block diagram, Types, safety precautions; Bipolar diathermy machine; Harmonic scalpel; Vessel Sealing Devices (Ligasure)

Fiber-optic endoscopy: Introduction, types, procedures and care of instruments. Cystoscope, Gastroscope, Laryngioscope, Colposcope, Endoscopic Camera

Laproscope: Type i-e Telescope rod lens system and Digital laproscope, Component parts and other accessories, applications, advantages and disadvantages

Transducers,

Optical Instruments: Optical Magnification Tools, Fiber optic Light Transmission,

Basic Life Support, Protection and maintenance of patient airway

Recommended Readings:

7. Handbook of Operation Theatre Techniques By Kilpadi
8. Operation Room Assistance Manual By T.S. Jayalakshmi
9. Pocket Guide To The Operating Room By Maxine A. Goldman
10. Instrumentation For The Operating Room: A Photographic Manual By Shirley M. Tighe
11. Introduction To Operating-Room Technique By Edna Cornelia And Kohn, Mary Louise Berry
12. Operating Room Management: Structure, Strategies, & Economics By Andrew P. Harris And William G. Zitzmann
13. Advanced Precautions For Today's O.R.: The Operating Room Professional's Handbook For The Manual Of Operating Room Management: An Administrative And Patient Care Resource By Cynthia Spry.
14. Text Book of Surgery (4th edition) (Indian Association of Surgeons) by Dr. Ahmad
15. Bailey & love's Short practice of surgery (24th edition)
16. Moroney,s surgery for nurses. Edited by Malcolm R. Colmer, Sixteenth Edition, and Published in1986 by Longman Group (Female) Ltd in Hong Kong.

17. Short Practice of Surgery by Bailey & Love Published by Chapman and Hall.
18. Essential Surgical Practice Vol: 1 by Cuschieri published by Butterworth Heimann.

1. GENERAL PATHOLOGY & MICROBIOLOGY

i. GEN. PATHOLOGY

Cell Injury and Death: Causes of cell injury, Necrosis, Apoptosis and Sub cellular responses. Cell Adaptations: Hyperplasia, Hypertrophy, Atrophy, Metaplasia and Intracellular accumulation. Inflammation: Acute inflammation. Vascular events, Cellular events and Chemical mediators. Chronic Inflammation. General, Granulomatous and Morphologic patterns of acute and chronic inflammation. Healing and Repair:

Normal controls, Repair by connective tissue and Wound healing. Haemodynamic Disorders. Edema, Hyperemia / congestion, Hemorrhage, Thrombosis, Embolism, Infarction and Shock. Diseases of Immunity. General features, Hypersensitivity reactions, Immune deficiencies, Autoimmunity and Amyloidosis. Neoplasia**:** Nomenclature, Molecular basis, Carcinogenic agents and Clinical aspects

ii. MICROBIOLOGY

Basic Bacteriology

Bacteria Compared with Other Microorganisms, Structure of Bacterial Cells, Growth, Genetics, Classification of Medically Important Bacteria, Normal Flora, Pathogenesis,, Host Defenses, Laboratory Diagnosis, Antimicrobial Drugs: Mechanism of Action, Antimicrobial Drugs: Resistance, Bacterial Vaccines, Sterilization & Disinfection, Biosafety and bio risk management,

Clinical Bacteriology

Overview of the Major Pathogens & Introduction to Anaerobic Bacteria. **Gram-Positive Cocci**; *Staphylococcus aureus,Streptococcus pyogenes, Staphylococcus epidermidis, Staphylococcus saprophyticus, S. pyogenes, Streptococcus agalactiae, Enterococcus faecalis,* Viridansstreptococci, *Streptococcus bovi and S. pneumoniae*

Gram-Negative Cocci; *Neisseriameningitidis*and*Neisseria gonorrhoeae.*

Gram-Positive Rods;*Bacillusanthracis,Bacillus cereus, Clostridium tetani, Clostridium botulinum, Clostridium perfringens,Clostridiumdifficile, Corynebacteriumdiphtheriae*and*Listeria monocytogenes*.

Gram-Negative Rods Related to the Enteric Tract; *E. coli, Salmonella* species,*Shigella*species, *Vibrio cholerae, Vibrio parahaemolyticus,Vibriovulnificus, Campylobacter jejuni, Helicobacter pylori, Klebsiella, Enterobacter, Serratia, Proteus, Providencia, Morganella, Pseudomonas spp.,Bacteroides&Prevotella.*

Gram-Negative Rods Related to the Respiratory Tract;*Haemophilusinfluenzae, Bordetella pertussis,* and *Legionella pneumophila*

Gram-Negative Rods Related to Animal Sources (Zoonotic Organisms);*Brucella*species,*Francisellatularensis, Yersinia pestis*, and *Pasteurellamultocida*

Mycobacteria, Actinomycetes, Mycoplasmas, Spirochetes, Chlamydiae, Rickettsiae, Minor Bacterial Pathogens

Basic Virology

Structure, Replication, Genetics, Classification of Medically Important Viruses, Pathogenesis, Host Defenses, Laboratory Diagnosis, Viral Vaccines.

Clinical Virology

Herpes Viruses, Rabies Virus, Polio Virus, Hepatitis Viruses, Human Immunodeficiency Virus, Dengue Virus.

Mycology

Basic Mycology, Cutaneous & Subcutaneous Mycoses, Systemic Mycoses, Opportunistic Mycoses,

Parasitology

Intestinal & Urogenital Protozoa, Blood & Tissue Protozoa, Minor Protozoan Pathogens, Cestodes, Trematodes, Nematodes.

Sterilization

Laboratory Exercises:

Each lecture will be followed by two hour practical class where the student will apply their theoretical knowledge in the understanding of related microbiological investigations, which have been proved useful for the diagnosis of human diseases.
During the other laboratory sessions, the students will be engaged in the preparation of media, the sterilization of glass ware, Antigens, Antibodies, Vaccines – haemolysin, permanent slides, laboratory reagents and also to assisting postgraduate students in the isolation of micro – organisms from clinical materials.

Practicals:

- Acute Inflammation
- Chronic Inflammation
- Necrosis
- Gangrene
- Pigmentation
- Calcification
- Urine Examination
- Sterilization
- Culture Media
- Antibiotic Sensitivity testing
- Culturing bacterial pathogens
- Examination of different clinical specimens
- Blood Culture
- Anaerobic Culture
- Gram Staining
- ZN Staining
- Biochemical tests to identify bacteria (Conventional, API 20E, API 20NE, Automated systems)
- PCR
- KOH preparation for scraping
- Stool Examination
- ELISA

RECOMMENDED BOOKS

1. Basic Pathology by Robbins Latest Edition
2. Clinical Pathology Interpretations by A.H. Nagi
3. Pocket Companion to Robbins, Pathologic basis of disease Cotran, Kumar

4. Theory and Practice of Histological Techniques by John D Bancrof

4. SURGERY / OT LAB SCIENCES I

Introduction, Indications for surgery and Types of incisions, Wounds, types of wounds, factors affecting wounds healing, care of wounds, Bandages and dressing, Trauma and metabolic response to trauma, Detailed description of chest and abdominal trauma, Hemorrhage, hemostasis and blood transfusion, Classification and brief description of shock, Fluid and electrolyte balance, Classification of body fluid changes, Pre, intra and post operative fluid therapy, Surgery and diabetes, Burns and grafts, Neoplasia, Preoperative assessment & preparation, Post operative treatment, complications and their management

TYPES OF ANAESTHESIA

Local anaesthetic agents and Regional anaesthesia (spinal and epidural)

Intravenous anaesthetic agents, Muscle relaxants, Inhalational anaesthetic agents, Anaesthesia and associated diseases, Complications of anaesthesia, Perioperative management, Cardiopulmonary Resuscitation. CPR, Recovery from anaesthesia, Pain management and postoperative care, Ulcers, sinuses and fistulas, Transplantation and Brief description of operation performed on: oesophagus, stomach, intestine gall bladder, bile duct, spleen, pancreas, liver, abdominal wall, hernias, breast, kidneys, ureters, prostate, peritoneum, mesentery and retroperitoneal space

SOFT TISSUE INJURIES

- Introduction
- Anatomy & physiology general description and management of injuries of:
  - Ligaments, Tendons, Muscles, Fascia & Bursae
- Detailed description of Physical Therapy management of individual tissue injuries around:
  - Shoulder region, Elbow region, Wrist and hand region, Knee region & Ankle region
- Muscles and tendons injuries of upper and lower limb
- Cervicolumber injuries, Whiplash of the cervical spine, Crush injuries & Spinal pain
- Degenerative and Inflammatory Conditions:
  - Osteo-orthosis/Arthritis, Spondylosis, Spondylolysis, Pyogenic arthritis, Rheumatoid arthritis, Juvenile arthritis, Tuberculosis arthritis, Gouty arthritis, Haemophilic arthritis, Neuropathic arthritis, Ankylosing spondylitis & psoriatic arthritis
- Tumors:Classification, Principles of general management, General description of benign and malignant tumors of musculoskeletal system
- Operation Theatre Administration & Management,Common Operation Room Procedures,Patient Positioning for Surgery,Assisting during Operations,Assisting during Anesthesia,Self-protection; Gown,Gloves,Shoes,Dress. Care of unconscious patient.Position,Airway,Catheter,N. G. tube,V. I.Care of Biopsy Specimen; Preservation,Labeling,Transport to Pathology dept,Wound management,First aid Dressings/ Bandages,Fracture,Splints P.O.P,Introduction Signs Symptoms and first aid management of;Hemorrhage,Burns,Shock. Introduction to anesthesia and techniques; Anaesthesia techniquesHistorical background, Types of Anaesthesia, Choice of Anaesthesia, General Anaesthesia, Indication of general anaesthesia, Endotracheal intubation, Maintenance, Monitoring, Emergency, Balanced Anaesthesia. Core of Anaesthetized patient; Local & regional anaesthesia, Spinal and epidural anaesthesia, Intravenous anaesthesia agents, Inhalational anaesthetic agents, Anaesthetic Adjuvant drugs, Complication of general anaesthesia, Complication of local/regional anaesthesia, Blood transfusion, Difficult Intubation. Surgical supplies; Surgical Sponges, Hemostatic Agents, Syringes, Surgical Wound Dressings, Drapes, Basins, Skin preparing Solutions, Other Supplies like Tube, Drains, Catheters and PostOpDrains, Gastrointestinal Tubes, Urethral Catheters, Splints, Suture and Suture Needles, Comparison of Suture, Materials, Components of Suture, Packaging, Suture Sizing, Suture, Surgical Needle Points,

Individual Suture Needles, Solutions, Normal Saline, Ringer's Lactate, Dextrose Water, Pediatric Solution.

PRACTICAL:

- Identification + use of different Antiseptic Solutions e.g Pyodine, Sprit, Cidex, Savalon etc.
- Identification of different suture Material Plain and chromic Catgut, ProleneVicrylPollydioxanone Silk, Nylon.
- Different Type of Fluids Identification & their use.
- A: Crystalloids
- -Isotonic Fluids-5% DW -Na CI
- -D/Saline
- -Ringrs Lactate Sol
- B: Colloids
- -Plasma Expander
- -Gelafundin
- -Albumin
- Anesthetic techniques
- Hands on training on different procedures
- Suturing techniques

RECOMMENDED BOOKS:

- Handbook Of Operation Theatre Techniques By Kilpadi
- Operation Room Assistance Manual By T.S. Jayalakshmi
- Pocket Guide To The Operating Room By Maxine A. Goldman
- Instrumentation For The Operating Room: A Photographic Manual By Shirley M. Tighe

4th Year:

1.	Community Health, Research Methodology, Social and Behavioral Sciences	100 Marks
2.	Special Pathology	200 Marks
3.	Surgery / OT Lab Sciences II	200 Marks
4.	Medical Lab Reporting & Evaluation	200 Marks
	Report Writing	Qualifying
	Total Marks	**700 Marks**

1. COMMUNITY HEALTH, RESEARCH METHODOLOGY, SOCIAL & BEHAVIORAL SCIENCES

i. Community Health

Introduction; History of Community Medicine, Definition, concept of Health & illness of diseases and Natural History of diseases, levels & prevention

Environmental Sanitation & Medical Entomology; Water, waste disposal and Environmental problems & pollution

Genetics; Prevention of genetic diseases and Genetic counseling

General and Descriptive Epidemiology; Time, Place and Person

Analytical Epidemiology; Case control and Cohort studies

Experimental Epidemiology Randomized Control Trial.

Systemic Epidemiology; Vector borne diseases, Water borne diseases, Air born diseases, Contact diseases and Diseases of major public health and its importance along with national health programs wherever Applicable.

Non-Communicable Diseases; Diabetes, Hypertension, Heart diseases, Blindness, Accidents, Geriatric problems

Occupational Health Problems; M.C.H. and family welfare Programs, Health care delivery in the community, National Health Policy, National Health programs including, Rehabilitation, Evaluation of Health, Programs, Health Planning Organization,

Community Nutrition; Foundation and status in Pakistan masses. Community nutrition programs: key features, benefits, planning, implementation, evaluation. Nutritional status assessment: Anthropometric, Dietary, Biochemical, Clinical measurements. Community Nutrition and Dietetics profession. Steps of nutritional epidemiological study, Testing and Piloting of nutritional epidemiological study, Questionnaire design. Evaluation, sources of variation in the dietary intake, Methodological studies on dietary questionnaires.

Structure of Health Care System In The Country; P.H.C. district level, State level and central level. P.H.C. Organization and Function and Role of Non Governmental Organization

Health Education; Principles of Health Promotion, Methods, approaches and media for, I.E.C (Information, Education & Communication), Medical and Health/Information system, Mental Health and Nutrition.

Teaching Methodology; Types of health services, public, private, scientific, traditional health system, Organization of public services in health, central, provincial and local levels, Levels of health care, primary, secondary and tertiary, Planning and Organization of health services, Implementation, Evaluation of health services, Management of resources in health services, Financial management, Health education and social cultural concept Ethics in Health Services, Theories of learning facilitations.

ii. Research Methodology

Research Fundamentals; Research, Theory in Research, Research Ethics

Research Design; Research Problems, Questions, and Hypotheses, Research Paradigms, Design Overview and Research Validity

Experimental Designs; Group Designs and Single-System Design

Non Experimental Research; Overview of Non experimental Research, Clinical Case Reports, Qualitative Research, Epidemiology, Outcomes Research and Survey Research.

Measurement; Measurement Theory and Methodological Research.

Data Analysis; Statistical Reasoning, Statistical Analysis of Differences; The basics, Statistical Analysis of Differences; Advanced and special Techniques, Statistical Analysis of Relationships; The basics and Statistical Analysis of Relationships; Advanced and special Techniques

Implementing Research; Implementing a Research Project and Publishing and Presenting Research

iii. Social & Behavioural Sciences

Introduction of Sociology

Social Action And Interaction; Social processes, Co-operation, Competition, Conflict and Accommodation.

Social Groups; Primary-Secondary, In and Out Group and Reference group

Culture; Values, Beliefs, Sanctions, Cultural relativism and Ethnocentrism, Norms, Folk ways, Conflict, Deviancy and Social control.

Socialization and Personality formation

Social Institution; Meanings, Social stratification and Meanings and Forms (Classes and Castes)

Social and Cultural Change; Factors promoting and resisting social change

The Field Of Medical Sociology; Contribution of Sociology in Health. Environmental pollution and Health, Patient, Healthcare provider relationship. Role of Healthcare provider and attendants in the managements of patient.

Introduction of Behavioural Sciences; Understanding Behaviour. Sensation, sense organs / special organs, Perception and factors affecting it, Attention, concentration, Memory, types and methods to improve it, Types and theories of thinking, Cognition and levels of cognition, Problem solving and decision making strategies, Communication Its types.

Personality and Intelligence; Psychological growth and development, Personality, theories and Factors affecting personality development, Assessment of personality Influence of personality in health, disease, hospitalization, stress, etc, Intelligence and its types Relevance of IQ and EQ Methods of enhancing EQ and IQ Factors affecting intelligence and their assessment

Stress Management

Doctor – Patient Relationship; Concept of boundaries and psychological reactions in doctor – patient relationship.

Pain, Sleep and Consciousness; Concept of pain, sleep and consciousness, Attend states of consciousness, Psychological influence on sleep and consciousness, Non-pharmacological methods of inducing sleep, Changes in consciousness.

Communication Skills; Principles of effective communication. A practical method of communication between the doctor and patient about disease, drugs, prognosis etc

Interviewing; Types of interview and Skills of interviewing

Health Psychology

Psychology in clinical management of patients, Psychological therapies, child's social and cognitive development, Psychological changes during adolescence, old age and their clinical management, Impact of illness on a patient's psychological well being. Association between psychological stress and physical well being, Role of doctor in patient reassurance.

Social And Community Perspective; Inequalities Ethnicity, culture and racism, Gender and Healthcare and Influence of health. Illness on behaviour

Application of Behavioural Principles In Health and Disease; Mentally / emotionally and physically handicapped, Homebound and medically compromised.

Recommended Text Books:

1. Text book of Community Medicine by: Park J E. Latest Edition
2. Horton, Paul B. and Chester L. Hunt, 1984 Sociology, Singapore: Megraw Hill Book Co.
3. Moon, Graham, 1995. Society and Health; An introduction to Social Science for Processionals, London: Routledge.
4. Rehabilitation Research (Principles and Applications) 3rd Edition By Elizabeth Domholdt
5. Textbooks of Community Medicine, by Prof. H. A. Siddique (2nd Edition).
6. A Handbook of Behavioural Sciences for Medical and Dental Students By: M H Rana, S Ali and M Mustafa, , University of Health Sciences Lahore
7. Developmental Psychology for Healthcare Professions By: Katherine A Billingham

2. SPECIAL PATHOLOGY

Theory:

The course outline is as follows:-

1. Blood Vessels & Heart,
2. Hematopoietic and Lymphoid Systems
3. Respiratory System
4. The Urinary System
5. Musculoskeletal System
6. Endocrine System
7. Nervous System

Practicals:

Basic principles of lab works, Hematopoietic System (ALL, CLL,AML, CML), Musculoskeletal System (Osteogenic sarcoma & Giant cell tumor), The Skin (Squamous cell carcinoma & Basal cell carcinoma), Endocrine System (Thyroid tumors, Colloid goiter, Follicular adenoma & Papillary carcinoma thyroid, Pituitary, Causes of hyperpituitrism & lab. Diagnosis, Causes of biliary, bitarism & lab. Diagnosis, Thyroid, Thyroid function test, Causes of hyperthyroidism & lab. Diagnosis, Causes of hypothyroidism & lab. Diagnosis, Parathyroid, Hyperparathyroidism, Hypoparathyroidism, Hypercalcemia, Hypocalcemia, Diabetes mellitus, Lab. Diagnosis & GTT, Diabetic ketoacidosis), Liver, gall bladder and biliary tract, Chronic cholecystitis, Hepatocellualr carcinoma & Liver cirrhosis), Nervous System (Meningioma etc), Basics of Histopathology / tissue Processing, Bone Marrow Biopsy

Recommended Books:

1. Pathological Basis of Disease by Kumar, Cotran, Robbins. 7th. Ed.
2. Medical Microbiology and Immunology by Levinson and Jawetz, 9th Ed. Mc Graw-Hill

3. Clinical Pathology Interpretations by A.H. Nagi

3. SURGERY / OT LAB SCIENCES II

ORTHOPEDIC SURGERY

FRACTURES

Definition, Classification, Causes, Clinical features, Healing of fractures, Complications

Principles of general management of Fracture of the Upper Extremity, Fracture of the Lower Extremity and Fracture of the vertebral column, thorax and pelvis; Basic and advanced trauma life support

DISLOCATIONS & SUBLUXATIONS

Definition, Traumatic dislocation, General description; Principles of general description and management of traumatic dislocation and subluxation of Shoulder joint, Acromioclavicular joint, Elbow joint, Hip joint and Knee joint

GENERAL ORTHOPEDIC DISORDERS

Carpel tunnel syndrome, Compartment syndromes, Muscular dystrophies, Neuropathies, Avascular necrosis of bone in adult and children, Ischemic contracture, Gangrene, Rickets, Osteoporosis and osteomalacia, Shoulder pain, Neck pain, Knee pain, Backache, Painful conditions around elbow; Detailed description of: Orthotics, Prosthetics, Splintage, Traction & POP

DEFORMITIES AND ANOMALIES

Definition, Causes, Classification, Congenital and acquired deformities, Physical and clinical and radiological features, Complications, Principles of medical and surgical management of the deformities, General description of following deformities:

DEFORMITIES OF THE SPINE*:*

Torticolis, Scoliosis, Kyphosis, Lordosis and flat back

DEFORMITIES OF THE LOWER LIMB:

CDH, coxa vera, coxa valga, anteversion, Retroversion, Genu valgum, Genu varum, Genu recurvatum, CDK, Talipes calcaneous equines, varus & valgus, Talipes calcaneovarus, Talipes calcaneovalgus, Talipes equinovarus, Pes cavus, Pes planus. Hallux valgus & varuma and Hallux rigidus and hammer toe

DEFORMITIES OF SHOULDER AND UPPER LIMB:

Sprengels shoulder, Cubitus varum, Cubitus valgum and Deputryn's contracture

THORACIC SURGERY

PULMONARY SURGERY

Introduction, types of incision, types of operation, complications of pulmonary surgery, drains , tubes, pneumonectomy, lobectomy , thoracoplasty, Operations on pleura. Chest injuries, Brief description of indication for pulmonary surgery, Diseases of chest wall and pleura, Diseases of bronchi, Tumors of lung, Lung abscess, Hydatid disease of lung, Pulmonary embolism, Mediastinal masses and Problems related to diaphragm

CARDIAC SURGERY

Introduction, Cardiorespiratory resuscitation, Special investigation procedures in cardiac surgery, Basic techniques in cardiac surgery, Types of incision, Types of operation, Complications of cardiac surgery, Lines, drains and tubes, Brief description of indications for cardiac surgery, Congenital heart disease, Acquired heart diseases, Diseases of the pericardium, Cardiac transplantation

VASCULAR SURGERY

Introduction, Investigation in vascular disease types of operation, Indication for vascular surgery, Complication of vascular surgery, Brief description of arterial occlusion, Gangrene, Detailed description of amputation, Aneurysm, Burgers disease, Raynaud's disease and syndrome, Varicose veins, Superficial and deep venous thrombosis, Venous hemorrhage, Lymph edema, Lymph adenitis and lymphomas

NEUROSURGERY

CRANIAL SURGERY

Introduction, Special investigation in brain diseases and traumas, Types of operations, indications and complications of cranial surgery, Head injuries to the brain, Acute intracranial hematomas, Fractures of the skull, Intra cranial abscess, Intracranial tumors and Intra cranial aneurysm and hydrocephalus

SURGERY OF VERTEBRAL COLUMN SPINAL CORD AND PERIPHERAL NERVES

Dislocation and management of dislocation of vertebral column, Tumors of vertebral column, Prolapse intervertebral disc, Disc protrusion, Spondylosis and spondylolisthesis, Spinal cord

injuries and their management, Tumors of spinal cord types of operations performed on nerves, Nerve injuries and their surgical management and Brief description of lesions of cranial and spinal nerves and their management.

EMERGENCY PROCEDURES & PRIMARY CARE ORGANIZATION AND ADMINISTRATION OF EMERGENCY CARE

Develop and implement emergency action plan, Emergency team, Initial patient assessment and care, Emergency communication, Emergency equipment and supplies, Venue location, Emergency transportation, Emergency care facilities and Legal need and documentation

PHYSICAL EXAMINATION OF THE CRITICALLY INJURED PATIENT/ATHLETE

Scene assessment and safety, Body substance isolation precautions, Primary survey, Secondary survey and Vital signs

AIRWAY MANAGEMENT

Air way anatomy, Air way compromise, Oxygen therapy and Advanced airway devices

SUDDEN CARDIAC DEATH

Incidence and etiology of sudden death in general population, Sudden cardiac arrest in athletes, Screening and recognition of cardiac warning signs, Preparation for cardiac emergencies and Management of sudden cardiac arrest

HEAD INJURIES

Pathomechanics of brain injuries, Types of pathology, Classification of cerebral concussion, Cerebral contusion, Cerebral hematoma, Second impact syndrome, Initial on site assessment, Sideline assessment, Special tests for assessment of coordination, Special tests for assessment of cognition, Other tests, Medications and Wake ups and rest.

EMERGENCY CARE OF CERVICAL SPINE INJURIES

Anatomy, Mechanism of injuries, Injuries to the spinal cord, Assessment and Management

EMERGENT GENERAL MEDICAL CONDITIONS

Sudden death, Exercise induced anaphylaxis, Acute asthma, Diabetes mellitus, Mononucleosis, Sickle cell traits and Hypertension.

ENVIRONMENT-RELATED CONDITIONS

Heat related emergencies and their prevention, Cold related injuries, Lightning and Altitude related emergencies

ORTHOPEDIC INJURIES

Basic emergency medical care, Fundamentals of skeletal fractures, Splinting techniques, Fractures and dislocations of upper extremity, Fractures and dislocations of lower extremity and Fractures and dislocations of spine

ABDOMINAL INJURIES

Initial evaluation, Specific injuries: abdominal wall contusions, splenic injuries, liver injuries, renal injuries, intestinal injuries, pancreatic injuries and Non-traumatic abdominal injuries: Appendicitis, ectopic pregnancy.

THORACIC INJURIES

Assessment and Management of different Types of injuries: fractures, Pneumothorax, hemothorax, pulmonary embolism.

SPINE BOARDING IN CHALLENGING ENVIRONMENTS

The soft foam pit in gymnastics, The pole vault pit, The swimming pole and diving well and The ice hockey rink

THE PSYCHOLOGICAL AND EMOTIONAL IMPACT OF EMERGENCY SITUATIONS

Defining psychological trauma, Psychological interventions in crisis situations, Psychological trauma in athletic environment, the psychological emergency response team, Internal team members, External team members and The psychological interventions recommendations.

PRIMARY CARE

Primary care: physical therapy modles1, Evidence - Based examination of diagnostic information, Cultural competence: An essential of primary health care, Pharmacologic considerations for the physical therapist and the patient interview: the science behind the art

EXAMINATION/EVALUATION

Prologue, Symptoms investigation, Part I: Chief complaint by body region, Symptoms investigation, Part II: Chief complaint by symptom, Patient health history including identifying health risk factor, Review of systems, Patient interview: the physical examination begins, Review of cardiovascular and pulmonary systems and vital signs, Upper quadrant screening examination, Lower quadrant screening examination, Diagnostic imaging and Laboratory tests and values

DISORDERS AND MANAGEMENT

Acute Care Physical Therapy Examination and Discharge Planning, Clinical Laboratory Values and Diagnostic Testing, Physiologic Monitors and Patient Support Equipment, Bed Rest, Deconditioning, and Hospital-Acquired Neuromuscular DisordersThe Immune System and Infectious Diseases and Disorders, Cardiovascular Diseases and Disorders, Pulmonary Diseases and Disorders, Musculoskeletal/Orthopedic Diseases and Disorders, Neurologic and Neurosurgical Diseases and Disorders, Endocrine Diseases and Disorders, Gastrointestinal Diseases and Disorders. Genitourinary Diseases and Disorders, Oncological Diseases and Disorders, Transplantation, Integumentary Diseases and Disorders and Wound Management.

SPECIAL POPULATIONS

The Pediatric and adolescent population, the obstetric client, the geriatric population and Health and wellness perspective in primary care.

Post Op Care of patient; Position,Monitoring,Recovery,Transportation,IVI and Drain Care,

Artificial Ventilation,Vital Sign Monitoring,Blood Transfusion,Basic Life Support,Protection and maintenance of patient airway,Breathing:Flow of air through respiratory passages,Natural or artificial respiration,Assisted by emergency oxygen,The movement of blood through the beating of the heart,The emergency measure of CPR,Considerations of patient transport,Basic bandaging and without the use of adjunctive equipment.The protection of the cervical spine,Splinting and immobilization.Use of drugs or invasive skills,Automated external defibrillator or AED,Advanced Life Support,Cardiopulmonary resuscitation in cardiac arrest and related

medical problems,Cardiac monitoring, Endotracheal intubation, Intravenous therapy in Hypoxia, Hypovolemia, Hyperkalemia or hypokalemia, Related disturbances of calcium or magnesium levels, Hypoglycemia, Hypothermia, Tension pneumothorax, Tamponade, Toxic and/or therapeutic, Acute trauma, Accidental amputation, acute appendicitis, Ruptured aortic aneurysm, Aortic dissection, Bleeding ectopic pregnancy, Bowel obstruction, Internal bleeding, Intestinal volvulus, Cardiac tamponade, Acute subdural hematoma, Acute airway obstruction, Limb ischemia, Acute mesenteric ischemia, Pneumothorax, Paraphimosis, Peritonitis, Priapism, Retained abortion, Stercoral perforation, Testicular torsion, Urinary retention, Thromboembolism and related mechanical obstruction.

Practical:

1. Positioning of patient
2. Post-OperativeCare &Monitoring
3. Maintaining Artificial Ventilation
4. Vital Sign Monitoring
5. Blood Transfusion
6. Monitoring of Breathing
7. Emergency measure of CPR
8. Automated external defibrillator
9. Cardiopulmonary resuscitation in cardiac arrest and related medical problems
10. Cardiac monitoring
11. Endotracheal intubation
12. Examination of different wounds
13. Use of Bandages and dressing in OT and wards
14. Examination of different types of trauma
15. Management of shock
16. Use of Different IV lines
17. Identification and Use of Different types of suturing materials
18. Different Suturing Techniques
19. Identification and Use of Different types of OT tables
20. Identification and Use of Different types of OT lights
21. Identification and Use of Different types of surgical instruments
22. Identification and Use of Different types of instruments used for air way management/intubation
23. Local anaesthetic agents and Regional anaesthesia
24. Identification and Use of Different types of drugs during operation
25. Cardiopulmonary Resuscitation (CPR)
26. Identification and Use of ECG Machines
27. Identification and Use of EEG Machines
28. Identification and Use of Echo-Cardiography
29. Identification and Use of Endoscopy Machine.
30. Rotation in surgical OT to observe different types of surgical procedure in operation theatres
31. Rotation in different surgical wards
32. Observation of thoracic surgery
33. Observation of Pulmonary surgery
34. Observation of Cardiac surgery
35. Observation of Vascular surgery
36. Observation of Neurosurgery
37. Observation of Cranial surgery
38. Observation of eye and ENT surgery
39. Observation of different Emergency procedures & primary care
40. Introduction to Operations in Obstetrics and Gynaecology
41. Introduction to ICU and ICU related techniques

RECOMMENDED TEXT BOOKS

1. Berry & Kohn's Operating Room Technique ByNancymarie Phillips

2. Introduction To Operating-Room Technique By Edna Cornelia And Kohn, Mary Louise Berry
3. Operating Room Management: Structure, Strategies, & Economics By Andrew P. Harris And William G. Zitzmann
4. Advanced Precautions For Today's O.R.: The Operating Room Professional's Handbook For The Manual Of Operating Room Management: An Administrative And Patient Care Resource By Cynthia Spry.
5. *Emergency Care in Athletic Training by*: Keith M.Gorse, Robert O. Blanc, Francis Feld, Matthew Radelet, 1st edition, 2010, FA Davis Company
6. Acute care hand book for Physical Therapists by: Jaime C paz, Michelle P West, 2nd edition, 2002, Butterworth Heinemann.
7. *Short practice of surgery* by Baily and Love's
8. *Text Book of Surgery* by Ijaz Ahsan
9. *Outline of Fractures*
10. Wound Care Essentials, practice principles, By Sharon Baranoski & Elizabeth A. Ayello
11. Clinical Surgery in General; RCS course manual by Arevil Manstial

4. MEDICAL LABS REPORTING AND EVALUATION

Purpose of this subject to make technologist be responsible for the supervision and operation of a relevant clinical laboratory within the field of specialization indicated by the title within the group, to perform the most difficult and highly complex test, analyses and examinations within the assigned laboratory, and to do related work as required**.**

INTRODUCTION TO PRINCIPLES OF GOOD LAB PRACTICE: Introduction, The fundamental points of good lab practice, The good lab practice principles, Internal Audit, External Audit, Proficiency testing, Accreditation, Lab Record Keeping, Laboratory information system, Optimizing Laboratory workflow and performance Procurements of Lab Consumables and instruments, Budgeting of Labs Inspections of Labs

RESOURCES; Management, Personnel, Facilities: buildings and equipment

CHARACTERIZATION & THE TEST ITEM: Date of dispatch, Number of containers or items, type of contents and quantity, identity of the test item, batch numbers, identity of the person responsible for the dispatch, Name of the transporter and type of carrier.

QUALITY ASSURANCE: Protocol (or study plan) review, Sop review, Planning (master schedule, inspection plan), Audits and inspections, Quality assurance statement, Qa inspections of suppliers and contractors, Issuing and archiving of QA files and reports.

INTERPRETING AND CORRELATING ABNORMALLABORATORY VALUES:

General Considerations, Fundamental Principles in Interpretation of Values

REPORTING OF ABNORMALITIES IN THE HEMATOLOGY PROFILE:

Anemias, Microcytic Anemia, Normocytic Anemia, Macrocytic Anemia, Low White Cell Counts, Coagulation Disorders, Bleeding Time Measures Platelet Function, Major Causes of Increased PT or APTT, The Other Cause of Isolated PT or APTT is Coagulation, Factor Deficiency, The Major Cause of Elevated PT and APTT is DIC.

REPORTING OF ABNORMALITIES IN CLINICAL CHEMISTRY

Hyponatremia, Pseudohyponatremia, Hypernatremia, Hypokalemia, Hyperkalemia, Renal Disease, BUN, Creatinine, Calcium and Phosphate, Calcium and Albumin, Glucose Abnormalities, Other Abnormal Laboratory findings in Diabetes Mellitus, Liver Function Tests, Correlations of Liver Function Test Results With Other Laboratory Findings

Cardiac Function Tests, Diagnosis of Myocardial Infarction and Acute Coronary Syndrome, Diagnosis of Congestive Heart Failure, Markers for Inflammatory Conditions

Thyroid Function, Adrenal Function.

REPORTING OF INFECTIONS (MICROBIOLOGY REPORTING)

General consideration, Antibiotic sensitivity, Urine Complete examination, Faecal examination, Direct Microscopy, Staining, Reporting of bacterial culture, Reporting of fungal culture, Reporting of viral culture, Reporting of bacterial infection, Reporting of fungal infection, Reporting of viral infection, Reporting of PCR.

REPORTING OF ABNORMALITIES IN THE IMMUNE SYSTEM

Reporting ofAllergy, Reporting ofHypersensitivity reactions, Reporting of Immune deficiency

Reporting of Autoimmune diseases, Reporting Of Immunological Diseases; Acetylcholine receptor, Graves' disease, Insulin-resistant diabetes, Systemic lupus erythematosus, Rheumatoid arthritis, Rheumatic fever, Hemolyticanemia, Idiopathic thrombocytopenic purpura, Goodpasture's syndrome, Pernicious anemia, Hashimoto's thyroiditis, Insulin-dependent diabetes mellitus, Acute glomerulonephritis, Guillain-Barré syndrome,

IgA nephropathy, Allergic encephalomyelitis and multiple sclerosis.

Practicals:

General aspects of report

Components of report

General Pattern of lab report

Interpretation of Lab reports

Normal and abnormal values Hematology reports

Normal and abnormalvalues Chemical pathology reports

Normal and abnormalvalues Microbiological reports

Normal and abnormalvalues Immunological reports

Abnormal aspects of reports

RECOMMENDED BOOKS

1. Basic Pathology by Robbins Latest Edition
2. Clinical Pathology Interpretations by A.H. Nagi
3. Pocket Companion to Robbins, Pathologic basis of disease Cotran, Kumar
4. Theory and Practice of Histological Techniques by John D Bancrof

I-C: BS AHS (Radiology Lab Sciences)

3rd Year

1. Medical Lab Establishment 200 Marks
2. Medical Instruments And Chemicals II (Specific) 100 Marks

3. General Pathology & Microbiology 200 Marks
4. Radiology Lab Sciences I (General Radiology & Radiation Physics) 200 Marks

Total Marks 700 Marks

1. MEDICAL LAB ESTABLISHMENT

LEADERSHIP AND MANAGEMENT; Operation management, Human Resource Management, Financial Management, Marketing Management, Quality Systems Management. **STRATEGIC PLANNING**

LABORATORY DESIGN AND SERVICE MODELS; Assessment, Physical Design, Identify Space for offices, Personal Facilities, Storage, Conference/Library area, Students Area, Fume Hoods and Biological safety cabinets, Furniture, Noise control, Eye wash station, Laboratory counters.

REGULATIONS, ACCREDITATION AND LEGISLATION; Prospective Payment System, Deficit Reduction Act, Clinical Laboratory Improvement Act of 1988 (CLIA '88), Physician Self-referral Ban, Ergonomic Safety and Health Program Management Guidelines, Three-Day Rule, Occupational Exposure to Hazardous Chemicals in Laboratories, Occupational Exposure to Blood-Borne Pathogens, Health Insurance Portability and Accountability Act: OIG Compliance Guidelines, CMS National Coverage Determinations: Hazardous Material Regulations, Laboratory-Related Governmental Agencies, Safety, Biological Hazard, Chemical Hazard, Ergonomic Hazard, Waste Disposal.

Practicals:

Recruitment of Staff

Documentation

Equipments

Test methods

Test Report design/ Certificates

Design of Lab

Size of Lab

Building requirement

Specified areas in lab

Safety

Hygiene

Disposal of Waste

RECOMMENDED BOOKS

1. Basic Pathology by Robbins Latest Edition
2. Clinical Pathology Interpretations by A.H. Nagi
3. Pocket Companion to Robbins, Pathologic basis of disease Cotran, Kumar
4. Theory and Practice of Histological Techniques by John D Bancrof

2.MEDICAL INSTRUMENTS & CHEMICALS II

Different relevant Techniques used in Medical fields. The names of instruments used, based upon different Techniques for working and evaluation of different parameters in Medical fields. Normal functioning of these instruments, parts of these instruments & individual functions of

these parts. Their trouble shootings and routine manipulations to obtain correct results. Maintenance of Sensitivity & Specificity of these instruments. The general study of following Medical Instruments available in Medical fields

X-Ray Machine: X-Ray tube, its structure, types and function. Portable and Mobile X-ray units: components, types and applications. Specialized X-Ray equipments: skull table, dental X-Ray equipments,

Mammography X-Ray Machine: Equipment and Technical Considerations, Mammography projections & Positioning,Composition and constituents of X-Ray film, methods of storage of films, Care and maintenance of X-Ray equipments, Significant mammographic findings & Related Pathology,

Contrast media, Purpose, Types a). Negative agents (Carbon dioxide, Air, Nitrous oxide), b) Positive agents (Barium sulfate, Iodinated)

Angiography and Cardiac Imaging: Basic principle of the procedure, types, Indications & Contraindications for the procedure, Patient positioning, Access method, Patient management during the exam, Contrast administration, Possible complications, Equipments, Exposure technique.

Fluoroscopy: types, image intensification, digital fluoroscopic equipments, C-arm fluoroscopic equipments. Visual Considerations, Instrumentation of Fluoroscopy, Practical Fluoroscopic Technique, Fluoroscopic Image Monitoring, Digital Fluoroscopy

Ultra Sound Machine: Principle, Components, Functions of each components, operation, advantages and disadvantages, Applications. Generation of ultrasound, Properties of ultrasound, Shape of the ultrasound beam, Spatial resolution, Echo Doppler effect, Ultrasound techniques i-e A-mode, B-mode, M-mode or TM-mode, B-scan, two-dimensional, Three- and four-dimensional techniques, B-flow.

Doppler techniques, Contrast agents, Artefacts, Adverse effects

CT Scan: Basic Principles of CT, Components, Functions of each components, operation, advantages and disadvantages, Applications. Data Acquisition, Image Reconstruction, Image Display, Methods of Data Acquisition, Image Quality, Quality Assurance, Post-Processing, Data Management

MRI: Principle, Components, Functions of each component, operation, advantages and disadvantages, Imaging weighting and contrast, Applications, MRI safety, Contrast agents in MRI, Advanced imaging techniques.

NMR: Principle, Components, Functions of each components, operation, advantages and disadvantages, Applications

Echo-Cardiography: Basic Principles of 2-D / M-Mode, Echocardiography Equipment,Construction, functions and applications, Principles of Doppler Echocardiography

Endoscopy Machine: Types, component parts, applications

Bone Densitometry: 1. Highlight different bone densitometry techniques. While focusing on Dual Energy X-Ray Absorptiometry (DEXA), also considers other densitometry methods for both axial and peripheral measurements. 2. Quality control issues and statistical interpretation of results relevant to DEXA.

Recommended Books:

3. Radiologic sciences for technologists by Stewart C. bushong.
4. A guide to radiologic procedure by Chapman.
5. Merrill atlas of radiography positioning and radiologic procedure vol 3 by Philip W Ballinger.
6. Fluoroscopy Notes by TM series.
7. Ultrasound teaching manual: The basics of Performing and Interpreting ultrasound Scans byMathias Hofer.
8. Colour atlas of ultrasound anatomy by Berthold Block, M.D
9. Echo made essay by Jaypee
10. Manual of cath lab Personnel invasive cardiology by Sanoy Watson .RN,BN,NFESC.
11. The cardiac catheterization Handbook by Mosby, Morton J.Kern.
12. Grossman cardiac catheterization, Angiography, Intervention by Donald s.Rain & William Grossman
13. Hand book of MRI Technique by Catherine Westbrook
14. Computed Tomography for Technologists A Comprehensive Text:by Lois Romans
15. Practical Gastrointestinal endoscopy by Colton PB and Williams CB in 1980 published by Oxford black well scientific
16. Text book of gastroteroentroloy by Bailliere tindall in London.

3. GENERAL PATHOLOGY & MICROBIOLOGY

i. GEN. PATHOLOGY

Cell Injury and Death: Causes of cell injury, Necrosis, Apoptosis and Sub cellular responses. Cell Adaptations: Hyperplasia, Hypertrophy, Atrophy, Metaplasia and Intracellular accumulation. Inflammation: Acute inflammation. Vascular events, Cellular events and Chemical mediators. Chronic Inflammation. General, Granulomatous and Morphologic patterns of acute and chronic inflammation. Healing and Repair:

Normal controls, Repair by connective tissue and Wound healing. Haemodynamic Disorders. Edema, Hyperemia / congestion, Hemorrhage, Thrombosis, Embolism, Infarction and Shock. Diseases of Immunity. General features, Hypersensitivity reactions, Immune deficiencies, Autoimmunity and Amyloidosis. Neoplasia**:** Nomenclature, Molecular basis, Carcinogenic agents and Clinical aspects

ii. MICROBIOLOGY

Basic Bacteriology

Bacteria Compared with Other Microorganisms, Structure of Bacterial Cells, Growth, Genetics, Classification of Medically Important Bacteria, Normal Flora, Pathogenesis,, Host Defenses, Laboratory Diagnosis, Antimicrobial Drugs: Mechanism of Action, Antimicrobial Drugs: Resistance, Bacterial Vaccines, Sterilization & Disinfection, Biosafety and bio risk management,

Clinical Bacteriology

Overview of the Major Pathogens & Introduction to Anaerobic Bacteria. **Gram-Positive Cocci**; *Staphylococcus aureus,Streptococcus pyogenes, Staphylococcus epidermidis, Staphylococcus saprophyticus, S. pyogenes, Streptococcus agalactiae, Enterococcus faecalis,* Viridansstreptococci, *Streptococcus bovi and S. pneumoniae*

Gram-Negative Cocci; *Neisseriameningitidis*and*Neisseria gonorrhoeae.*

Gram-Positive Rods;*Bacillusanthracis,Bacillus cereus, Clostridium tetani, Clostridium botulinum, Clostridium perfringens, Clostridiumdifficile, Corynebacteriumdiphtheriae*and*Listeria monocytogenes*.

Gram-Negative Rods Related to the Enteric Tract; *E. coli, Salmonella* species,*Shigella*species, *Vibrio cholerae, Vibrio parahaemolyticus, Vibriovulnificus, Campylobacter jejuni, Helicobacter pylori, Klebsiella, Enterobacter, Serratia, Proteus, Providencia, Morganella, Pseudomonas spp.,Bacteroides&Prevotella.*

Gram-Negative Rods Related to the Respiratory Tract;*Haemophilusinfluenzae, Bordetella pertussis,* and *Legionella pneumophila*

Gram-Negative Rods Related to Animal Sources (Zoonotic Organisms);*Brucella*species,*Francisellatularensis, Yersinia pestis,* and *Pasteurellamultocida*

Mycobacteria, Actinomycetes, Mycoplasmas, Spirochetes, Chlamydiae, Rickettsiae, Minor Bacterial Pathogens

Basic Virology

Structure, Replication, Genetics, Classification of Medically Important Viruses, Pathogenesis, Host Defenses, Laboratory Diagnosis, Viral Vaccines.

Clinical Virology

Herpes Viruses, Rabies Virus, Polio Virus, Hepatitis Viruses, Human Immunodeficiency Virus, Dengue Virus.

Mycology

Basic Mycology, Cutaneous & Subcutaneous Mycoses, Systemic Mycoses, Opportunistic Mycoses,

Parasitology

Intestinal & Urogenital Protozoa, Blood & Tissue Protozoa, Minor Protozoan Pathogens, Cestodes, Trematodes, Nematodes.

Sterilization

Laboratory Exercises:

Each lecture will be followed by two hour practical class where the student will apply their theoretical knowledge in the understanding of related microbiological investigations, which have been proved useful for the diagnosis of human diseases.
During the other laboratory sessions, the students will be engaged in the preparation of media, the sterilization of glass ware, Antigens, Antibodies, Vaccines – haemolysin, permanent slides, laboratory reagents and also to assisting postgraduate students in the isolation of micro – organisms from clinical materials.

Practicals:

- Acute Inflammation
- Chronic Inflammation
- Necrosis
- Gangrene
- Pigmentation

- Calcification
- Urine Examination
- Sterilization
- Culture Media
- Antibiotic Sensitivity testing
- Culturing bacterial pathogens
- Examination of different clinical specimens
- Blood Culture
- Anaerobic Culture
- Gram Staining
- ZN Staining
- Biochemical tests to identify bacteria (Conventional, API 20E, API 20NE, Automated systems)
- PCR
- KOH preparation for scraping
- Stool Examination
- ELISA

RECOMMENDED BOOKS

1. Basic Pathology by Robbins Latest Edition
2. Clinical Pathology Interpretations by A.H. Nagi
3. Pocket Companion to Robbins, Pathologic basis of disease Cotran, Kumar
4. Theory and Practice of Histological Techniques by John D Bancrof

4. RADIOLOGY LAB SCIENCES I(General Radiology and Radiation Physics)

RADIATION PHYSICS

Concepts of Radiation

Nature of our surroundings, Sources of Ionizing Radiation, Discovery of X-rays, Development of Modern Radiology, Basic Radiation Protection

Definitions

Fundamentals of Physics, Units of Measurement

Mechanics

Heat and Thermodynamics, Waves and Oscillation

The Atom

Centuries of Discovery, Combinations of Atoms, Magnitude of Matter, Atomic Structure, Atomic Nomenclature, Radioactivity

Types of Ionizing Radiation

Electromagnetic Radiation, Photons Everywhere, Electromagnetic Spectrum, Radiologically Important Photons, Energy and Matter

Electricity and Magnetism

Electric to Electromagnetic Energy, Electrostatics, Electrodynamics, Magnetism

Electromagnetism

Electromagnetic Effects, Electromagnetic Induction, Electric Generators and Motors, The Transformer, Rectification

RADIATION PROTECTION

Fundamental Principles of Radiobiology

From Molecules to Humans, Human Biology, Law of Bergonie and Tribondeau

Physical Factors Affecting Radiosensitivity

Biologic Factors Affecting Radiosensitivity

Radiation Dose-Response Relationships

Molecular and Cellular Radiobiology

Irradiation of Macromolecules, Radiolysis of Water, Direct and Indirect Effect, Celol Survival, Kinetics, LET, RBE, and OER

Early Effects of Radiation

Acute Radiation Lethality, Local Tissue Damage, Hematologic Effects, Cytogenetic Effects

Late Effects of Radiation

Local Tissue Effects, Life Span Shortening, Risk Estimates, Radiation-Induced Malignancy, Total Risk of Malignancy, Radiation and Pregnancy

Health Physics

Cardinal Principles of Radiation Protection, Maximum Permissible Dose, X-rays and Pregnancy

Practical

Radiation Protection Procedures

Occupational Exposure, Patient Dose, Reduction of Occupational Exposure, Reduction of Unnecessary Patient Dose

General Radiology

Standard Terminology for Positioning and Projection

Standard terms: Radiographic position, Radiographic projection, Radiographic view

Positioning terminology: Recumbent, Supine, Prone, Trendelenburg, Decubitus, Erect/upright, Anterior position, Posterior position, Oblique position

General planes: Sagittal or midsagittal, Coronal or midcoronal, Transverse, Longitudinal

Skull lines: Glabellomeatal line, Interpupillary line, Orbitomeatal line, Infraorbitomeatal line, Acanthiomeatal line, Mentomeatal line

Skull landmarks: Auricular point, Gonion (angle), Mental point, Acanthion, Nasion, Glabella, Inner canthus, Outer canthus, Infraorbital margin, Occlusal plane, External auditory meatus, Mastoid tip

Terminology of movement and direction: Cephalad/caudad, Inferior/superior, Proximal/distal, Plantar/palmar, Pronate/supinate, Flexion/extension, Abduction/adduction, Inversion/eversion, Medial/lateral

Positioning aids: Sponges, Sandbags, Immobilization devices

Accessory equipment: Calipers, Lead strips, Lead shields or shadow shields, Lead markers, Image receptor holders

Positioning Considerations for Routine Radiographic Procedures

Patient instructions

Image analysis

1. Patient positioning, 2. Part placement, 3. Image receptor selection and Placement, 4. Beam-part-receptor alignment, 5. Beam restriction and shielding

Special considerations

1. Atypical conditions, 2. Trauma Radiography, 3. Pediatric Imaging., 4. Geriatric Radiography

5. Portable Radiography., 6. Tomography., 7. Introduction to Computed Radiography& Digital Radiography

Special needs patients

1. Trauma, 2. Obesity, 3. Cultural awareness, 4. Claustrophobia

Positioning for the following studies:

Skeletal system:

a. Upper extremity 1) Fingers, 2) Hand, 3) Wrist, 4) Forearm, 5) Elbow, 6) Humerus

b. Shoulder 1) Shoulder joint, 2) Scapula, 3) Clavicle, 4) Acromioclavicular articulations

c. Lower extremity: 1) Toes, 2) Foot, 3) Ankle, 4) Calcaneus, 5) Tibia/fibula, 6) Knee, 7) Patella, 8) Femur

d. Pelvic girdle: 1) Pelvis, 2) Hip

e. Vertebral column: 1) Cervical, 2) Thoracic, 3) Lumbar, 4) Sacrum, 5) Coccyx, 6) Sacroiliac articulations, 7) Scoliosis survey

f. Bony thorax: 1) Ribs, 2) Sternum, 3) Sternoclavicular articulations

g. Cranium: 1) Skull, 2) Facial bones, 3) Nasal bone, 4) Orbits/optic foramina, 5) Zygomatic arches, 6) Mandible, 7) Temporomandibular articulations, 8) Paranasal sinuses

h. Special studies: 1) Bone survey, 2) Long bone measurement, 3) Bone age, 4) Foreign body

Respiratory system: a. Upper airway, b. Chest

Abdominal viscera: a. Abdomen and GI, b. Urological studies

FROM THE WATCHING OF SHADOWS:

History, A New Kind of Ray, How a Medical Image Helps, What Imaging Studies Reveal, Radiography(x-rays), Fluoroscopy, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Ultrasound, Endoscopy

RADIOGRAPHY AND MAMMOGRAPHY:

Equipment components, Procedures for Radiography & Mammography, Benefits versus Risks and Costs, Indications and contraindications

COMPUTED TOMOGRAPHY (CT):

What is Computed Tomography?, Equipment used for Computed Tomography, Indications and Contra indications, How it helps in diagnosis, The Findings in Computed Tomography and Benefits versus Risks and Costs.

FLUOROSCOPY:

What is Fluoroscopy? Equipment used for fluoroscopy, Indications and Contra indications, How it helps in diagnosis, The Findings in Fluoroscopy, Benefits versus Risks and Costs

ENDOSCOPY:

What is Endoscopy? Equipment used for Endoscopy, Indications and Contra indications, how it helps in diagnosis, The Findings in Endoscopy and Benefits versus Risks and Costs.

INTERVENTIONAL RADIOLOGY

Practicals:

Practical's according to departmental schedule

DARK ROOM

- Need for good darkroom procedures and necessity for proper darkroom construction.
- Darkroom construction and equipment –
- Theory of the photographic process, Safe light
- photographic process fundamentals;
- Construction of film; handling.
- Density Ratio,
- Constituents of Darkroom: Chemistry; Developer, Fixer
- Automatic processing: Differences between manual and automatic
- processing.
- Types and care of processing apparatus, film artifacts and their causes.
- Sensitometry, Densitometry and Optical Density.

There will be an overview of the common instruments used in the above sub disciplines.

Recommended Books:

1:- Radiologic sciences for technologists by Stewart C. bushong .

2:-The essential physics of Medical imaging by Bushberg.

3:- Quality assurance work for radiographers and radiologic Technologist by Peter J Lioyd.

4:- Instruction Manual for Bushong bt TM. Series

5:- Radiographic Positioning by Eisenberg.

6:- Merrill atlas of radiography positioning and radiologic procedure vol 1, 2, 3 by Philip W

Ballinger.

7:- Clarke positioning in radiography by Clarke.

8:- Reference book of atlas of diagnostic imaging by Professor Dr. Mohammad Tariq.

This course component covers the study of common diagnostic and therapeutic imaging tests. At the end of the course students will be aware of the indications and implications of commonly used diagnostic imaging tests as they pertain to patient's management. The course will cover that

how X-Ray, CT, MRI, Ultrasound and Other Medical Images are created and how they help the health professionals to save lives.

4th Year:

1.	Community Health, Research Methodology, Social and Behavioral Sciences	100 Marks
2.	Special Pathology	200 Marks
3.	Radiology Lab Sciences II (Nuclear Medicine & Surgery)	200 Marks
4.	Medical Lab Reporting & Evaluation	200 Marks
	Report Writing	Qualifying
	Total Marks	**700 Marks**

1. COMMUNITY HEALTH, RESEARCH METHODOLOGY, SOCIAL & BEHAVIORAL SCIENCES

i. Community Health

Introduction; History of Community Medicine, Definition, concept of Health & illness of diseases and Natural History of diseases, levels & prevention

Environmental Sanitation & Medical Entomology; Water, waste disposal and Environmental problems & pollution

Genetics; Prevention of genetic diseases and Genetic counseling

General and Descriptive Epidemiology; Time, Place and Person

Analytical Epidemiology; Case control and Cohort studies

Experimental Epidemiology Randomized Control Trial.

Systemic Epidemiology; Vector borne diseases, Water borne diseases, Air borne diseases, Contact diseases and Diseases of major public health and its importance along with national health programs wherever Applicable.

Non-Communicable Diseases; Diabetes, Hypertension, Heart diseases, Blindness, Accidents, Geriatric problems

Occupational Health Problems; M.C.H. and family welfare Programs, Health care delivery in the community, National Health Policy, National Health programs including, Rehabilitation, Evaluation of Health, Programs, Health Planning Organization,

Community Nutrition; Foundation and status in Pakistan masses. Community nutrition programs: key features, benefits, planning, implementation, evaluation. Nutritional status assessment: Anthropometric, Dietary, Biochemical, Clinical measurements. Community Nutrition and Dietetics profession. Steps of nutritional epidemiological study, Testing and Piloting of nutritional epidemiological study, Questionnaire design. Evaluation, sources of variation in the dietary intake, Methodological studies on dietary questionnaires.

Structure of Health Care System In the Country; P.H.C. district level, State level and central level. P.H.C. Organization and Function and Role of Non-Governmental Organization

Health Education; Principles of Health Promotion, Methods, approaches and media for, I.E.C (Information, Education & Communication), Medical and Health/Information system, Mental Health and Nutrition.

Teaching Methodology; Types of health services, public, private, scientific, traditional health system, Organization of public services in health, central, provincial and local levels, Levels of health care, primary, secondary and tertiary, Planning and Organization of health services, Implementation, Evaluation of health services, Management of resources in health services, Financial management, Health education and social cultural concept Ethics in Health Services, Theories of learning facilitations.

ii. Research Methodology

Research Fundamentals; Research, Theory in Research, Research Ethics

Research Design; Research Problems, Questions, and Hypotheses, Research Paradigms, Design Overview and Research Validity

Experimental Designs; Group Designs and Single-System Design

Non Experimental Research; Overview of Non experimental Research, Clinical Case Reports, Qualitative Research, Epidemiology, Outcomes Research and Survey Research.

Measurement; Measurement Theory and Methodological Research.

Data Analysis; Statistical Reasoning, Statistical Analysis of Differences; The basics, Statistical Analysis of Differences; Advanced and special Techniques, Statistical Analysis of Relationships; The basics and Statistical Analysis of Relationships; Advanced and special Techniques

Implementing Research; Implementing a Research Project and Publishing and Presenting Research

iii. Social & Behavioural Sciences

Introduction of Sociology

Social Action And Interaction; Social processes, Co-operation, Competition, Conflict and Accommodation.

Social Groups; Primary-Secondary, In and Out Group and Reference group

Culture; Values, Beliefs, Sanctions, Cultural relativism and Ethnocentrism, Norms, Folk ways, Conflict, Deviancy and Social control.

Socialization and Personality formation

Social Institution; Meanings, Social stratification and Meanings and Forms (Classes and Castes)

Social and Cultural Change; Factors promoting and resisting social change

The Field Of Medical Sociology; Contribution of Sociology in Health. Environmental pollution and Health, Patient, Healthcare provider relationship. Role of Healthcare provider and attendants in the managements of patient.

Introduction of Behavioural Sciences; Understanding Behaviour. Sensation, sense organs / special organs, Perception and factors affecting it, Attention, concentration, Memory, types and methods to improve it, Types and theories of thinking, Cognition and levels of cognition, Problem solving and decision making strategies, Communication Its types.

Personality and Intelligence; Psychological growth and development, Personality, theories and Factors affecting personality development, Assessment of personality Influence of personality in health, disease, hospitalization, stress, etc., Intelligence and its types Relevance of IQ and EQ Methods of enhancing EQ and IQ Factors affecting intelligence and their assessment

Stress Management

Doctor – Patient Relationship; Concept of boundaries and psychological reactions in doctor – patient relationship.

Pain, Sleep and Consciousness; Concept of pain, sleep and consciousness, Attend states of consciousness, Psychological influence on sleep and consciousness, Non-pharmacological methods of inducing sleep, Changes in consciousness.

Communication Skills; Principles of effective communication. A practical method of communication between the doctor and patient about disease, drugs, prognosis etc.

Interviewing; Types of interview and Skills of interviewing

Health Psychology

Psychology in clinical management of patients, Psychological therapies, child's social and cognitive development, Psychological changes during adolescence, old age and their clinical management, Impact of illness on a patient's psychological well being. Association between psychological stress and physical well being, Role of doctor in patient reassurance.

Social And Community Perspective; Inequalities Ethnicity, culture and racism, Gender and Healthcare and Influence of health. Illness on behaviour

Application of Behavioural Principles In Health and Disease; Mentally / emotionally and physically handicapped, Homebound and medically compromised.

Recommended Text Books:

1. Text book of Community Medicine by: Park J E. Latest Edition
2. Horton, Paul B. and Chester L. Hunt, 1984 Sociology, Singapore: Megraw Hill Book Co.
3. Moon, Graham, 1995. Society and Health; An introduction to Social Science for Processionals, London: Routledge.
4. Rehabilitation Research (Principles and Applications) 3rd Edition By Elizabeth Domholdt
5. Textbooks of Community Medicine, by Prof. H. A. Siddique (2nd Edition).
6. A Handbook of Behavioural Sciences for Medical and Dental Students By: M H Rana, S Ali and M Mustafa, , University of Health Sciences Lahore
7. Developmental Psychology for Healthcare Professions By: Katherine A Billingham

2. SPECIAL PATHOLOGY

Theory:

The course outline is as follows:-

1. Blood Vessels & Heart,
2. Hematopoietic and Lymphoid Systems
3. Respiratory System
4. The Urinary System
5. Musculoskeletal System
6. Endocrine System
7. Nervous System

Practicals:

Basic principles of lab works, Hematopoietic System (ALL, CLL,AML, CML), Musculoskeletal System (Osteogenic sarcoma & Giant cell tumor), The Skin (Squamous cell carcinoma & Basal cell carcinoma), Endocrine System (Thyroid tumors, Colloid goiter, Follicular adenoma & Papillary carcinoma thyroid, Pituitary, Causes of hyperpituitrism & lab. Diagnosis, Causes of biliary, bitarism & lab. Diagnosis, Thyroid, Thyroid function test, Causes of hyperthyroidism & lab. Diagnosis, Causes of hypothyroidism & lab. Diagnosis, Parathyroid, Hyperparathyroidism, Hypoparathyroidism, Hypercalcemia, Hypocalcemia, Diabetes mellitus, Lab. Diagnosis & GTT, Diabetic ketoacidosis), Liver, gall bladder and biliary tract, Chronic cholecystitis, Hepatocellualr carcinoma & Liver cirrhosis), Nervous System (Meningioma etc), Basics of Histopathology / tissue Processing, Bone Marrow Biopsy

Recommended Books:

1. Pathological Basis of Disease by Kumar, Cotran, Robbins. 7th. Ed.
2. Medical Microbiology and Immunology by Levinson and Jawetz, 9th Ed. Mc Graw-Hill

3. Clinical Pathology Interpretations by A.H. Nagi

3. RADIOLOGY LAB SCIENCES II(Nuclear Medicine and Surgery)

NUCLEAR MEDICINE

Introduction to Nuclear Physics:

Atomic and nuclear structure, Artificial and natural radioactivity, Modes of radioactive decay, Exponential decay and; Half-life and mean life of radionuclides, Radioactive decay series and equilibrium, Interaction of high energy radiation with matter

Radiation Detection and Instrumentation

Basic principles of radiation detectors and their common properties, Gas-filled detectors and their application, Scintillation detectors, Rectilinear scanners, Non imaging probes, Scintillation counters, Dose calibrator, Scintillation camera, Multicrystal devices, Tomographic imaging technique, SPECT and PET, Image production & display, Image quality in nuclear medicine, Quality assurance procedures in Nuclear Medicine instrumentation, Use of computers in Nuclear Medicine-principles & applications to NM data

acquisition, processing & display.

Radiation protection: Radiation quantities and units, Radioactive waste disposal, Radiation shielding and transportation of radioactive materials, Health physics instrumentation, Methods of safe Handling of Radionuclides and Pertaining Rules and Regulations

Radiochemistry and Radiopharmaceuticals: Radiopharmaceuticals, Production of radioisotopes, Radioisotope generators, Quality control and quality assurance of radiopharmaceuticals, Hot laboratory and dispensing operations, Chemical toxicity of radionuclides.

Clinical nuclear medicine imaging: Systemic Nuclear Medicine teaching including application of

radiopharmaceuticals for imaging of different organs, Indications of nuclear medicine diagnostic and therapeutic procedures, Techniques of performing scintigraphy and common therapy procedures, Acquisition protocols, image processing and quantitation on images

MAGNETIC RESONANCE IMAGING (MRI)

What is MRI? Equipment used for MRI, Indications and Contra indications, How it helps in diagnosis, The Findings in MRI, Benefits versus Risks and Costs and Functional MRI.

ULTRASOUND:

What is Ultrasound? Equipment used for Ultrasound, Indications and Contra indications, How it helps in diagnosis, The Findings in Ultrasound and Benefits versus Risks and Costs.

Practical:

The techniques and methods of major nuclear medicine diagnostic and therapeutic applications

- Elution of Mo-Tc generator system

- Calculation of dose and preparation of radiopharmaceuticals.
- Quality control of radiopharmaceuticals
- Estimation of bound and free fraction.
- Thyroid uptake studies.
- Quality control tests for gamma camera.
- Routine operational tests for SPECT.
- Dynamic studies with patient.
- Static and SPECT studies

Procedures:

Abscess and Infection, Skeletal, Cardiovascular, Endocrine/Exocrine, Gastrointestinal, Genitourinary, Respiratory, Central Nervous System, Tumor, SPECT

Therapeutic Procedures

Introduction to radiology in surgery

Importance and Role of Imaging in Surgical Conditions, Surgical process

Introduction to Diagnostic process

Arterial Disorders: Arterial stenosis or occlusion, Acute arterial occlusion and Arterial dilation, Aortic aneurysm

Venous Disorders: Venous incompetence varicose veins, Venous thrombosis

Musculoskeletal Disorders: Fractures of bones, Dislocations of joints, Compound & Simple Fracture, Describing a dislocation or fracture, Complications of fracture / dislocation.

The Breast: Investigation of the breast diseases, Benign breast disease, Malignant tumors of the breast.

The Cranium: Head and Brain injury, Hydrocephalus, Intracranial tumors, Subarachnoid hemorrhage and aneurysms.

Diseases of the Gastrointestinal Tract: Congenital abnormalities of the GIT, Foreign bodies in the oesophagus and lungs, Corrosive injury of oesophagus, Stones and Stricture in the bile duct.

Diseases of The Genitourinary System: Imaging investigations of the genital tract, Congenital abnormalities of kidneys and renal tract, Hydronephrosis, Renal ,Ureteric and Bladder calculi, Rupture of the bladder, Urethral stricture, Varicocele and Hydrocele, Neoplasms of the Genitourinary system

Practicals:

Practical's according to departmental schedule

1. Preparation of patients for different Radiological procedures
2. Use of X-rays machines
3. Use of Mammography machines
4. Use of Interventional Radiology
5. Use of Computed Tomography (CT) machines
6. Use of Fluoroscopymachines
7. Use of Endoscopymachines
8. Use of Magnetic Resonance Imaging (MRI) machines
9. Use of Ultrasoundmachines
10. Use of Angiographymachines
11. Use of Bone densitometrymachines
12. Radiography(x-rays) & Mammography

13. Interventional Radiology
14. Computed Tomography (CT)
15. Fluoroscopy
16. Endoscopy
17. Magnetic Resonance Imaging (MRI)
18. Ultrasound
19. Nuclear Medicine

The techniques and methods of major nuclear medicine diagnostic and therapeutic applications

- Elution of Mo-Tc generator system
- Calculation of dose and preparation of radiopharmaceuticals.
- Quality control of radiopharmaceuticals
- Estimation of bound and free fraction.
- Thyroid uptake studies.
- Quality control tests for gamma camera.
- Routine operational tests for SPECT.
- Dynamic studies with patient.
- Static and SPECT studies

Procedures:

Abscess and Infection, Skeletal, Cardiovascular, Endocrine/Exocrine, Gastrointestinal, Genitourinary, Respiratory, Central Nervous System, Tumor, SPECT

Therapeutic Procedures

Note:

The students are expected to make a record of studies along with Medical Equipments used in the log book. The log book is a collection of evidence that learning has taken place.

It is a reflective record of achievements. The log book shall also contain a record of the procedures which student would have performed/observed.

RECOMMENDED TEXT BOOK:

1. Looking Within (How X-ray, CT, MRI, Ultrasound and Other Medical Images Created and How They Help Physicians Save Lives) By Anthony Brinton Wolbarst
2. Clinical sonography a practical guide by Roger C Saunders / Tom Winter
3. The requisite ultrasounds by Barbara S. Hertberg, William D Middleton
4. Clinical Dopper Ultrasound by Paul Allen Paul A Dubin Myron A Pozniar
5. *A–Z of Musculoskeletal and Trauma Radiology* By: James R. D. Murray
6. *Essentials of Radiology* by Fred. A. Mettler, 2nd edition.
7. *Imaging in rehabilitation,* By: Terry. R. Malone, Charles Hazle & Michael L. Grey. McGraw Hill Publishers.
8. Ramesh Chandra. Nuclear Medicine Physics, Lippincott Williams And Wilkins, 2004.
9. Donald R Bernier, Nuclear medicine: Technology and techniques. Mosby, @1997.
10. Manual of Nuclear Medicine Procedures by Raman Mistry
11. Instructional Manual by TM Series
12. Short Practice of Surgery by Bailey and Love's
13. Surgery by Shamim Ahmed
14. Text Book of Surgery by Ijaz Ahsa
15. Radiologic Technologist and Book of Surgical Procedures by Anthony C Aradposol
16. Learning Radiology; Recognizing the Basis by William Herring

4. MEDICAL LABS REPORTING AND EVALUATION

Purpose of this subject to make technologist be responsible for the supervision and operation of a relevant clinical laboratory within the field of specialization indicated by the title within the

group, to perform the most difficult and highly complex test, analyses and examinations within the assigned laboratory, and to do related work as required.

INTRODUCTION TO PRINCIPLES OF GOOD LAB PRACTICE: Introduction, The fundamental points of good lab practice, The good lab practice principles, Internal Audit, External Audit, Proficiency testing, Accreditation, Lab Record Keeping, Laboratory information system, Optimizing Laboratory workflow and performance Procurements of Lab Consumables and instruments, Budgeting of Labs Inspections of Labs

RESOURCES; Management, Personnel, Facilities: buildings and equipment

CHARACTERIZATION & THE TEST ITEM: Date of dispatch, Number of containers or items, type of contents and quantity, identity of the test item, batch numbers, identity of the person responsible for the dispatch, Name of the transporter and type of carrier.

QUALITY ASSURANCE: Protocol (or study plan) review, Sop review, Planning (master schedule, inspection plan), Audits and inspections, Quality assurance statement, Qa inspections of suppliers and contractors, Issuing and archiving of QA files and reports.

INTERPRETING AND CORRELATING ABNORMALLABORATORY VALUES:

General Considerations, Fundamental Principles in Interpretation of Values

REPORTING OF ABNORMALITIES IN THE HEMATOLOGY PROFILE:

Anemias, Microcytic Anemia, Normocytic Anemia, Macrocytic Anemia, Low White Cell Counts, Coagulation Disorders, Bleeding Time Measures Platelet Function, Major Causes of Increased PT or APTT, The Other Cause of Isolated PT or APTT is Coagulation, Factor Deficiency, The Major Cause of Elevated PT and APTT is DIC.

REPORTING OF ABNORMALITIES IN CLINICAL CHEMISTRY

Hyponatremia, Pseudohyponatremia, Hypernatremia, Hypokalemia, Hyperkalemia, Renal Disease, BUN, Creatinine, Calcium and Phosphate, Calcium and Albumin, Glucose Abnormalities, Other Abnormal Laboratory findings in Diabetes Mellitus, Liver Function Tests, Correlations of Liver Function Test Results With Other Laboratory Findings

Cardiac Function Tests, Diagnosis of Myocardial Infarction and Acute Coronary Syndrome, Diagnosis of Congestive Heart Failure, Markers for Inflammatory Conditions

Thyroid Function, Adrenal Function.

REPORTING OF INFECTIONS (MICROBIOLOGY REPORTING)

General consideration, Antibiotic sensitivity, Urine Complete examination, Faecal examination, Direct Microscopy, Staining, Reporting of bacterial culture, Reporting of fungal culture, Reporting of viral culture, Reporting of bacterial infection, Reporting of fungal infection, Reporting of viral infection, Reporting of PCR.

REPORTING OF ABNORMALITIES IN THE IMMUNE SYSTEM

Reporting ofAllergy, Reporting ofHypersensitivity reactions, Reporting of Immune deficiency

Reporting of Autoimmune diseases, Reporting Of Immunological Diseases; Acetylcholine receptor, Graves' disease, Insulin-resistant diabetes, Systemic lupus erythematosus, Rheumatoid arthritis, Rheumatic fever, Hemolyticanemia, Idiopathic thrombocytopenic purpura,

Goodpasture's syndrome, Pernicious anemia, Hashimoto's thyroiditis, Insulin-dependent diabetes mellitus, Acute glomerulonephritis, Guillain-Barré syndrome,

IgA nephropathy, Allergic encephalomyelitis and multiple sclerosis.

- Interpreting and correlating abnormal results from Radiological studies
  General Considerations
  Fundamental principles in interpreting radiological imaging
  Essential Physiologic and pathologic investigations prior to radiologic scanning in various normal and abnormal conditions
- Interpretation of X-Ray results and clinical correlation
- Interpretation of Mammography X-Ray results and clinical correlation
- Interpretation of abnormalities in Angiography and Cardiac imaging
- Reporting and Interpretation of normal and abnormal results of Fluoroscopy
- Reporting and Interpretation of normal Ultrasound images and abnormalities in various diseased conditions
- Evaluation of the Reporting of CT Scan
- Normal and abnormal MRI results, reporting and clinical interpretation
- Reporting and interpretation of NMR imaging
- Evaluation of Echo-Cardiography results
- Reporting and interpretation of Endoscoping imaging results in normal and abnormal conditions

Practicals:

General aspects of report

Components of report

General Pattern of lab report

Interpretation of Lab reports

Normal and abnormal values Hematology reports

Normal and abnormalvalues Chemical pathology reports

Normal and abnormalvalues Microbiological reports

Normal and abnormalvalues Immunological reports

Abnormal aspects of reports

General requirements for performing radiological imaging studies

General aspects of imaging report

Interpreting radiological images

Differentiation of normal and abnormal radiological images

RECOMMENDED BOOKS

1. Basic Pathology by Robbins Latest Edition
2. Clinical Pathology Interpretations by A.H. Nagi
3. Pocket Companion to Robbins, Pathologic basis of disease Cotran, Kumar
4. Theory and Practice of Histological Techniques by John D Bancrof

I-D: PUBLIC HEALTH LAB SCIENCES

3rd Year

1.	Medical Lab Establishment	200 Marks
2.	Medical Instruments And Chemicals II (Specific)	100 Marks
3.	General Pathology & Microbiology	200 Marks
4.	Public Health Lab Sciences I	200 Marks
	Total Marks	**700 Marks**

1. MEDICAL LAB ESTABLISHMENT

LEADERSHIP AND MANAGEMENT; Operation management, Human Resource Management, Financial Management, Marketing Management, Quality Systems Management. **STRATEGIC PLANNING**

LABORATORY DESIGN AND SERVICE MODELS; Assessment, Physical Design, Identify Space for offices, Personal Facilities, Storage, Conference/Library area, Students Area, Fume Hoods and Biological safety cabinets, Furniture, Noise control, Eye wash station, Laboratory counters.

REGULATIONS, ACCREDITATION AND LEGISLATION; Prospective Payment System, Deficit Reduction Act, Clinical Laboratory Improvement Act of 1988 (CLIA '88), Physician Self-referral Ban, Ergonomic Safety and Health Program Management Guidelines, Three-Day Rule, Occupational Exposure to Hazardous Chemicals in Laboratories, Occupational Exposure to Blood-Borne Pathogens, Health Insurance Portability and Accountability Act: OIG Compliance Guidelines, CMS National Coverage Determinations: Hazardous Material Regulations, Laboratory-Related Governmental Agencies, Safety, Biological Hazard, Chemical Hazard, Ergonomic Hazard, Waste Disposal.

Practicals:

Recruitment of Staff

Documentation

Equipments

Test methods

Test Report design/ Certificates

Design of Lab

Size of Lab

Building requirement

Specified areas in lab

Safety

Hygiene

Disposal of Waste

RECOMMENDED BOOKS

1. Basic Pathology by Robbins Latest Edition

2. Clinical Pathology Interpretations by A.H. Nagi
3. Pocket Companion to Robbins, Pathologic basis of disease Cotran, Kumar
4. Theory and Practice of Histological Techniques by John D Bancrof

2. MEDICAL INSTRUMENTS & CHEMICALS II

Different relevant Techniques used in Medical fields. The names of instruments used, based upon different Techniques for working and evaluation of different parameters in Medical fields. Normal functioning of these instrument, parts of these instruments & individual functions of these parts. Their trouble shootings and routine manipulations to obtain correct results. Maintenance of Sensitivity & Specificity of these instruments. The general study of following Medical Instruments available in Medical fields:

Public Health Equipment

1. Spray pump(vector control)
2. Food sampling kit (food safety)
3. Protective gear (uniform)
4. Aflatoxin testing kit (food safety)
5. Water sampling kit (water safety)
6. Chlorine taps(water treatment)
7. DPD Tablets(chlorine testing)
8. Sphygmomanometer(BP Machine)
9. Refrigerator, EPI
10. Autoclave
11. Infant weighing scale
12. Suction machine

First Aid Equipment

Bandages, Ace bandage, compression stocking, Snakebite kit, Heating pad, Traction, Ostomy care, Tracheotomy care, Defibrillator

Respiratory Equipment

Ventilator, continuous positive airway pressure, bi-level positive airway pressure, and demand positive airway pressure equipment

Oxygen cylinder**,** Oxygen concentrator**,** Nebulizer**,** Masks and canulas**,** Respiratory supplies**,** Cough assist machine**,** Suction machine**,** Manual resuscitation bags with face mask

Meters/Monitors

Thermometer**,** Stethoscope**,** Blood glucose meter**,** Blood coagulation (PT/INR) meter**,** Pulse oximeter**,** Weight scale**,** Blood pressure monitor**,** Apnea monitor**,** Electrocardiogram monitor**,** Fetal monitor

Voiding Equipment

- Catheter
- Colostomy bags

Infant Care

- Incubator, Radiant warmer, Bilirubin lights, Phototherapy, Apnea monitor

1. Insulin infusion pump
2. Implantable cardioverter defibrillator
3. Automatic implantable cardioverter defibrillator with cardiac resynchronization
4. Ventricular (assist) bypass device
5. Mechanical walker

6. Implantable pacemaker pulse generator
7. Piston syringe
8. Intravascular administration set, and
9. Continuous ventilator
10. Ice liner for vaccine storage
11. Cold chain equipment's
12. Vaccine carrier box

Recommended Books

1. Practical Sanitation: A Handbook for Sanitary Inspectors and Others; WithApx. On Sanitary Law, by Herbert Manley by George Reid
2. Practical Sanitation: A Handbook for Sanitary Inspectors and Others Interested in Sanitation by George Reid and Herbert Manley
3. Sanitary Inspectors' Practical Guide: With Inspection of Lodging-Houses (Under Sanitary Acts) and the Sale of Food & Drugs Amendment Act, 1879 for Sanitary ... and Local Board Districts of England by Joseph Robinson
4. Sanitary Inspector's Handbook;: A manual for sanitary inspectors and other executive public health officers, by Henry Hurrell Clay
5. Elementary Sanitary Engineering in India;: A text-book for Indian sanitary inspectors and others interested in the application of the science of sanitary engineering to tropical conditions, by George Brans by Williams
6. The Australian sanitary inspector's text book / by John L. Bruce and Theodore Mailler Kendall
7. Sanitary Inspector, Volume IV by Maine State Board Of Health.
8. Food Hygiene Microbiology and HACCP By S. J. Forsythe, P. R. Hayes.
9. Food Hygiene and Sanitation by SunetraRoday.

3. GENERAL PATHOLOGY & MICROBIOLOGY

i. GEN. PATHOLOGY

Cell Injury and Death: Causes of cell injury, Necrosis, Apoptosis and Sub cellular responses. Cell Adaptations: Hyperplasia, Hypertrophy, Atrophy, Metaplasia and Intracellular accumulation. Inflammation: Acute inflammation. Vascular events, Cellular events and Chemical mediators. Chronic Inflammation. General, Granulomatous and Morphologic patterns of acute and chronic inflammation. Healing and Repair:

Normal controls, Repair by connective tissue and Wound healing. Haemodynamic Disorders. Edema, Hyperemia / congestion, Hemorrhage, Thrombosis, Embolism, Infarction and Shock. Diseases of Immunity. General features, Hypersensitivity reactions, Immune deficiencies, Autoimmunity and Amyloidosis. Neoplasia**:** Nomenclature, Molecular basis, Carcinogenic agents and Clinical aspects

ii. MICROBIOLOGY

Basic Bacteriology

Bacteria Compared with Other Microorganisms, Structure of Bacterial Cells, Growth, Genetics, Classification of Medically Important Bacteria, Normal Flora, Pathogenesis,, Host Defenses, Laboratory Diagnosis, Antimicrobial Drugs: Mechanism of Action, Antimicrobial Drugs: Resistance, Bacterial Vaccines, Sterilization & Disinfection, Biosafety and bio risk management,

Clinical Bacteriology

Overview of the Major Pathogens & Introduction to Anaerobic Bacteria. **Gram-Positive Cocci**; *Staphylococcus aureus*,*Streptococcus pyogenes*, *Staphylococcus epidermidis*, *Staphylococcus*

saprophyticus, S. pyogenes, Streptococcus agalactiae, Enterococcus faecalis, Viridansstreptococci, *Streptococcus bovi and S. pneumoniae*

Gram-Negative Cocci; *Neisseriameningitidis*and*Neisseria gonorrhoeae.*

Gram-Positive Rods;*Bacillusanthracis,Bacillus cereus, Clostridium tetani, Clostridium botulinum, Clostridium perfringens,Clostridiumdifficile, Corynebacteriumdiphtheriae*and*Listeria monocytogenes*.

Gram-Negative Rods Related to the Enteric Tract; *E. coli, Salmonella* species,*Shigella*species, *Vibrio cholerae, Vibrio parahaemolyticus,Vibriovulnificus, Campylobacter jejuni, Helicobacter pylori, Klebsiella, Enterobacter, Serratia, Proteus, Providencia, Morganella, Pseudomonas spp.,Bacteroides&Prevotella.*

Gram-Negative Rods Related to the Respiratory Tract;*Haemophilusinfluenzae, Bordetella pertussis,* and *Legionella pneumophila*

Gram-Negative Rods Related to Animal Sources (Zoonotic Organisms);*Brucella*species,*Francisellatularensis, Yersinia pestis*, and *Pasteurellamultocida*

Mycobacteria, Actinomycetes, Mycoplasmas, Spirochetes, Chlamydiae, Rickettsiae, Minor Bacterial Pathogens

Basic Virology

Structure, Replication, Genetics, Classification of Medically Important Viruses, Pathogenesis, Host Defenses, Laboratory Diagnosis, Viral Vaccines.

Clinical Virology

Herpes Viruses, Rabies Virus, Polio Virus, Hepatitis Viruses, Human Immunodeficiency Virus, Dengue Virus.

Mycology

Basic Mycology, Cutaneous & Subcutaneous Mycoses, Systemic Mycoses, Opportunistic Mycoses,

Parasitology

Intestinal & Urogenital Protozoa, Blood & Tissue Protozoa, Minor Protozoan Pathogens, Cestodes, Trematodes, Nematodes.

Sterilization

Laboratory Exercises:

Each lecture will be followed by two hour practical class where the student will apply their theoretical knowledge in the understanding of related microbiological investigations, which have been proved useful for the diagnosis of human diseases.
During the other laboratory sessions, the students will be engaged in the preparation of media, the sterilization of glass ware, Antigens, Antibodies, Vaccines – haemolysin, permanent slides, laboratory reagents and also to assisting postgraduate students in the isolation of micro – organisms from clinical materials.

Practicals:

- Acute Inflammation

- Chronic Inflammation
- Necrosis
- Gangrene
- Pigmentation
- Calcification
- Urine Examination
- Sterilization
- Culture Media
- Antibiotic Sensitivity testing
- Culturing bacterial pathogens
- Examination of different clinical specimens
- Blood Culture
- Anaerobic Culture
- Gram Staining
- ZN Staining
- Biochemical tests to identify bacteria (Conventional, API 20E, API 20NE, Automated systems)
- PCR
- KOH preparation for scraping
- Stool Examination
- ELISA

RECOMMENDED BOOKS

1. Basic Pathology by Robbins Latest Edition
2. Clinical Pathology Interpretations by A.H. Nagi
3. Pocket Companion to Robbins, Pathologic basis of disease Cotran, Kumar
4. Theory and Practice of Histological Techniques by John D Bancrof

4. PUBLIC HEALTH LAB SCIENCES I

Sociology of Health and Disease

1. Evolution of Health & Healing,
2. Body, Mind, Illness and Environment
3. Theories, research and debates of medical sociology.
4. Social, environmental and occupational factors in health and illness;
5. The meaning of health and illness from the patient's perspective;
6. The historical transformation of the health professions and the health work force;
7. The social and cultural factors surrounding the creation and labeling of diseases;
8. Disparities in health, access to healthcare, and the quality of healthcare received;
9. Organizational and ethical issues in medicine including rising costs and medical technology; and health care reform.

Principles of Psychology

1. The Scope of Psychology
2. The Functions of the Brain
3. On Some General Conditions of Brain-Activity.
4. Habit
5. The Automaton-Theory
6. The Mind-Stuff Theory
7. The Methods and Snares of Psychology
8. The Relations Of Minds To Other Things.
9. The Stream of Thought.
10. The Consciousness of Self.

11. Attention.
12. Conception.
13. Discrimination and Comparison.
14. Association.
15. The Perception of Time.
16. Memory.
17. Sensation.
18. Imagination.
19. The Perception of 'Things'
20. The Perception of Space.
21. The Perception of Reality.
22. "Reasoning."
23. The Production of Movement.
24. Instinct
25. The Emotions.
26. Will.
27. Hypnotism.

Medical Anthropology

1. Introduction of Medical Anthropology
2. Culture and social aspects of the body, health, sickness and illness in the cross cultural prospective
3. Effects of culture on health
4. Medicalization
5. Authoritative knowledge and belief
6. Global inequities
7. The phenomenology of disability, death and role of medical schools
8. Understanding interpretive approaches, critical theory and phenomenology

Personal Hygiene

1. Introduction to Personal Hygiene
    - Hand wash
    - Eye hygiene
    - Hair hygiene
    - Body hygiene
    - Oral hygiene
    - Nails and cuticles
    - Feet and shoes
    - Protection from noise and UV Light
    - Control of foul odour
2. Role of personal hygiene in communicable and Non communicable diseases
3. Types of cleanliness (intrinsic & extrinsic)
4. Prevention of cough cold and other contagious disease
5. Smoking and protecting rights of others
6. Personal hygiene at home
    - Clothes
    - Kitchen
    - Washroom
7. Personal hygiene at schools
8. Personal hygiene at surroundings
9. Personal hygiene at work place
10. Cleanliness and religion

Professional Ethics

1. Understanding of the ethical problems and principles.
2. Understanding of the professionalism and ethics of other professions: how they interact and what can be expected from them as correct ethical behavior.
3. Benefit from a critical scrutiny of their own ethics by those from other professions.

4. The general principles of professional ethics.
5. Ethics of several major professions: Business Ethics, Media Ethics, Police Ethics, Medical Ethics, Legal Ethics, and Research Ethics.
6. The nature of a profession, professional codes of ethics, confidentiality, whistle-blowing.
7. The responsibility of business to the environment, uses and abuses of human research.
8. Animal ethics in research.

Health Promotion, Advocacy & Social Mobilization

1. Concept and Determinants of Health
2. Health Literacy and Health Communication
3. Introduction of Health Education
4. Introduction to Health Promotion
5. Ottawa Charter, Jakarta Declaration, Healthy Cities 2000
6. Advocacy, Community Participation, Enablers and Healthy Public Policy
7. Approaches to Health Promotion
8. Cultural Diversity in Health Promotion
9. Intervention Programs
10. Social Mobilization

Research Methodology

1. Introduction to Research Methodology
2. Types of Research
3. Selection of Research Topic
4. Formulation of Objectives
5. Literature Search
6. Writing Introduction
7. Plagiarism
8. Writing Methodology
9. Data Collection/Questionnaire Design
10. Analysis and Interpretation
11. Report Writing
12. Timeline (Gantt Chart)
13. Budget Plan
14. Research Ethics

Population Dynamics

1. Understanding demography and population dynamics
2. Demographic cycle
3. International demographic/population trends
4. Population dynamic in Pakistan
5. Life expectancy
6. Population dynamics verses national economy
7. Population transition

Concept of Health and Disease

1. Concept of health
2. Dimensions of health

3. Definition of health
4. Health spectrum
5. Determinants of health
6. Responsibility of health
7. Indicators of health
8. Concept of disease
9. Concept of causation
10. Levels of prevention
11. Historical background of public health
12. Evolution of public health
13. Definitions of common public health terms
14. Health for all

Primary Health Care

1. Introduction and Philosophy of PHC & HFA
2. Principles of PHC
3. Essential components of PHC
4. Barriers in implementation of PHC
5. Organization of PHC Services in Pakistan-1
6. Introduction to MDG's and SDG's
7. Introduction to National Health Programmes

Fundamental Principles of Infectious Disease

1. Infection, Contamination, Pollution, Infestation, Infectious Disease, Communicable Disease, Contagious Disease
2. Host, Immune and Susceptible Person
3. Sporadic, Endemic, Epidemic, Pandemic, Epizootic, Exotic and Zoonotic
4. Contact, Fomites, Carriers, Vectors and Reservoir of Infection
5. Incubation, Infective, Prodromal Period and Generation Time
6. Cross Infection, Nosocomial, Opportunistic Infection and Iatrogenic Disorders
7. Surveillance, Eradication and Elimination
8. Reservoir and Source of Infections
9. Escape of Organism, Mode of Transmission,Entry Into the Body, Susceptible Hostand Host Defenses (Immunity)
10. Controlling the Reservoir, Early Diagnosis and Treatment, Isolation, Quarantine, Disinfection Interruption of Transmission

Basic Epidemiology

1. Introduction to Epidemiology
2. Measures of Disease Frequency: Prevalence and Incidence
3. Measures of Mortality
4. Descriptive Study Designs
5. Analytical Study Designs
6. Measures of Association
7. Criteria for Causation
8. Screening

Basic Biostatistics

1. Introduction to Biostatistics and its Application in Research

2. Data: its Types, Sources and uses
3. Organizing and Displaying Data
4. Measures of Central Tendency and Measures of Dispersion
5. Introduction to Statistical Software
6. Probability
7. Normal Distribution
8. Sampling Techniques
9. Confidence Intervals for Mean
10. Confidence Intervals for Proportion
11. Hypothesis Testing
12. Introduction to Tests of Significance
13. Correlation and Regression

Community Nutrition

1. Introduction to Human Nutrition and Balanced Diet
2. Identification of Population at Risk
3. Factors Contributing to Community Nutritional Disorders
4. Healthy Nutrition for Pregnant Women, Lactating Mothers and Children
5. Problems Related to Procurement, Storage, Supply and Distribution of Food to the Vulnerable Groups
6. Adequate Supply of Food (quality and quantity)
7. International Food Organizations (WFO etc)
8. Politics in Food Supply
9. Food Supply to Drought , Earthquake, War and Refugees
10. Management of Nutritional Disorder Diseases in Communities

Community Pediatrics

1. Neonatal Care
2. Growth Monitoring
3. Promotion of Breastfeeding
4. Oral Rehydration
5. Immunization
6. Community Feeding
7. Nutritional Surveillance
8. Regular Health Check-ups

Environment& Occupational Health

1. Air Pollution, its Hazards and Prevention
2. Noise Pollution, its Hazards and Prevention
3. Water Pollution, its Hazards and Prevention
4. Water Purification
5. Radiation, its Hazards and Prevention
6. Waste Management
7. Ozone Layer Depletion
8. Climate Change and Global Warming
9. Introduction to Occupational Health
10. Evolution of Occupational Health (Labor Movements)
11. Occupational Health Hazards and its Prevention
12. Work Place Safety
13. Prevention of hospital based health hazards in hospital workers
14. Social Security
15. Prevention of Gender Harassment

4th Year:

1. Community Health, Research Methodology, Social and Behavioral Sciences — 100 Marks

2.	Special Pathology	200 Marks
3.	Public Health Lab Sciences II	200 Marks
4.	Medical Lab Reporting & Evaluation	200 Marks
	Report Writing	Qualifying
	Total Marks	**700 Marks**

1. COMMUNITY HEALTH, RESEARCH METHODOLOGY, SOCIAL & BEHAVIORAL SCIENCES

i. Community Health

Introduction; History of Community Medicine, Definition, concept of Health & illness of diseases and Natural History of diseases, levels & prevention

Environmental Sanitation & Medical Entomology; Water, waste disposal and Environmental problems & pollution

Genetics; Prevention of genetic diseases and Genetic counseling

General and Descriptive Epidemiology; Time, Place and Person

Analytical Epidemiology; Case control and Cohort studies

Experimental Epidemiology Randomized Control Trial.

Systemic Epidemiology; Vector borne diseases, Water borne diseases, Air born diseases, Contact diseases and Diseases of major public health and its importance along with national health programs wherever Applicable.

Non-Communicable Diseases; Diabetes, Hypertension, Heart diseases, Blindness, Accidents, Geriatric problems

Occupational Health Problems; M.C.H. and family welfare Programs, Health care delivery in the community, National Health Policy, National Health programs including, Rehabilitation, Evaluation of Health, Programs, Health Planning Organization,

Community Nutrition; Foundation and status in Pakistan masses. Community nutrition programs: key features, benefits, planning, implementation, evaluation. Nutritional status assessment: Anthropometric, Dietary, Biochemical, Clinical measurements. Community Nutrition and Dietetics profession. Steps of nutritional epidemiological study, Testing and Piloting of nutritional epidemiological study, Questionnaire design. Evaluation, sources of variation in the dietary intake, Methodological studies on dietary questionnaires.

Structure of Health Care System In The Country; P.H.C. district level, State level and central level. P.H.C. Organization and Function and Role of Non Governmental Organization

Health Education; Principles of Health Promotion, Methods, approaches and media for, I.E.C (Information, Education & Communication), Medical and Health/Information system, Mental Health and Nutrition.

Teaching Methodology; Types of health services, public, private, scientific, traditional health system, Organization of public services in health, central, provincial and local levels, Levels of health care, primary, secondary and tertiary, Planning and Organization of health services, Implementation, Evaluation of health services, Management of resources in health services, Financial management, Health education and social cultural concept Ethics in Health Services, Theories of learning facilitations.

ii. Research Methodology

Research Fundamentals; Research, Theory in Research, Research Ethics

Research Design; Research Problems, Questions, and Hypotheses, Research Paradigms, Design Overview and Research Validity

Experimental Designs; Group Designs and Single-System Design

Non Experimental Research; Overview of Non experimental Research, Clinical Case Reports, Qualitative Research, Epidemiology, Outcomes Research and Survey Research.

Measurement; Measurement Theory and Methodological Research.

Data Analysis; Statistical Reasoning, Statistical Analysis of Differences; The basics, Statistical Analysis of Differences; Advanced and special Techniques, Statistical Analysis of Relationships; The basics and Statistical Analysis of Relationships; Advanced and special Techniques

Implementing Research; Implementing a Research Project and Publishing and Presenting Research

iii. Social & Behavioural Sciences

Introduction of Sociology

Social Action And Interaction; Social processes, Co-operation, Competition, Conflict and Accommodation.

Social Groups; Primary-Secondary, In and Out Group and Reference group

Culture; Values, Beliefs, Sanctions, Cultural relativism and Ethnocentrism, Norms, Folk ways, Conflict, Deviancy and Social control.

Socialization and Personality formation

Social Institution; Meanings, Social stratification and Meanings and Forms (Classes and Castes)

Social and Cultural Change; Factors promoting and resisting social change

The Field Of Medical Sociology; Contribution of Sociology in Health. Environmental pollution and Health, Patient, Healthcare provider relationship. Role of Healthcare provider and attendants in the managements of patient.

Introduction of Behavioural Sciences; Understanding Behaviour. Sensation, sense organs / special organs, Perception and factors affecting it, Attention, concentration, Memory, types and methods to improve it, Types and theories of thinking, Cognition and levels of cognition, Problem solving and decision making strategies, Communication Its types.

Personality and Intelligence; Psychological growth and development, Personality, theories and Factors affecting personality development, Assessment of personality Influence of personality in health, disease, hospitalization, stress, etc, Intelligence and its types Relevance of IQ and EQ Methods of enhancing EQ and IQ Factors affecting intelligence and their assessment

Stress Management

Doctor – Patient Relationship; Concept of boundaries and psychological reactions in doctor – patient relationship.

Pain, Sleep and Consciousness; Concept of pain, sleep and consciousness, Attend states of consciousness, Psychological influence on sleep and consciousness, Non-pharmacological methods of inducing sleep, Changes in consciousness.

Communication Skills; Principles of effective communication. A practical method of communication between the doctor and patient about disease, drugs, prognosis etc

Interviewing; Types of interview and Skills of interviewing

Health Psychology

Psychology in clinical management of patients, Psychological therapies, child's social and cognitive development, Psychological changes during adolescence, old age and their clinical management, Impact of illness on a patient's psychological well being. Association between psychological stress and physical well being, Role of doctor in patient reassurance.

Social And Community Perspective; Inequalities Ethnicity, culture and racism, Gender and Healthcare and Influence of health. Illness on behaviour

Application of Behavioural Principles In Health and Disease; Mentally / emotionally and physically handicapped, Homebound and medically compromised.

Recommended Text Books:

1. Text book of Community Medicine by: Park J E. Latest Edition
2. Horton, Paul B. and Chester L. Hunt, 1984 Sociology, Singapore: Megraw Hill Book Co.
3. Moon, Graham, 1995. Society and Health; An introduction to Social Science for Processionals, London: Routledge.
4. Rehabilitation Research (Principles and Applications) 3rd Edition By Elizabeth Domholdt
5. Textbooks of Community Medicine, by Prof. H. A. Siddique (2nd Edition).
6. A Handbook of Behavioural Sciences for Medical and Dental Students By: M H Rana, S Ali and M Mustafa, , University of Health Sciences Lahore
7. Developmental Psychology for Healthcare Professions By: Katherine A Billingham

2. SPECIAL PATHOLOGY

Theory:

The course outline is as follows:-

1. Blood Vessels & Heart,
2. Hematopoietic and Lymphoid Systems
3. Respiratory System
4. The Urinary System
5. Musculoskeletal System
6. Endocrine System
7. Nervous System

Practicals:

Basic principles of lab works, Hematopoietic System (ALL, CLL,AML, CML), Musculoskeletal System (Osteogenic sarcoma & Giant cell tumor), The Skin (Squamous cell carcinoma & Basal cell carcinoma), Endocrine System (Thyroid tumors, Colloid goiter, Follicular adenoma & Papillary carcinoma thyroid, Pituitary, Causes of hyperpituitrism & lab. Diagnosis, Causes of biliary, bitarism & lab. Diagnosis, Thyroid, Thyroid function test, Causes of hyperthyroidism & lab. Diagnosis, Causes of hypothyroidism & lab. Diagnosis, Parathyroid, Hyperparathyroidism, Hypoparathyroidism, Hypercalcemia, Hypocalcemia, Diabetes mellitus, Lab. Diagnosis & GTT, Diabetic ketoacidosis), Liver, gall bladder and biliary tract, Chronic cholecystitis, Hepatocellualr carcinoma & Liver cirrhosis), Nervous System (Meningioma etc), Basics of Histopathology / tissue Processing, Bone Marrow Biopsy

Recommended Books:

1. Pathological Basis of Disease by Kumar, Cotran, Robbins. 7th. Ed.
2. Medical Microbiology and Immunology by Levinson and Jawetz, 9th Ed. Mc Graw-Hill

3. Clinical Pathology Interpretations by A.H. Nagi

3. PUBLIC HEALTH LAB SCIENCES II

Applied Epidemiology

The contents of the course are as follows:

1. Disease frequency: Incidence and Prevalence

2. Proportional Morbidity and mortality
3. Details of measures of association and inference in cohort and case control studies
4. Further applications of Chance, confounding and bias in studies.
5. Interaction and effect modification.
6. Issues in screening.
7. Survival time analysis.
8. Standardization techniques in epidemiological studies.
9. Parametric test: ANOVA
10. Non Parametric tests: Chi square test for several proportions, n × k tables and tables with ordered data, Fisher's exact test, non-parametric tests for a single or more than one samples e.g. Wilcoxon's Rank sum tests, Mann-Whitney U-tests.
11. Partial correlation coefficients, coefficient of determination.
12. Multiple regression and
13. Logistic regression

Epidemiology of Infectious Diseases

1. Disease Spread Through Respiratory Tract
2. GIT Infections
3. Vector-Borne Diseases
4. Zoonotic Diseases
5. Contagious Diseases
6. Surface Infections
7. Sexually Transmitted Infections
8. Emerging and Re-emerging Diseases

Non Communicable Disease Epidemiology

1. Hypertension
2. Coronary Heart Diseases
3. Stroke
4. Cancers
5. Blindness
6. Diabetes Mellitus
7. Obesity
8. Injuries and Accidents

Reproductive Health

1. Introduction to Reproductive Health and Life Cycle Approach
2. ICPD
3. Reproductive Behavior
4. Safe Motherhood
5. Breastfeeding
6. Contraception
7. STI's
8. Reproductive Health Rights
9. Gender Power and Reproductive Health
10. Infertility

Health Policy and Management

1. Introduction to Health Management
2. Strategic Management
3. Planning
4. Organization
5. Monitoring
6. Evaluation
7. Pakistan Health Policy 2009
8. Health Financing

9. Stewardship
10. History of Health Policy in Pakistan
11. Determinants of health policy

Health Planning

1. Importance and Significance of Planning
2. Understanding the Planning Concepts
3. Planning Models
4. Types of Plans
5. Planning Process
6. Planning Tools
7. Planning Commission of Pakistan
8. Role of ECNEC in Planning
9. Planning for Planning

District Health Management

1. Introduction to Healthcare Care Delivery System In Pakistan{Public and Private Sector}
2. Organization of Health Care System in a District
3. Healthcare Services Delivered at Different Tiers of District Health Management Services.{Minimum Service Delivery Standards}
4. Health Information System at District Level.
5. Organization and Functioning of Dispensary,MCHC, BHU, RHC, THQ, DHQ,
6. Referral Chain of Patient from BHU to DHQ and onwards
7. Duties of Different Health Care Providers Employed in District Health Management.
8. Role of District administration in district health management
9. Nazim and its part in district health management

Health Professional Education

1. Theories of learning and skill development
2. Student-centered learning, active learning, deep learning, col laborative learning
3. Conditions of learning: characteristics of powerful learning environments
4. Using reflective practice to promote learning
5. Educational principles and theories related to clinical teaching and learning
6. Identify different approaches to curriculum development and their underlying philosophies
7. Identify local, national and international drivers which shape curricula in medical education
8. Design and critique programmes (courses) and modules (components of courses) in medical education
9. Design and critique evaluation strategies and models for programs and modules
10. Develop assessment strategies
11. Design assessment tasks appropriate to a range of learning outcomes
12. Research approaches, methods and techniques in health professions education

Mental Health

1. Introduction to Mental Health
2. Prevention of Mental ill Health and Promote Mental Health
3. Risk and Protective Factors for Mental Disorders
4. Socioeconomic Determinants of Mental Health
5. Mental Health and Quality of Life
6. Strengthening Community Network
7. Reducing Harm from Addictive Substances
8. Prevention of Child Abuse and Neglect
9. Coping with Parental Mental illness
10. Management of Mental Health in Rehabilitation Centers

Disaster Management

1. Concept of Disaster
2. Types of Disaster
3. Effect of Disaster on Health
4. Elements at Risk in Disaster
5. Disaster Management Cycle
6. Role of Public Health in Disaster
7. Role of NDMA in Managing Disaster
8. Health Education for Disaster Safety
9. Public Health Review
10. Interdisciplinary Disaster Planning
11. Community Level Preparedness
12. Disaster Mitigation and Post-Event Response
13. Risk Communications
14. Environmental Health Degradation
15. Mental Health Challenges of a Disaster
16. Monitoring and Evaluation of Recovery Efforts

Adolescent and Sexual Health

1. Welcome, introductions, course overview, ground rules, expectations
2. Empowerment, oppression, privilege, social justice
3. Anatomy&PhysiologySexualResponse CycleMenstrual Cycle, Conception, Contraception
4. Sexually Transmitted Infections
5. HIV/AIDS
6. Sexual Assault
7. Gender, Sexual Orientation, Heterosexism&Homophobia
8. Technology & Sexuality
9. Relationships & Communication
10. Body Image, Media & Sexuality

Microbiology

Fundamentals of Microbiology

2. Introduction to Medical Microbiology
3. Gen.Immunology
4. Microbial Taxonomy
5. Gen.Virology
6. Mycology

Entomology

1. Classification of Arthropod Vectors, General Characteristics of Arthropods, Mites & Ticks
2. Insects

3. Lice Bugs & Fleas
4. Flies
5. Mosquitoes
6. Common Arthropod Borne Diseases
7. Arthropods of Medical Importance (Mosquito, Flies, Flees, Ticks, Mites and Human Lice)
8. Principles of Arthropods Control (Environmental, Chemical, Biological and Genetics)
9. Insecticides and Their Public Health Importance

Parasitology

1. Identification of parasites

2. Life cycles.

3. Epidemiological factors.

4. Host-parasite relationships.

5. Immunity to parasites.

A. Protozoa

- Plasmodium and Malaria
- EntameobaHistolytica and Dysentery
- Giardia Lamblia and Giardiasis
- Trichomonas and Trichomoniasis
- Leishmaniaand Leishmaniasis

B. Helminths

- Taeniasaginata, Ancylostomaduodenale, Ascaris, enterobiusvermicularis and worm infestation

C. Ectoparasites

- Pediculushumanus and Head lice
- Sarcoptesscabei and scabies

1. Recent molecular techniques.

2. The appropriate preventive and control measures.

International Health

1. Introduction to the Concept of International Health
2. International Health Organizations
3. Strengthening Health Security by implementing the international health regulations
4. Global System for Alert and Response
5. IHin Context of Multi-Hazard Dimension
6. Country Capacity Building for International Health
7. International Travel, Health & Mass Gatherings
8. Public Health at Ports, Airports, Entry and Exit Points on Borders
9. IHR Procedure and Implementations

School Health

1. Objective of school health services
2. School health team
3. Duties of School medical officer
4. Duties of School health nurse
5. Medical inspection of school children
6. Common school health problems
7. Infectious diseases in schools

8. Healthy school environment
9. Role of teacher in school
10. School health services on Pakistan
11. Models of school health services
12. The Health Needs of School-Age Children
13. School health education program, Planning and implementation

Field Visits

Seminars by students

4. MEDICAL LABS REPORTING AND EVALUATION

Purpose of this subject to make technologist be responsible for the supervision and operation of a relevant clinical laboratory within the field of specialization indicated by the title within the group, to perform the most difficult and highly complex test, analyses and examinations within the assigned laboratory, and to do related work as required.

INTRODUCTION TO PRINCIPLES OF GOOD LAB PRACTICE: Introduction, The fundamental points of good lab practice, The good lab practice principles, Internal Audit, External Audit, Proficiency testing, Accreditation, Lab Record Keeping, Laboratory information system, Optimizing Laboratory workflow and performance Procurements of Lab Consumables and instruments, Budgeting of Labs Inspections of Labs

RESOURCES; Management, Personnel, Facilities : buildings and equipment

CHARACTERIZATION & THE TEST ITEM: Date of dispatch, Number of containers or items, type of contents and quantity, identity of the test item, batch numbers, identity of the person responsible for the dispatch, Name of the transporter and type of carrier.

QUALITY ASSURANCE: Protocol (or study plan) review, Sop review, Planning (master schedule, inspection plan), Audits and inspections, Quality assurance statement, Qa inspections of suppliers and contractors, Issuing and archiving of QA files and reports.

INTERPRETING AND CORRELATING ABNORMALLABORATORY VALUES:

General Considerations, Fundamental Principles in Interpretation of Values

REPORTING OF ABNORMALITIES IN THE HEMATOLOGY PROFILE:

Anemias, Microcytic Anemia, Normocytic Anemia, Macrocytic Anemia, Low White Cell Counts, Coagulation Disorders, Bleeding Time Measures Platelet Function, Major Causes of Increased PT or APTT, The Other Cause of Isolated PT or APTT is Coagulation, Factor Deficiency, The Major Cause of Elevated PT and APTT is DIC.

REPORTING OF ABNORMALITIES IN CLINICAL CHEMISTRY

Hyponatremia, Pseudohyponatremia, Hypernatremia, Hypokalemia, Hyperkalemia, Renal Disease, BUN, Creatinine, Calcium and Phosphate, Calcium and Albumin, Glucose Abnormalities, Other Abnormal Laboratory findings in Diabetes Mellitus, Liver Function Tests, Correlations of Liver Function Test Results With Other Laboratory Findings

Cardiac Function Tests, Diagnosis of Myocardial Infarction and Acute Coronary Syndrome, Diagnosis of Congestive Heart Failure, Markers for Inflammatory Conditions

Thyroid Function, Adrenal Function.

REPORTING OF INFECTIONS (MICROBIOLOGY REPORTING)

General consideration, Antibiotic sensitivity, Urine Complete examination, Faecal examination, Direct Microscopy, Staining, Reporting of bacterial culture, Reporting of fungal culture, Reporting of viral culture, Reporting of bacterial infection, Reporting of fungal infection, Reporting of viral infection, Reporting of PCR.

REPORTING OF ABNORMALITIES IN THE IMMUNE SYSTEM

Reporting ofAllergy, Reporting ofHypersensitivity reactions, Reporting of Immune deficiency

Reporting of Autoimmune diseases, Reporting Of Immunological Diseases; Acetylcholine receptor, Graves' disease, Insulin-resistant diabetes, Systemic lupus erythematosus, Rheumatoid arthritis, Rheumatic fever, Hemolyticanemia, Idiopathic thrombocytopenic purpura, Goodpasture's syndrome, Pernicious anemia, Hashimoto's thyroiditis, Insulin-dependent diabetes mellitus, Acute glomerulonephritis, Guillain-Barré syndrome,

IgA nephropathy, Allergic encephalomyelitis and multiple sclerosis.

Practicals:

General aspects of report

Components of report

General Pattern of lab report

Interpretation of Lab reports

Normal and abnormal values Hematology reports

Normal and abnormalvalues Chemical pathology reports

Normal and abnormalvalues Microbiological reports

Normal and abnormalvalues Immunological reports

Abnormal aspects of reports

RECOMMENDED BOOKS

1. Basic Pathology by Robbins Latest Edition
2. Clinical Pathology Interpretations by A.H. Nagi
3. Pocket Companion to Robbins, Pathologic basis of disease Cotran, Kumar
4. Theory and Practice of Histological Techniques by John D Bancrof

REPORT WRITING (Applicable to all Lab Sciences)

In Final Year the students will be given a particular topic for research report writing. A Supervisor shall be allotted by the Incharge / Chairperson and approved by the concerned Dean, to a group of up to 10-25 students in one group. The Supervisor shall allot a specific topic for research. The group of students shall prepare a research report and submit it to the Incharge / Chairperson of department through allotted Supervisor for approval. This report shall be evaluated by a committee notified by the Dean after recommendation by the Incharge / Chairperson, comprising of 03 senior most teachers of the department. If approved the group of students shall be confirmed for award of degree. The details of the report are given below.

- Title page
- Names of students
- Students I.D number
- Supervisor's name

- Program name
- Name of the department
- Project title
- Abstract

Abstract

A maximum of one page (200 words) on the work performed and your main conclusions. Abstract should be single line spacing, should not contain any figures, contain a maximum of 2 references, and written in Arial / New Times Roman font size II. The title of the project should be on the first line (Arial / New Times Roman size 11, bold). The name of the student and their supervisor should appear on the next line (Arial / New Times Roman size 11, italic).The abstract should be then be included as a single paragraph. References (if required) should be included at the end (Arial / New Times Roman, size 9).

Points into account while writing Abstract

Explain the purpose of your study/paper. This should optimally be only one sentence long. State the primary objectives and scope of the study or the reasons why the document was written (unless these things are already clear from the title of the document or can be derived from the rest of the abstract). Also state the rationale for your research. Why did you do the research? Is the topic you are researching an ignored or newly discovered one? In terms of Methodology (research methods), clearly states the techniques or approaches used in your study. If you want to introduce new methods or approaches in your abstract, keep in mind the need for clarity.

Describe your results (the findings of your experimentation), the data collected, and effects observed as informatively and concisely as possible. These results of course may be experimental or theoretical, but remember the difference between conjecture and fact and note them in your abstract. Give special priority in your abstract to new and verified events and findings that contradict previous theories. Mention any limits to the accuracy or reliability of your findings.

By stating your conclusions, you are in essence describing the implications of the results: why are the results of your study important to your field and how do they relate to the purpose of your

Investigation? Often conclusions are associated with recommendations, suggestions and both rejected and accepted hypotheses. You may wish to include information that is incidental to the main purpose of your paper, but is valuable to those outside your area of study. If you choose to include such information, be careful not to exaggerate its relative importance to the abstracted document

Declaration of Originality

Place on a separate page;

"We hereby declare that this project is entirely our own work other than the counsel of our supervisor and that it has not been submitted for any academic award, or part thereof, at this or any other Educational Institution"

Signed: Authors

Counter signed: Supervisor

Acknowledgements (Optional)

To include those individuals or groups of individuals you would like to thank in relation to the support you received.

Table of Contents

You should list all of the sections and sub-sections, together with their corresponding page numbers

List of Tables

List of Figures

List of Appendices

Suggested Chapter Structure

The following outlines a chapter structure suitable to a project, which involved a distinct component of data collection. The structure of the main body is flexible and you should discuss an appropriate structure with your supervisor. The content and importance of each section will depend on the type of project you are undertaking and again should be discussed with your supervisor before submission.

Chapter 1. Introduction

i) Introduction (Very brief review of literature and indicate significance of study)

ii) Statement of Problem (Should include clear purpose of study)

iii) Questions/Hypothesis

iv) Outline Methodology

v) Definition of Terms

The introduction should 'set the scene' for the examiners and enable them to appreciate the relevance of your work in a particular research area.

Chapter 2. Literature Review

A literature review is an extended essay, which is based on source material. In simple terms, the merit of your literature review is proportional to the comprehensive nature and originality of your sources. Your writing should be confined to the questions/hypothesis being examined. A literature review is more than a listing of references. You should attempt to synthesize a new understanding of your topic, and provide a critique of what other commentators have had to say on the subject.

Chapter 3. Methodology

i) Participant Selection (Including ethical considerations)

ii) Experimental Design

iii) Measurement Procedures

- Data collection procedures
- Rationale for selecting these procedures/questions

iv) Analysis of Data

The methodology should describe the characteristics of the subjects, award of ethical approval, and where appropriate the apparatus, calibration procedures, reliability of the methods used, experimental protocols and the statistical treatments of the data. Diagrams and photographs may be appropriate to illustrate procedures.

Chapter 4. Analysis of Results

Your results should consist of tables of your findings, illustrated with graphs where appropriate. The results section should contain text, which takes the reader through your graphs and tables, pointing out the salient features. Tables should wherever possible summarize the data from several subjects in the form of means and standard deviations. You do not need to give tables of every piece of original data. If you feel it is essential to include these put them in an appendix.

Chapter 5. Discussion of Results

It is good practice to begin with a summary of your findings. This is your opportunity to interpret your data in the context of what is already known from existing literature. However, make every effort to explain your findings first, justifying the arguments by reference to previously published work, NOT the other way around. The discussion is the place for explanations and opinions. Link your findings with the purpose/questions/hypothesis of your project. Include critical appraisal of your own work and that of others. Address what you would do differently with hindsight?

Chapter 6. Conclusion

- Summary of main findings
- Recommendations (Impact of findings and future research)
- Conclusion

This section should summarize main findings, highlight areas where more work is needed and suggest avenues for future development of this work. An overall conclusion from the study should be included to complete the project.

References: A list of references must be included at the end of the project document and appropriately referenced within the text according to a recognized standard of the University.

Appendices: In this section, if required, include any raw data, interview transcript, computer program listings, and questionnaires etc., which were not in the results section, but which may need to be consulted.