FACULTY OF HEALTH & MEDICAL SCIENCES

INSTITUTE OF ALLIED HEALTH SCIENCES

CURRICULUM

BS OPTOMETERY AND VISION SCIENCES

Dec 2014 (Aug 2020 Revised)

AZAD JAMMU & KASHMIR University
MUZAFFARABAD

Associate Dean
Dr. Bashir ur Rehman

CONTENTS

Copyright information
Bachelor of Science in Cardiovascular technology

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Notice

Information provided in this book reflects the curriculum structure and academic polices as by the time of production. To keep updated with the latest development, readers are encouraged to visit the course page at the website the faculty of health and Medical sciences university of AJK

Dean's welcome

Dear student and prospective student,

I welcome you wholeheartedly to the faculty of health and Medical sciences at the University of Azad Jammu & Kashmir.

The Optometrists are highly qualified medical professionals who have the satisfaction of helping their patients care for the most highly valued human sense—sight. All optometrists provide general eye and vision care. With favorable working conditions, regular hours, and a minimum of emergency calls, optometry offers many career options and great freedom in choosing a location to live and practice. Today, the profession of optometry involves much more than just prescribing and fitting glasses and contact lenses. BS Optometry is trained to evaluate any patient's visual condition and to determine the best treatment for that condition. They are viewed more and more as primary care providers for patients seeking ocular or visual care. Most optometrists are in general practice, while others are involved in specialty practice such as cornea and contact lenses, geriatrics, low vision services, environmental and occupational vision, pediatrics, sports vision, vision therapy, and ocular disease and special testing. Still others choose to enter optometric education and/or perform scientific research. Optometrists practice in rural communities, suburban areas, and large metropolitan cities. Some practice alone while others are in group practices. Some optometrists practice with other health care professionals in multidisciplinary settings. Other optometrists choose a career in the military, public health, or other government service. Opportunities also exist to practice in hospitals, clinics, teaching institutions, and community health centers, the ophthalmic industry, HMOs and retail optical settings. After completing the course, you will be offered of bachelor of sciences degree that qualified you to work as an optometrist. It is designed in a way that offer you the most interactive, informal and encouraging environment conducive to learning, you will be encouraged to think critically. To seek knowledge yourself and translate theory in to practice.

Our curriculum is based on the art and sciences of helping you learn, the principles of over educational philosophy are that you are self-directed learners, have rich experience and knowledge on which to draw, desire to learn to better handle real life situations, and see education as a process that and increases competence and leads to achievement of your full potential.

Last but not least, every facility that makes you enjoy learning shall be at your disposal. I am confident that you will excel in this program and wish you all the best.

Dr. Bashir Ur Rehman

Associate Dean Faculty of Health and Medical Sciences.

Objectives and curriculum

The four-year professional optometry curriculum includes instruction in all the clinical and practical phases of optometry as well as in the theoretical and fundamental aspects of vision science.

UAJ&K Optometry degree course is designed to provide the theoretical and practical training to equip graduates with advanced clinical skills which they will use to work as independent eye care professionals.

The specific objective of the programme is to produce optometrists with capabilities to:

- Function effectively and efficiently and exhibit ethical behavior in an optometrist role,
- Complete all work in accordance with legal and ethical requirements of field, using accepted safety practices, and appropriate terminology specific to the occupation and industry.
- Operate sophisticated medical equipment to assist physician in the diagnosis and treatment of eye's disorders.
- Detect sight problems and prescribe and fit glasses as well as contact lenses and other visual aids and also detect and manage a variety of eye conditions such as Glaucoma and Age-related macular degeneration.
- Detect corneal abrasions, ulcers, or infections; glaucoma; and other eye diseases that require treatment with pharmaceutical agents, management and referral when necessary
- Detect visual skill problems such as the inability to move, align, fixate and focus the ocular mechanism in such tasks as reading, driving, computer use, and in tasks related to hobbies and employment
- Detect the inability to properly process and interpret information requiring perception, visualization, and retention, such as that needed for most learning tasks
- Diagnose poor vision-body coordination as one interacts with the environment as in sports, occupations, and other everyday activities requiring spatial judgments
- Diagnose clarity problems such as simple near- or far-sightedness or complications due to the aging process, disease, accident or malfunction.
- Additionally, diagnose, manage, and refer systemic diseases such as hypertension, diabetes, and others that are often first detected in the eye; provide pre- and post-surgical care for cataracts, refractive laser treatment, retinal problems, and other conditions that require pre- and post-surgical care, and encourage preventative measures such as monitoring infants' and children's visual development, evaluating job/school/hobby related tasks, and promoting nutrition and hygiene education.

- Perform tasks that can be challenging, like removing a foreign body from the cornea, evaluating a child who is not performing well in school, fitting a contact lens patient, prescribing medication for glaucoma, providing follow-up care after refractive surgery, and fitting a legally blind patient with a magnifying device that will enable the patient to read.
- The curriculum is designed to prepare students to work anywhere in Pakistan and abroad. In this regard, the curriculum meets international standards in certification and ensures that students master world-class performance competences. Subjects are taught over eight semesters, the duration of each semester is 20 weeks. A maximum of 18 credits can be obtained in a single semester. The bachelor degree is awarded when the students accumulate a total of 124 credits.
- In the fourth study year students are required to complete an eight weeks practicum in an accredited institution, attend particular honors seminars, undertake independent research and write an honors thesis in a major subject.

Title of Degree: **BS OPTOMETERY AND VISION SCIENCES**

Minimum Duration: **08 semesters**
First four semesters on Campus
Last four semesters in Teaching Hospitals

Total Duration: **08-12 semesters**

Total Credit Hours: **124 credit hours**

List of Affiliated Teaching/Training hospitals:

- **Sheikh Khalifa Bin Zayed Al Nahyan /Combined Military Hospital CMH Muzaffarabad**
- **Abbas institute of medical sciences**
- **Divisional Head Quarter Hospital Mirpur**

Academic Regulation

Attendance

Regular class attendance is important and expected. The Faculty of Health and Medical Sciences considers both tardiness and early departure from class forms of absenteeism. Students absent from class for all work missed.

Grade	Numerical Equivalent	Grade Point/ Letter Grade
A	90--100%	A+
B	80—89.9%	A
C	70—79.9%	B+
D	65—71.9%	B
E	50—64.9%	C
F	Below 50% (Course with Draw)	F

Instruction have the right to determine whether work missed can be made up and have the liberty to set reasonable expectations for attendance based on frequency of class meetings and on the instruction delivery method, Subject, type, and level of the class attendance policies will be clearly stated for students by their respective instructors on separate documents (Course outlines/schedules) or appendices to the syllabus.

ASSESSMENT CRITERIA (*According to the Credit hours of each course):*

The students will be assessed on both verbal and written performance shown in the class according to the following criteria:

Course with Lab 3(2, 1)

S. No	Assessment Task	Frequency	Total Marks
1	Terminal	1	50
2	Midterm	1	30
3	Lab/Viva	1	50
4	Quiz(One Before midterm, One before Terminal)	2	10
5	Assignment(One Before midterm, One before Terminal with final presentation)	2	10

Course without Lab 3(3,0)

Sr.No	Assessment Task	Frequency	Total Marks
1	Terminal	1	75
2	Midterm	1	45
3	Quiz(One Before midterm, One before Terminal)	2	15
4	Assignment (One Before midterm, One before Terminal with final presentation)	2	15

Course without Lab 2(2,0)

Sr.No	Assessment Task	Frequency	Total Marks
1	Terminal	1	50
2	Midterm	1	30
3	Quiz(One Before midterm, One before Terminal)	2	10
4	Assignment (One Before midterm, One before Terminal with final presentation)	2	10

Work Ethics

To fulfill the responsibility to teach essential workplace ethics, the Faculty of Health and Medical Sciences evaluates program students on attendance, attitude, productivity, organization skills, communication, cooperation, and respect. Because students are preparing for employment, it is essential that they become accustomed to standards of behavior in the workplace. At the conclusion of the course, faculty members assign separate numerical work ethics grades which appear beside the course letter grades on both transcripts and grade reports. The work ethics grading scale is as follows:

- (Exceeds Expectations),
- 2 (meets Expectations)
- 1 (Needs Improvement), and
- 0 (Unacceptable).

Academic Honesty

Academic honesty is expected at all times. Any student found to have engaged in academic misconduct such as cheating, plagiarism, or collusion is subject to disciplinary sanctions. The term "Plagiarism" includes, but is not limited to, the use, by paraphrase or direct 1uotation, of the published or unpublished work of another person without full and clear acknowledgment. The term "collusion" includes, but is not limited to, the unauthorized collaboration with any other person in preparing work offered for academic credit. Student are advised that faculty routinely use turnitin. Com both to prevent plagiarism and to assist in verifying when/ if it has occurred.

Course withdrawal

Students may withdraw from a course without academic penalty until the mid-point of the course. By withdrawing before the midpoint of the course, the student is automatically assigned a grade of w which does not affect cumulative grade point average.

Students who stop attending class(es) without formally withdrawing risk earning a final grade of F, which will appear on the academic transcript.

Phones and other Device

Students are strictly prohibited from using cell phones and personal electronic devices within learning facilities without the explicit permission of a Faculty or staff member.

Food & Drinks in Classroom

Food and beverages (other than water) are not allowed in classrooms/labs.

Grading of Clinical Courses

Grading the clinical grade will be based on the following

- Competencies (25%)
- Terminal Competency Eval. (15%)
- Clinical Participation (20%)
- Faculty Evaluations (30%)
- Professional characteristics (5%)
- Staff Evaluations (5%)

Clinical Participation will be calculated as follows:

- Two tardies (arriving more than five minutes late or leaving early) = 1 absence
- Perfect attendance = 0 absence = 100% of pts.
- Above average attendance – 1 absence = 90% of pts
- Poor attendance = 3 absences = 0% of pts
- Clinical compliance checks will be made periodically by the faculty

Removal from clinical site

The Faculty of Health & Medical Sciences

Sciences agreements with its affiliates that provide opportunities for internship, clinical, practicum, or similar experiences stipulate that the college remove immediately any student who violates host site policies or procedures or who fails to observe all rules, regulations, dress codes, and other requirements or expectations of the affiliate at its request. Students are hereby informed that such removal may result in their inability to complete required portions of the curriculum (and thus to graduate) and in consequences up to and including dismissal from the program and /or college according to the policies and procedures outlined in this publication. Faculty are not required to find alternate locations to complete assignments.

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SCHEME OF STUDIES
BS OPTOMETERY AND VISION SCIENCES

1st Semester

Code	Course Title	Credit Hour
BMT-3101	Anatomy– I	3 (2 + 1)
BMT-3102	Physiology – I	3 (2 + 1)
BMT-3103	Biochemistry – I	3 (2 + 1)
BMT-3104	Microbiology – I	3 (2 + 1)
BMT-3105	Pakistan Studies	3 (3 + 0)
BMT-3106	Introduction to Computer & IT	3 (3 + 0)
Total Credit Hours		**18**

2nd Semester

Code	Course Title	Credit Hour
BMT-3201	Pathology	3 (3 + 0)
BMT-3202	Anatomy– II	3 (2 + 1)
BMT-3203	Physiology – II	3 (2 + 1)
BMT-3204	Biochemistry – II	3 (2 + 1)
BMT-3205	Microbiology – II	3 (2 + 1)
BMT-3206	Islamic Studies	3 (3 + 0)
Total Credit Hours		**18**

3rd Semester

Code	Course Title	Credit Hour
BMT-4301	Pharmacology-I	2 (2 + 0)
BMT-4391	Ocular Anatomy	2 (2 + 0)
BMT-4392	Ocular Physiology	2 (2 + 0)
BMT-4393	Ocular Pathology	2 (2 + 0)
BMT-4394	Public and preventive health	2 (2 + 0)
BMT-4395	Basic clinical functions and skills	2 (2 + 0)
BMT-4305	Arabic	3 (3 + 0)
Total Credit Hours		**15**

4th Semester

Code	Course Title	Credit Hour
BMT-4401	Pharmacology – II	2 (2 + 0)
BMT-4491	Basic Optics and Refraction	2 (2 + 0)
BMT-4492	Geometrical Optics	2 (2 + 0)
BMT-4404	Applied Physics and Engineering Sciences	2 (2 + 0)
BMT-4405	Epidemiology and Biostatistics	2 (2 + 0)
BMT-4406	English Communication Skill	2 (2 + 0)
BMT-4493	Basic Dispensing Optics	2 (2 + 0)
BMT-4494	Physical Optics	2 (2 + 0)
Total Credit Hours		**16**

5th Semester

Code	Course Title	Credit Hour
BMT-5591	Primary Health Care & Primary Eye Care	3 (3 + 0)
BMT-5592	Overview of Blindness and National Program for Prevention & Control of Blindness in Pakistan	2 (2 + 0)
BMT-5593	Advanced Refraction & Retinoscopy	2 (2 + 0)
BMT-5594	Practical Retinoscopy	2 (2 + 0)
BMT-5595	Ophthalmic Instruments & their Maintenance	3 (3 + 0)
BMT-5596	Advance Visual Optics & Advance Visual Functions	3 (3 + 0)
Total Credit Hours		**15**

6th SEMESTER

Code	Course Title	Credit Hours
BMT-5691	Orthoptics Techniques & contact Lenses	3 (2 + 1)
BMT-5692	Application of Advanced Visual Functions	2 (2 + 0)
BMT-5693	Clinical Optometry & Dispensing Optics	2 (2 + 0)
BMT-5694	Avoidable & Unavoidable Causes of Blindness	2 (2 + 0)
BMT-5695	Ocular Motility & Binocular Single Vision	3 (3 + 0)
BMT-5696	OPD Training in Optometry	2 (2 + 0)
	Total Credit Hours	**15**

7th SEMESTER

Code	Course Title	Credit Hours
BMT-6791	Advanced Diseases of Eye & Their Management	3 (3 + 0)
BMT-6792	Clinical Orthoptics-I	2 (2 + 0)
BMT-6793	Applied Statistics, Research Methodology & Project	3 (3 + 0)
BMT-6794	Introduction to Bio Medical Ethics	3 (3 + 0)
BMT-6795	Visual Sciences 1,2,3,4	2 (2 + 0)
BMT-6796	Low Vision	2 (2 + 0)
	Total Credit Hours	**15**

8th SEMESTER

Code	Course Title	Credit Hours
BMT-6891	Review of Basics of Vision and Optics	3 (3 + 0)
BMT-6892	Binocular Vision & its Clinical Application	3 (3 +)
BMT-6893	Clinical Orthoptics-II	2 (2 + 0)
BMT-6894	Dispensing Optics	2 (2 + 0)
BMT-6895	OPD Training in Orthoptics	3 (2 + 1)
BMT-6896	Bachelor Thesis	3 (3 + 0)
	Total Credit Hours	**15**

1ST SEMESTER

BMT-3101– ANATOMY– I

ANATOMY- I **CREDIT HOURS 3(2+1)**

COURSE DESCRIPTION

The focus of this course is an in-depth study and analysis of the general and regional organization of the human body. Emphasis is placed upon structure and function of human movement. A comprehensive study of human anatomy histology, embryology, with emphasis on the nervous, musculoskeletal, and circulatory systems is incorporated. Introduction to general anatomy lays the foundation of the course. Dissection and identification of structures in the cadaver supplemented with the study of charts, models, projected materials and radiographs are utilized to identify anatomical landmarks and configurations of the upper limb. Identify anatomical structures within the thorax with emphasis on structures of thoracic wall and thoracic cavity. Dissection and identification of structures in manikins/smart board systems supplemented with the study of charts, models, projected materials and radiographs are utilized to identify anatomical landmarks and configurations of the upper and lower limb.

LEARNING OBJECTIVES

- Define basic technical terminology and language associated with anatomy
- Describe the structure, composition and functions of the organs in the human body
- Comprehend the concepts (& associated principles) for each general type of anatomical structures
- Demonstrate skills in the surface markings of clinically important structures, on normal living bodies and the correlation of structure with function
- Describe concepts of embryology and histology
- Identify histological slides of the human body
- Describe the interdependency and interactions of the structural and functional components of upper limb
- Identify anatomical structures of the thoracic wall and thoracic cavityDescribe gross anatomy of neuro-musculoskeletal and circulatory system of lower limb, abdominal wall and pelvis.
- Demonstrate anatomical landmarks and configuration of the lower limb, abdominal wall and pelvis through dissection/identification of structures in the maniacs / smart board systems supplemented with the study of charts, models, projected materials, and radiographs.
- Describe major stages of embryological development of the lower limb with development of the neurological and vascular supplies to the lower limb.

COURSE CONTENTS

GENERAL ANATOMY AND FUNCTIONAL 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 marking
- Cartilage
- Development of bone and cartilage
- Microscopic picture of cartilage and bone

THE MUSCLE

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

STRUCTURES RELATED TO MUSCLES & BONES

- Tendons
- Aponeurosis Fasciae
- Synovial bursae
- Tendon Synovial sheaths
- Raphes
- Ligaments
- Condyle
- Epicondyle
- Ridge
- Tuberosity
- Tubercle
- Foramen
- Canal
- Groove
- Process

- Spur

THE JOINTS

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

CARDIOVASCULAR SYSTEM

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

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 nerve
- Typical spinal nerve
- Microscopic picture of nerve
- Introduction of autonomic nervous system
- Anatomy of neuromuscular junction

GENERAL HISTOLOGY

- Cell
- Epithelium
- Connective tissue
- Bone

- Muscle tissue
- Nerve tissues
- Blood vessels
- Skin and appendages
- Lymphatic organs

GENERAL EMBRYOLOGY

- Male and female reproductive organs
- Cell division and Gametogenesis
- Fertilization, cleavage, blastocyte 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) Developmental defects.

THORAX
STRUCTURES OF THE THORACIC WALL

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

THORACIC CAVITY

- Bones and joints of thorax
- Walls of thorax
- Thoracic openings
- Diaphragm
- Mediastinum (description of superior, inferior ,anterior ,middle posterior divisions along with contents)
- Pleura
- Trachea
- Lungs (external features, fissures, lobes, segments, structures passing, arterial supply,Venous drainage, lymphatic drainage).
- Mechanism of breathing
- Pericardium
- Heart – Its blood supply, venous drainage & nerve supply
- Large veins of thorax, superior and inferior vena cava., pulmonary veins brachiocephalic veins
- Large Arteries – Aorta & its branches

APPLIED ANATOMY

- Thoracic outlet syndrome
- Needle thoracotomy
- Pericarditis and cardiac tamponade
- Heart sounds
- Coronary artery syndrome and referred pain
- Heart blocks and arrhythmias
- Valvular heart diseases
- Atrial/ventricular septal defects ,PDA, tetralogy of fallot
- Pneumothorax ,heamothorax, heamopneumothorax, empyema
- Pleurisy
- Overview of chest radiographs

UPPER LIMB
UPPER LIMB OSTEOLOGY

- Detailed description of all bones of upper limb and shoulder girdle. (Clavicle, humerus, scapula, radius, ulna, carpal bones ,metacarpal bones, phalanges.)

MYOLOGY

- Muscles connecting upper limb to the axial skeletal
- Muscles around shoulder joint
- Muscles in brachial region
- Muscles of forearm
- Muscles of hand
- Retinacula
- Palmar aponeurosis
- Flexor tendon dorsal digital expansion

NEUROLOGY

- Course, distribution and functions of all nerves of upper limb(spinal accessory nerve, musculocutaneous nerve, median nerve, ulnar nerve ,axillary and radial nerve)
- Brachial plexus

ANGIOLOGY (CIRCULATION)

- Course and distribution of all arteries and veins of upper limb
- Lymphatic drainage of the upper limb
- Axillary lymph node

UPPERLIMB REGIONS

- Axilla
- Cubital fossa

ARTHROLOGY

- Acromioclavicular and sternoclavicular joints
- Shoulder joint

- Elbow joint
- Wrist joint
- Radioulnar joints
- Inter carpal joints
- Joints MCP and IP
- Surface anatomy of upper limb
- Surface marking of upper limb

APPLIED ANATOMY

- Carpal tunnel syndrome
- Anatomic snuff box
- Dupuytren contracture
- Rotator cuff syndrome
- Tennis elbow
- Brachial plexus nerve block
- ulnar ,radial and median nerve injury
- erb's palsy and claw hand
- winged scapula
- dislocated shoulder joint

DEMONSTRATION

- Shoulder joint, attached muscles and articulating surfaces
- Elbow joint
- Wrist joint
- Radioulnar joint Sternoclavicular joint
- Brachial plexus
- Blood supply of brain
- Structure of bones

LOWER LIMB
LOWER LIMB OSTEOLOGY

- Detailed description of all bones of lower limb and pelvis along with their markings (Femur, tibia, fibula, patella and foot bones)

MYOLOGY

- Muscles of gluteal region
- Muscles around hip joint
- Muscles of thigh

- Muscles of lower leg and foot

NEUROLOGY

- Course, distribution, supply of all nerves of lower limb and gluteal region
- 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
- Surface Marking of lower limb

APPLIED ANATOMY

- Femur ,tibia, fibula fractures
- varicose veins
- femoral hernias
- anterior compartment syndrome
- ligamentous injury of knee joints
- DVT
- Hip joint stability and trendelberg sign
- Ankle joint dislocation
- Pes cavus and pes planus
- Femoral nerve injury ,common fibular nerve injury, tibial nerve injury

BMT-3102 – PHYSIOLOGY – I

PHYSIOLOGY- I **CREDIT HOUR 3(2+1)**

COURSE DESCRIPTION

The course is designed to study the function of the human body at the cellular, tissue and systems levels. The course will help students in understanding the complexities of the cells, tissues, and major organs and systems of the human body, concentrating on basic mechanisms underlying human life processes and important diseases affecting normal human function

LEARNING OBJECTIVES

- Define the terminology related to the structure and function of the human body systems
- Compare and contrast the structural and functional characteristics of the various human body cells
- Describe basic chemical concepts and principles as they apply to the structure and functioning of the blood and neuromuscular system
- Analyze the interrelationships of body organ systems, homeostasis, and the complementarity of structure and functioning of the blood and neuromuscular system
- Demonstrate advance techniques to investigate the body and interpret data to be used for diagnosis and treatment
- Define the principles behind medical instrumentation and their usage

COURSE CONTENTS

INTRODUCTION TO PHYSIOLOGY

- Definition
- Branches of physiology
- Functional organization of human body

CELL PHYSIOLOGY

- Cell membrane and its functions
- Cell organelles and their functions
- Membrane transport systems (active and passive transport)
- Homeostasis
- Control systems in the body
- Genes: control and function

NERVE AND MUSCLE

- Structure and function of neuron
- Physiological properties of nerve fibers
- 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

CARDIOVASCULAR SYSTEM

- Heart and circulation
- Function of cardiac muscle
- Cardiac pacemaker and cardiac muscle contraction
- Cardiac cycle
- ECG: recording and interpretation
- Common arrhythmias
- Types of blood vessels and their function
- Hemodynamics 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
- Triple response and cutaneous circulation

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

SPECIALIZED CONNECTIVE TISSUES

a) BLOOD AND LYMPHATIC SYSTEM

- 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 hemoglobin
- 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

b) BONE, CARTILAGE AND JOINTS

- Osteology
- Functions of Bones
- Cartilage
- Development of bone and cartilage

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 and control of blood sugar
- The endocrine functions of the kidney and Physiology of growth.

LAB WORK

- Use of the microscope
- Determination of hemoglobin
- 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.
- Blood indices in various disorders
- Clotting disorders
- Blood grouping and cross matching
- Stethography
- Breath sounds
- Respiratory rate
- Lung function tests

BMT-3103 – BIOCHEMISTRY – I

BIOCHEMISTRY-I **CREDIT HOURS: 3(2+1)**

COURSE DESCRIPTION

This course provides the knowledge and skills in fundamental organic chemistry and introductory biochemistry that are essential for further studies. It covers introduction to the biomolecules i.e. amino acid, proteins carbohydrates, fats, enzymes and nucleic acids. The nutritional biochemistry concludes the course

LEARNING OBJECTIVES

- Describe cell and body fluids in the context of chemistry and human biochemistry
- Discuss the properties, classification and functions of biomolecules with emphasis on amino acid, peptides, proteins, enzymes, carbohydrates, lipids and nucleic acid
- Explain importance of nutritional biochemistry with emphasis on minerals, trace elements, vitamins and balance diet

COURSE CONTENTS

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.

NUTRITIONAL BIOCHEMISTRY MINERALS & TRACE ELEMENTS

- Sources
- RDA
- Biochemical Functions & Clinical Significance of Calcium & Phosphorus
- Sources
- RDA
- Biochemical Functions & Clinical Significance of Sodium Potassium& Chloride
- Metabolism of Iron, Cu, Zn, Mg, Mn, Se, 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
- Balanced Diet.

RECOMMENDED BOOKS

1. Harper's Biochemistry by Robbert K. Murray, Daryl K. Granner, Peter A. Mayes,Victor W. Rodwell, Latest Ed.
2. Lippincott's Illustrated Review of Biochemistry by Pamela C. Champe and Richard A. Harvey, Latest Ed.
3. Practical Clinical Biochemistry by Varley.
4. Textbook of Biochemistry by Devlin, 5th Ed.
5. Textbook of Medical Biochemistry Vol-I and II by M.A. Hashmi.
   Biochemistry by Stryer, Lubert, Latest Ed.

BMT-3104 – MICROBIOLOGY – I

Aims and Objectives:

- To introduce the students with basic concepts in Medical microbiology and acquire skill in practical work.
- To produce a team of Medical Technologists steeped in knowledge of Medical microbiology.
- To equip Medical Technologists with latest advance techniques in the field of diagnostic Medical Microbiology.

- **Introduction to Microbiology with particular reference to Clinical Microbiology.**

  - History and development of microbiology
  - Bacterial Cell
  - Bacterial Growth: Nutritional Requirement
  - Types of Culture media

- **Classification of Medically Important Bacteria**

  - Normal Flora
  - Gram Positive Cocci
  - Gram Negative Cocci
  - Gram Positive Aerobic and Anaerobic Bacilli
  - Actinomycetes
  - Gram Negative Aerobic and Anaerobic Bacilli
  - Enterobacteriacae
  - Aeromonas Plesiomonas
  - Vibrio and Campylobacter
  - Pseudomonas and Oxidase Positives
  - Haemophilus
  - Bordetella and Brucella
  - Spirochetes
  - Atypicals: Legionella and Mycoplasma

  - Specimen collection and handling
  - The role of Laboratory in diagnosis of Infections
  - Source and spread of infection
  - Sterilization and disinfection
  - Diagnostic methods in microbiology
  - Introduction to Bacterial Virulence and Pathogenicity

BMT-3105 – PAKISTAN STUDIES

- **Historical Perspective.**
- Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-i-Azam Muhammad Ali Jinnah.
- Factors leading to Muslim.
- People and land: Indus Civilization, Muslim advent, Location and Geo-Physical features.
- **Government and Politics in Pakistan Political and constitutional phases:**
  1947-58, 1958-71, 1971-77, 1977-88, 1988-99, 1999 onward.
- **Contemporary Pakistan:**
  Economic institutions and issues, Society and Social structure, Ethnicity, Foreign policy of Pakistan and Challenges, Futuristic outlook of Pakistan.

BMT-3106 – INTRODUCTION TO COMPUTER & IT

- Computer Basics: Electronic data processing (E. D. P), Disc operating system (DOS), Windows operating systems, Software and hard ware.

- Microsoft Office: M.S Word, M.S. Excel, M.S. Power Point, SPSS.

- Networking & Internet: Introduction to HTML, Web Browser, Web Development, Introduction to Data Communication, Local area networking (LAN), Network Configuration.

- Written Communication – The patient record; Principles of Data entry and Management, Computers in Documentation, Entry on the Patient record.

- Reporting Skills: Nurse to Nurse, report to primary care provider, Interdisciplinary Team.

- Ethical Concerns in Documentation & Reporting: Confidentiality, Access to Records.

2ND SEMESTER

BMT-3201– PATHOLOGY

PATHOLOGY -I **CREDIT HOURS 3(3+0)**

COURSE DESCRIPTION

The course will develop an understanding among students about the pathology of underlying clinical disease states and involving the major organ systems. Course includes general pathology, hematology, pathology of breast and endocrine system and genetics. Epidemiological issues will be presented and discussed. Students will use problem-solving skills and information about pathology to decide when referred to another health care provider or alternative intervention is indicated

COURSE OBJECTIVES

- Discuss concepts of general pathology
- Discuss recognize signs and symptoms that are considered red flag for serious disease
- Discuss and disseminate pertinent information and findings, and ascertain the appropriate steps to follow during physical therapy management

COURSE CONTENTS

GENERAL PATHOLOGY WHICH INCLUDES

CELL INJURY AND DEATH

- Causes of cell injury
- Pathogenesis of necrosis and apoptosis
- Sub cellular responses

CELL ADAPTATIONS

- Relevant examples: Hyperplasia, Hypertrophy, Atrophy, Metaplasia and intracellular accumulation

INFLAMMATION

- Acute inflammation
- Vascular events and cellular events
- Chemical mediators

CHRONIC INFLAMMATION

- General and granulomatous inflammation
- Morphologic patterns of acute and chronic inflammation

HEALING & REPAIR

- Normal controls of healing and repair.

- Repair by connective tissue
- Wound healing

HAEMODYNAMIC DISORDERS

- Edema and its types
- Hyperemia /congestion, Hemorrhage, Thrombosis, Embolism, Infarction, Shock.

NEOPLASIA

- Nomenclature of neoplasia
- Molecular basis of neoplasia
- Carcinogenic agents of neoplasia
- Clinical aspects of neoplasia
- Progression of neoplasia
- Screening
- Carcinogenesis
- Tumor markers
- Paraneoplastic syndrome

HEAMATOLOGY

- RBCs and related disorders
- WBCs and related disorders
- Platelets and related disorders
- Blood transfusions and transfusion reactions

GENETICS

- Gene mutations
- Autosomal and sex chromosomal disorders

MUSCULOSKELETAL, SKIN AND CONNECTIVE TISSUE DISORDERS

- Congenital disorders
- Osteoarthritis ,rheumatoid arthritis, gout
- Osteomyelitis, septic arthritis
- Osteopenia, osteoporosis, osteomalacia
- SLE, scleroderma, mixed connective tissue disorders
- Raynaud's disease
- Neuromuscular junction disorder

- Neoplasms of bone ,muscle and connective tissue
- Common skin disorders (albinism, melasmas , vitiligo, acne, eczema, psoriasis, LP, urticaria, blistering lesions ,neoplasms)

PATHOLOGY OF BREAST

- Inflammatory conditions(acute mastitis, periductal mastitis, mammary duct ectasia, fat necrosis)
- Benign tumors and fibrocystic changes(intraductal papilloma, fibro adenoma, phylloides tumor) ,Breast cancer

PATHOLOGY OF ENDOCRINE SYSTEM

- Pituitary gland (pituitary adenoma, hyperpituitarism , SIADH)
- Thyroid gland (grave's disease ,MNG, myxedema, cretinism, thyroiditis-hashimoto ,subacute and reidel, neoplasm)
- Parathyroid gland (hypoparathyroidism, hypoparathyroidism)
- Endocrine pancreas(type1 and 2 DM)
- Adrenal glands (Cushing's syndrome, Conn's syndrome, adrenal insufficiency ,pheochromocytoma)

RECOMMENDED BOOKS

1. Goodman CC & Fuller KS. Pathology: implication for the Physical Therapist. 4th ed. Elsevier:USA;2015
2. Kumar V, Abbas AK, &Aster JC. Robbins basic pathology. 9th ed. Elsevier: Philadelphia; 2013.
3. Thomson AD & Cotton RE. Lecture notes on pathology. 3rd ed. FA Davis; 1983

BMT-3202–ANATOMY– II

ANATOMY- II **CREDIT HOURS 3(2+1)**

COURSE DESCRIPTION

The focus of this course is an in-depth study and analysis of the regional and systemic organization of the body. Emphasis is placed upon structure and function of human movement. A comprehensive study of human anatomy with emphasis on the nervous, musculoskeletal and circulatory systems Course will cover human anatomy with emphasis on the nervous, skeletal, muscle, and circulatory systems. Course will lay down the foundation of Neuroanatomy (Head and neck region, abdomen and pelvis to be supplemented through dissection and identification of structures in the manikins/smart boards, charts, models, projected materials and radiographs.

LEARNING OBJECTIVES

- Demonstrate anatomical landmarks and configuration of the lower limb, abdominal wall and pelvis through dissection/identification of structures in the manikins / smart board systems supplemented with the study of charts, models, projected materials, and radiographs. Describe regional organization of human brain & neural pathways
- Classify the nervous system
- Explain structure and function of spinal cord

THE HEAD AND 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)
- Joints of neck.
- Digestive system(oral cavity, pharynx, esophagus)
- Respiratory system(nose, nasal cavity, paranasal sinuses, larynx, trachea)
- Endocrine system(pituitary gland, pineal gland, thyroid gland, parathyroid gland)
- Ear (external ear, internal ear, middle ear, tympanic membrane)

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
- Muscles of eye

THE SKULL

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

APPLIED ANATOMY

- skull fractures
- significance of fontanelle
- TMJ dislocation
- trigeminal neuralgia
- intracranial hemorrhage
- laryngeal nerve lesions

NEURO ANATOMY

- Central Nervous System: Disposition, Parts and Functions
- Brain stem (Pons, Medulla, and Mid Brain)
- Cerebrum
- Cerebellum
- Thalamus
- Basal ganglia
- Limbic system
- 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
- 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
- Autonomic Nervous system

APPLIED ANATOMY

- Spinal cord injury
- Intracranial hemorrhage
- Facial nerve palsy
- Trigeminal nerve injury
- Horner syndrome

ABDOMEN

Abdominal wall

- Structure of anterior abdominal wall
- Structure of rectus sheath
- Structure of posterior abdominal wall
- Lumbar spine (vertebra)
- Peritoneum
- Description of viscera (gastrointestinal tract, GIT Accessory organs, kidneys, ureters, suprarenal glands)

PELVIS

- Brief description of posterior, anterior and lateral walls
- Pelvic floor muscles
- Sacrum
- Brief description of perineum
- Brief description of viscera (GIT, Urinary bladder, reproductive organs)
- Nerve and blood supply of vessels)

APPLIED ANATOMY

- Hernia (inguinal hernia)
- Peptic ulcers
- Intestinal obstruction
- Cholelithiasis and cholecystitis
- Porto-systemic anastomoses
- Kidney stones
- Ectopic pregnancy
- BPH
- Hemorrhoids

RECOMMENDED BOOKS

- Clinical Neuroanatomy Anatomy for Medical Students by Richard S. Snell,
- Gray's Anatomy by Prof. Susan Standring 41th Ed., Elsevier.
- Clinically Oriented Anatomy by Keith Moore.
- Clinical Anatomy by R.J. Last, Latest Ed.
- Cunningham's Manual of Practical Anatomy by G.J. Romanes, 15th Ed., Vol-I, II and III.

BMT-3203 –PHYSIOLOGY – II

PHYSIOLOGY-II **CREDIT HOURS: 3(2-1)**

COURSE DESCRIPTION

The course is designed to study the function of the human body with emphasis on function of human digestive system, nervous system, reproductive system, body fluids and renal system. These topics are addressed by a consideration of clinical and applied physiology in relation to clinical modules and practice

LEARNING OBJECTIVES

- Describe major functions of the digestivesystem
- Explain major functions of central and peripheral nervous
- Discuss major functions of male and female reproductive
- Describe major functions body fluids and renal system and relate this to clinical practice

COURSE CONTENTS

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
- Mechanism of temperature regulation
- Function of the autonomic nervous system and the physiological changes of aging

SPECIAL SENSES, SKIN AND TEMPERATURE REGULATION

- Special senses organs (EYE, EAR, NOSE)
- Skin and temperature regulation

GASTROINTESTINAL TRACT

- General function of gastrointestinal tract
- Enteric nervous system
- Control of gastrointestinal mobility and secretions
- 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
- Endocrine & exocrine pancreas and functions of pancreas in digestion
- Dysphagia
- Physiological basis of acid peptic disease

REPRODUCTION

- Function of the male reproductive system, Spermatogenesis
- Mechanism of erection and ejaculation
- Production and function of testosterone and Physiological changes during male puberty
- Function of the female reproductive system
- Production and function of estrogen, and progesterone
- Menstrual cycle
- Physiological changes during female puberty and menopause
- Pregnancy and the physiological changes taking place in the mother
- Function of the placenta
- Parturition and lactation
- Neonatal physiology

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
- Micturition and its control

LAB WORK
NERVOUS SYSTEM

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

Note
The students are expected to make a practical note book. The book is a collection of evidence that learning has taken place. It is a reflective record of their achievements

RECOMMENDED 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, 12thEd.

BMT-3204 – BIOCHEMISTRY – II

BIOCHEMISTRY-II **CREDIT HOURS: 3(2-1)**

COURSE DESCRIPTION

This course will provide the knowledge and skills in fundamental organic chemistry and introductory biochemistry that are essential for further studies. It will also cover the basic biochemical, cellular, biological and microbiological processes, basic chemical reactions in the prokaryotic and eukaryotic cells, the structure of biological molecules, introduction to the nutrients i.e. carbohydrates, fats, enzymes, nucleic acids and amino acids. The course also covers the section of nutritional biochemistry

LEARNING OBJECTIVES

- Explain biochemical description of different human tissues
- Describe respiration at cellular and molecular level
- Explain metabolism of carbohydrates, protein and lipids

COURSE CONTENTS

TISSUE BIOCHEMISTRY

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

METABOLISM BIOENERGETICS

- Introduction to Bioenergetics
- Biological Oxidations
- 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
- 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
- Metabolism of Eicosanoids

METABOLISM OF PROTEINS & AMINO ACIDS

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

LAB WORK

Section 1

Techniques of Instruments in Clinical Biochemistry with examples.

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

Section 2

Clinical quantatives analysis in Biochemistry

1. Sample Collection Blood, Faces and body fluids
2. Serum Glucose Estimation
3. Glucose tolerance Test (GTT)
4. Serum Cholesterol estimation (Total, HDL and HDL cholesterol)
5. Serum Bilirubin Estimation (Total, Direct and Indirect bilirubins)
6. Serum Amylase Estimation
7. Serum AST Estimation
8. Serum ALT Estimation
9. Serum ALP Estimation
10. Serum Creatine Kinase(CK) Estimation
11. Serum Ascorbic acid Estimation
12. Serum LDH Estimation
13. Serum Proteins Estimation (Total, Albumin & Globulin)
14. Serum Total lipids Estimation
15. Serum calcium Estimation (total, ionized & unionized)
16. Serum Uric acid Estimation
17. Serum Magnesium Estimation
18. Serum Urea Estimation
19. Serum Creatinine Estimation

RECOMMENDED BOOKS

1. Harper's Biochemistry by Robbert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, Latest Ed.
2. Lippincott's Illustrated Review of Biochemistry by Pamela C. Champe and Richard A. Harvey, Latest Ed.
3. Practical Clinical Biochemistry by Varley.
4. Textbook of Biochemistry by Devlin, 5th Ed.
5. Textbook of Medical Biochemistry Vol-I and II by M. A. Hashmi. Biochemistry by Stryer, Lubert, Latest Ed.

BMT-3205 – MICROBIOLOGY – II

- Introduction
- Fundamental of Infectious diseases
- The importance of Laboratory
- Epidemiology: Basic Principle and investigations
- Spread and transmission of Disease
- Role of Microbiologist in the Control of Diseases
- Nosocomial Infections
- Medically important Fungi
- Medically Important Parasites
- Medically Important Viruses
- Antimicrobial Agent

BMT-3206 – ISLAMIC STUDIES – I

- **Introduction to Quranic Studies:** Basic Concepts o Quran, History of Quran, Uloom-ul-Quran.
- **Study of Selected Text of Holly Quran:** Verses of Surah Al-Baqra related to faith (Verse No-284-286), Verses of Surah Al-Hujrat related to Adab Al-Nabi (Verse No-1-18), Verses of Surah Al-Mumanoon related to characteristics of faithful (Verse NO-1-1-II), Verses of Surah Al-Furqan related to social ethics (Verse No-63-77), Verses of Surah Al-Inam related to Ihkam (Verse No-152-1), Verse of Surah Al-Ihzab related to Adab-al-Nabi (Verse No. 6, 21, 40, 56, 57, 58), Verses of Surah Al-Hashar (18, 19, 20) related to thinking, day of judgment, Verse of Surah Al-Saf Related to Tafakar, Tadabar 9Verse No-1, 14).

- **Seerat of Holy Prophet (S.A.W) – I:** Life of Muhammad Bin Abdullah (S.A.W) (Before Prophet Hood), Life of Holy Prophet (S.A.W) in Makkah, Important lessons derived from the life of Holy Prophet (S.A.W) in Makkah.

- **Seerat of Holy Prophet (S.A.W) – II:** Life of Holy Prophet (S.A.W) in Madina, Important Events of Life Holy Prophet in Madina, Important Lessons Derived from the Life of Holy Prophet in Madina.

- **Introduction to Sunnah:** Basic Concepts of Hadith, History of Hadith, Kinds of Hadith, Uloom-ul-Hadith, Sunnah & Hadith, Legal Position of Sunnah.

- **Introductions to Islamic Law & Jurisprudence:** Basic Concepts of Islamic Law & Jurisprudence, History & Importance of Islamic Law & Jurisprudence, Sources of Islamic Law & Jurisprudence, Nature of Differences in Islamic Law, Islam and Sectarianism.

- **Islamic Culture & Civilization:** Basic Concepts of Islamic Culture & Civilization, Historical Development of Islamic Culture & Civilization, Characteristics of Islamic Culture & Civilization, Islamic Culture & Civilization and Contemporary Issues.

- **Islam & Science:** Basic Concepts of Islam & Science, Contributions of Muslims in the Development of Science, Quran & Science.

- **Islamic Economic System:** Basic Concepts of Islamic Economic System, Means of Distribution of wealth in Islamic Economics, Islamic Concept of Riba, Islamic Ways of Trade & Commerce.

- **Political System of Islam:** Basic Concepts of Islamic Political System, Islamic Concept of Sovereignty, Basic Institution of Govt. in Islam.
- **Islamic History:** Period of Khilaft—Rashida, Period of Umayyads, Period of Abbasids.

- **Social System of Islam:** Basic Concepts of Social System of Islam, Elements of Family, Ethical values of Islam.

3RD SEMESTER

BMT-4301 Pharmacology-I

- **General Concepts of Pharmacology:**
- Pharmacokinetics, Pharmacodynamics.
- **Drugs Affecting on the Autonomic Nervous System:**
  - Sympathomimetic agonist, Sympathetic Antagonist, Parasympathomimetics, Cholinergic blocking agents, Neuromuscular blocking agents, Competitive neuromouscular blockers, Depolarizing neuromouscular blockers Central muscle relaxants.
- **Drugs Affecting on the Cardiovascular System:**
  - Drugs Used in the treatment of congestive cardiac failure, drugs used in the treatment of Arrhythmia, drugs used in the treatment of angina & other vasodilators, drugs used in the treatment of hypertension.
- **Drugs Affecting on the Kidney:**
  - Osmotic diuretics, Xanthine diuretics, Mercurial diuretics, carbonic anhydrase inhibitors, Thiazides Diuretics loop diuretics, Ethacrynic acid, potassium sparing diuretics.
- **Drugs Affecting on the Respiratory System:**
  - Bronchodialators, Antitussive agents.
- **Drugs Affecting on the Gastro-intestinal System:**
  - Drugs used in the treatment of peptic ulcers, emetics & antiemetics Purgatives, Antidiarrhocal agents.

Practicals:

- Introduction
- Pharmaceutical Preparations
- Instruments used in Pharmacology
- Weights and measurements

BMT-4391 Ocular Anatomy

- Embryology
- Orbit
- Eye lids
- Eye Lashes
- Lacrimal Apparatus
- Cornea
- Sclera
- Intra Ocular Muscles
- Extra Ocular Musles
- Lens
- Uveal Tissues
- Vitreous
- Retina
- Optic Nerve
- Visual Pathways

BMT-4392 Ocular Physiology

- Protective mechanism in eye
- Pre-corneal tear film, eyelids and lacrimation
- Eye movements
- Coat of eyeball
- Corneal physiology
- Aqueous humour and vitreous humour ,Iop
- Pupil
- Accommodation
- Presbyopia
- Retina Structure and function
- Vision –Visual pathway
- Refractive error
- Binocular vision, stereopsis
- Color vision

BMT-4393 Ocular Pathology

- Pathophysiology of ocular Angiogenesis
- Pathology of Ocular Infection
- Pathology of Cornea &Conjuctiva
- Pathology of Uveal Tract
- Pathology of Glaucoma
- Pathology of Retina
- Pathology of Retina in Systemic Disease
- Pathology of Orbital Space occupying Lesion
- Pathology of Optic Nerve
- Retinoblastoma
- Pathology of Lens
- Accomodation
- BSV

BMT-4394 Public and preventive health

- Epidemiology of blindness- Defining blindness & visual impairment
- Eye in primary health care
- Contrast between clinical & community health program
- Community eye care program
- Vitamin A deficiency blindness
- Vision 2020- The Right to Sight
- Screening for eye diseases
- Organization management of
- eye care program
- School eye health program
- Causes of blindness
- Childhood blindness
- Specific blinding disorders

BMT-4395 Basic clinical functions and skills

- History Taking
- VA Estimation
- EOM, Cover Test
- Saccades, Persuits
- Hirschberg Test
- Pupil Examination
- Maddox Rod
- Von Herrick Method
- External Eye Exam
- Lid Eversion
- TBUT, Tear Meniscus
- Shirmer Test
- Color Vision-Stereopsis
- Confrontation Test
- Photostress Stress
- Slit Lamp Exam
- Direct Ophthalmoscopy
- Digital IOP
- Air Puff Tonometery
- Schiotz Tonometery
- Goldmann Applanation Tonometry
- Gonioscopy
- Amsler Grid
- Corneal Sensitivity

BMT-4305 – ARABIC

BSMT 4305 ARABIC

فهرست الكتاب

4th SEMESTER

BMT-4401 Pharmacology – II

- Drug handling by cells & tissues- pharmacokinetics & pharmacodynamics specific to ocular surfaces & intraocular conditions
- Delievering methods of ocular medications- residence in conjunctival sac- drug vehicle affects drug delievery- advanced ocular drug system
- Reconstituting tear film- tear substitutes
- Ocular drugs & Autonomic Nervous System
- IOP drugs
- Eicosanoids- prostaglandins- leukotrienes
- Serotonins(neurotransmitters, glucocorticoids, immunosuppressive agents)
- Anaesthetics
- Ocular toxicity from systemic administration of drugs
- Steroids &NSAIDs
- Antimicrobials
- Mydriatics & cycloplegics
- Diagnostic dyes(Fluorescein & Rose Bengal)
- Subconjunctival injections
- Periorbital & retro bulbar injections

BMT-4491 Basic Optics and Refraction

- Cylinderical lenses
- Imaging due to 2 cylinders in contact with axis parallel
- 2 cylinders in contact with axis perpendicular
- Spherical & cylinderical lenses in contact
- Spherocylenderical lens rotation
- Field stop & aperture
- Entrance & exit pupil
- Aperture & defocus blur
- Receiver-detector diameter
- Depth of focus & depth of field
- Chromatic aberrations- Methods of removing chromatic aberrations
- Monochromatic aberrations- Deviation from paraxial approximation
- Difference between ray & wave front aberration
- 3rd order aberrations- spherical, astigmatism, distortion, field curvature
- Ways of minimizing spherical aberration- pupil size- bending of lens shape-factors
- Lens tilt- Astigmatism
- Glass slab – displacement without deviation & displacement without dispersion
- System of two thin lenses- Review of front & back vertex powers & equivalent powers
- Review of 6 cardinal points
- System of more than 2 thin lenses- calculation of equivalent power using magnification formula

BMT-4492 Geometrical Optics

- Nature of light
- Wave front
- Refractive index
- Laws of reflection and refraction
- Plane mirror
- Reflection by spherical mirror
- Concave mirror image
- Convex mirror image
- Prisms
- Lens and types of lens
- Linear and angular magnification
- Nodal point
- Thin lens,sign convention
- Prentice rule

BMT-4404 Applied Physics and Engineering Sciences

- United and Physical quantities
- Fluid Mechanics
- Behaviour of Compressed Gases

Practical demonstration with compressors & compressed gas cylinders

- Temperature and Heat
  - Themal Properties of Matter
  - First Law of Thermodynamics
  - Second Law of Thermodynamics
  - Behabiour of Steam

Practical demonstration on boiler

- Electromagnetic Waves
  - Light
    - Practical
  - Ultraviolet Radiation

    Practical
  - Infrared Radiation

    Practical
  - Ionizing Radiation

    Practical
  - Transducers

    Practical
  - Optical Instruments
  - Optical Magnification Tools

    Practical
  - Fiberoptic Light Transmission

    Practical
  - Endoscopes & Endoscopic Camera

    Practical
  - Medical Grade Materials

BMT-4405 Epidemiology and Biostatistics

- Rates: Incidence and Prevalence
- Descriptive Statistics
- Probability
- Hypothesis Testing; One Sample Inference
- Hypothesis Testing: One Sample Inference
- Non Parametric Methods
- Hypothesis Testing; Categorical data
- Study design and measure of risk
- Regression and correlation methods
- Design and analysis techniques for epidemiologic studies

BMT-4406 English Communication Skill

- 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 and minutes of the meeting, use of library and internet recourses.
- Presentation skills: Personality development (emphasis on content, style and pronunciation).
- Academic writing: How to write a research paper/term paper (emphasis on style, content, language, form, clarity, consistency.
- Technical report writing, progress report writing.

BMT-4493 Basic Dispensing Optics

- Low cost vision devices
- Simple corrective lenses
- Aphakic lenses
- Spectacles for low vision
- Ophthalmic lens power
- Lens power & transposition
- Radiation & the eye
- Lens effectivity
- Effects of working distance & vertex distance on the refractive power of lenses
- Focimetery
- Neutralization
- Axis marking
- Prism marking
- Ophthalmic use of tinted & photochromic lenses
- Measurement of IPD
    - Distance
    - Near
    - Bifocal height
- Ophthalmic prism & lens decentration

BMT-4494 Physical Optics

- **Nature of light**
- **Source of light**
- **Polarized light**
- **Intensity of light**
- **Birefringence**
- **Relationship between amplitude and intensity**
- **Coherence ,interference ,constructive and destructive interference, fringes and fringes width**
- **Double slits, multiple slits ,gratings**
- **Diffraction, circular surface, airy disc**
- **Resolution of an instrument, Raleigh criterion**
  - **Scaterring, Raleighs scattering, tyndall effect**
- **Fluorescence and phosphorescence**
- **Basis of laser,coherence,population inversion, spontaneous emission, Einstein theory of lasers**
- **Radiometry solid angle, radiometric units, Photopic and scotopic luminous efficiency and efficacy curves, photometric units**
- **Inverse square law of photometry ,Lamlets law**
- **Other units of light measurements, retinal illumination,torlands**

5th SEMESTER

BMT-5591 Primary Health Care & Primary Eye Care

- Fundamentals of primary Health care
- Essential Elements of Primary Health Care
- Basic Strategies of Health Care
- Health Education
- Health Promotion
- Counseling
- Fundamentals of Primary Eye Care
- Elements of Primary Eye Care
    - Promotive
    - Preventive
    - Curative
    - Rehabilitative
- Integration of Primary Eye care into primary health care and the establishment of an eye care network / referral system
- Recording AND Reporting in primary eye care
- Advance diseases of eye
- Vision Standards
    - Railway
    - Roadways
    - Airlines
- Industrial vision Screening
    - Modified clinical methods and industrial vision test
- Color vision
    - Tests
    - Coding
    - Defects
- History
    - Recording
    - Significance
- Slitlamp biomicroscopy

BMT-5592 Overview of Blindness and National Program for Prevention & Control of Blindness in Pakistan

- Overview of blindness
- Definition (according to who)
  - Low vision
  - Blindness
- Magnitude and prevalence of blindness
  - Global
  - National level
- Major causes of blindness
- Future projections
- Implications of blindness(social,economical) on Individual and community
- National demography
- National eye health indication
- Special high risk groups
- Vision 2020
- Overview of national health programme
  - Structure
  - Delivery system
- Overview of national programme on prevention of Blindness
  - Team approach
  - Major action plan
- Basic concepts of comprehensive eye core

BMT-5593 Advanced Refraction & Retinoscopy

- Advance techniques in refraction
  - Review of Retinoscopy
  - Cycloplegic Refraction
  - Cross Cylinder Technique
  - Duo Chrome Test
  - Auto-Refraction
  - Determination of Cylinder Axis And Power
  - Cutting the Cylinder AND Spherical Equivalent
  - Transpositioning
- Options For Correcting Reffractive Errors
  - Glasses
  - Far point Correction
  - Effect of Accomodation
  - Partial VS Full Correction
  - Contact Lenses (TYPES)
  - Refractive Surgery
- Preoperative Evaluation (keratometry , pachymetry ,Topography)
- Procedures
- Complications
  - **Special Consideration For Correction**
  - **Strabismus**
  - **Refraction after Cataract Surgery**
  - **Pseudophakia ,Aphakia**
  - **Anisometropia**
  - **High Myopia**
  - **High Hyperopia**

BMT-5594 Practical Retinoscopy

- Principle Of Retinoscopy
- OPD Training
- Adjustment Of Retinoscopes Special Features

BMT-5595 Ophthalmic Instruments & their Maintenance

- Refractive instruments
- Optotypes & MTF
- Spatial frequency
- Test chart standards
- Choice of test charts
- Trial case lenses
- Refractor head units
- Optical considerations of refractor units
- Trial frame design
- Near vision difficulties with units & trial frames
- Retinoscopy
- Objective optometers
- Infrared optometer devices
- Projection charts
- Illumination of consulting room
- Brightness acuity tests
- Vision analyzer
- Pupilometer
- Potential acuity meter
- Aberrometer
- Ophthalmoscopes & relative devices
    - Design & illumination
    - Design of viewing
    - Ophthalmoscopic disc
    - Filters for ophthalmoscopy
    - Indirect ophthalmoscopy
    - Slit lamp ophthalmoscopy
- Lensometer
- Lens guage or clock
- Slit lamp
- Tonometers
- Keratometer & corneal topography
- Refractometer
- Synaptophore
- Color vision testing devices
- Field of vision & testing devices
- Scans
- ERG
- New instruments
- Gonioscopy
- Applanation tonometery

BMT-5596 Advance Visual Optics & Advance Visual Functions

6th SEMESTER

BMT-5691 Orthoptics Techniques & contact Lenses

- Basic terminologies in Orthoptic/squint
- Orthoptic instruments
  - Prism bars
  - Synaptophore
  - Maddox wing
  - Hess screen
  - Risely prism
- Instruments used in home ,offices, historical and now in use
- Squint
- Motor signs in squint
  - Head position
  - Cover -uncover test
- Types of squint
  - Latent/manifest
  - Horizontal/vertical
  - Paralytic/con comittant
- Dissociated vertical deviation
- Assessment of ocular motility status
  - Diplopia testing
  - Bielschowsky head tilting test
- Syndromes
  - Duane's
  - Brown's
- Miscellaneous (jaw winking,mobius,FUEM)
- Mobius
- Multiple sclerosis
- Trauma and squint
- Investigations of squint
- Treatment of squint
  - Non _ surgical
  - Surgical

Part-II Contact Lenses

Anatomy and physiology of cornea in relation to contact lens

Contact lens

- History
- Types
- Material and manufacturing
- Indications and contraindications
- Complications and their management
- Patient selection
- Pre fitting measures
- Fitting contact lens
  - Gas permeable lens
  - Hard and soft lens etc.
  - Sclera lenses and prosthesis
- Contact lens for
  - Astigmatism
  - Keratoconus
  - Presbyopes

- Contact lens in dry eyes and other eye problems
- Verifying contact lens
- Contact glasses versus spectacles
- Instruments used in contact lens practice
- Business aspects of contact lens practice
- And practice management

BMT-5692 Application of Advanced Visual Functions

- Stereopsis and its assessment
- Pupil
  - Optical and sensory aspect
- Accommodation Convergence
- Relationship
- Methods of measurements
- Ocular aAccomodation versus spectacles
- accomodation
- Purkinje images
- Types
- Glare and contrast
- Measuring
- Adaptation
- Concept of spatial frequency and
- modulation(contrast)
- Spatial and temporal resolution
- Modulation transfer function(MTF) of eye
- Measurements
- Fourier theory
- Optical transfer function(OTF)
- Visual acuity in relation to the intensity
- And contrast
- Vision through pinhole ,slit and filters etc.
- Light and dark adaptation
- Image of grating
- Square wave
- Single wave

BMT-5693 Clinical Optometry & Dispensing Optics

- Eye examination ,history of patient
  - Signs and symptoms of disease
- Vision assessment
  - Adults
  - Children
- Diagnostic tests
  - Hirschberg test
  - Extra ocular movements
  - Hand neutralization of lenses
  - Focimetry
  - Worth four dot test
  - Astigmatic fan
  - Duo chrome test
  - Slit lamp examination
  - Visual field analyzer
  - A & B scans
- Refraction
  - children
  - Adults
  - Presbyopes
  - Aphakic patients
  - In Nystagmus patient
- Fundoscopy

Part-II Dispensing Optics

- Lens manufacturing
  - Spectacle lenses ,surfacing and polishing
  - Glazing
- Techniques of plastic and glass lens
  - Lens quality
  - Faults in lens material
  - Properties of lens material
- Spectacle frame
  - Choice, Material and its types
  - Frame coloration, construction
  - Manipulation and repair
- Progressive lens
  - Fitting
  - Measurements
- Impact resistant lenses
  - Types
  - For specific patients
  - Tempered glass lens
- Auto edger
  - Types
  - Fitting
- Ophthalmic prism
  - Unit
  - Thickness difference

- Dividing, compounding and resolving prism
- Rotary and effective prism power in near vision
- Reflection from spectacles lenses, ghost image,
- Reflection in bifocals
- Pediatric dispensing
- Safety lenses/toughened

BMT-5694 Avoidable & Unavoidable Causes of Blindness

- List of avoidable and unavoidable cause of blindness
- Epidemiology

- High risk group
- For avoidable blindness
- For unavoidable blindness
- avoidable cause
- Management
- future projections

- Unavoidable cause
- Future projections
- Measures takens after unavoidable
- Blindness
- Rehabilitative services
- Universal eye health

- Global action plan
- Goal and objectives
- Cause of Blindness
- Children
- Adults
- Old age

- Genetic and congenital ocular visual disorder
- Epidemiology of developmental disorder
- Leading to blindness
- Avoidable
- Unavoidable
- Sympathetic ophthalmitis
- Painful blind eye
- Management

BMT-5695 Ocular Motility & Binocular Single Vision

- Bsv and its assessment
- Terminologies
  - ARC ,suppression, diplopia, amblyopia,
  - Eccentric fixation
  - Near point of convergence and
  - Accommodation
  - Vergence disorder and vision therapy
  - For vergence
  - Ocular domin
- ance test
  - Convergence insufficiency
  - (prism used in convergence insufficiency)
- Sensory and motor evaluation
- Herring's and Sherrington's law
- Ocular motility nerves
- Ocular motor nerve system
  - Supranuclear control of eye movements
  - Saccadic movements and disorders
  - Gaze palsies
  - Ocular motor apraxia
- Smooth pursuit system
- Parkinson's disease and eye
- Nystagmus
  - Types
  - Compensatory mechanism
  - Treatment
- Non- visual reflex system

BMT-5696 OPD Training in Optometry

7th SEMESTER

BMT-6791 Advanced Diseases of Eye & Their Management

BMT-6792 Clinical Orthoptics-I

BMT-6793 Applied Statistics, Research Methodology & Project

BMT-6794 Introduction to Bio Medical Ethics

BMT-6795 Visual Sciences 1,2,3,4

- Investigations & Management of Hetrophorias
- Motor & Sensory investigation of concomitant squints
- Amblyopia
- Causes
- Types
- Treatment modalities
- Diplopia
- Anomalous Retinal Correspondence
- Follow – up of patients with strabismus / amblyopia
- Special populations with strabismus
- Investigations of non-comitant squints
- Convergence difficulties
- Nystagmus
- Common Orthoptic procedures

BMT-6796 Low Vision

- Definition of Low Vision
- Psychological implications of low vision
- Principles of functional assessment in low vision
- Concepts of community based rehabilitation
- Problem solving skills
- Environmental modifications
- Adaptive daily living skills
- Non-optical devices
- Sighted guide
- Overview of low vision devices
- Indications for referral

8th SEMESTER

BMT-6891 Review of Basics of Vision and Optics

- Review of Retinoscopy
- Cycloplegic refraction
- Cross cylinder technique
- Duo chrome test
- Auto-refraction
- Determination of cylinder axis and power
- Cutting the cylinder and the spherical equivalent
- Transposition while prescribing (plus toric vs minus toric)
- Glasses (spectacle)
  - Far point correction
  - Effect of accommodation
  - Partial vs. full correction
- Contact lens (hard contact lens, soft contact lens, RGP lens)
  - Types: Toric, disposable, extended wear
  - Lens fitting
  - Patient selection
  - Complications
- Surgery – RK, PRK, LASIK
  - Preoperative evaluation: keratometry, pachymetry, topography
  - Procedures
  - Complications
- Strabismus
- Refraction after cataract surgery pseudophakia, aphakia
- Anisometropia
- High myopia, High Hyperopia
- Uses of Prisms

BMT-6892 Binocular Vision & its Clinical Application

- Principles of Ocular Motility BSV (Binocular Single Vision) & Dysfunctions of Ocular Motility
- Investigations & Management of Hetrophorias Motor & Sensory investigation of concomitant squints
- Amblyopia
- Causes
- Types
- Treatment modalities
- Diplopia
- Anomalous Retinal Correspondence
- Follow – up of patients with strabismus
- Special populations with strabismus
- Investigations of non-comitant squints
- Convergence difficulties
- Nystagmus
- Common Orthoptic procedures

BMT-6893 Clinical Orthoptics-II

- Preliminary clinical evaluation
- Retinoscopy
- Retinoscopy in astigmatism
- Dynamic retinoscopy variation of dynamic retinoscopy
- Retinoscopy
- Retinoscopy in astigmatism
- Dynamic retinoscopy variation of dynamic retinoscopy
- Subjective refraction,Principal and methods – fogging technique
- Jacksons crossed cylinder,Monocular refractive end points + 1 blur
- Duochrome tests ,Binocular equalizing method
- Binocular subjective refraction,Near subjective refraction
- Convergence and anomalies of convergence
- Accommodation and anomalies of accommodation
- Accommodation and presbyopia,Confortable near vision
- The amplitude of accommodation ,Effect of age
- Crossed cylinder test of accommodation
- Determination of presbyopic addition
- Direct Ophthalmoscopy
- Optics and uses
- Direct Ophthalmoscopy
- Optics and uses
- Biomicroscopy
- Indirect Ophthalmoscopy
- Optics and uses
- Indirect Ophthalmoscopy
- Optics and uses
- Visual field and visual field tests
- Kinetic and static perimetry
- Visual field and visual field tests
- Kinetic and static perimetry
- Visual field and visual field tests
- Kinetic and static perimetry
- Visual field and visual field tests
- Kinetic and static perimetry
- Photo documentation
- Methods of ocular photography- anterior eye and fundus
- Photo documentation
- Methods of ocular photography- anterior eye and fundus
- Photo documentation
- Methods of ocular photography- anterior eye and fundus

BMT-6894 Dispensing Optics

- Low cost vision devices
  - Simple corrective lenses
  - Aphakic lens
- Spectacles for low vision
- Use of donated glasses
- Vergence method of ray tracing
- Basic optical properties of single vision lenses
- High index lenses, Aphakic lenses properties and disadvantages
- Ophthalmic lens power
- Lens power and transposition
- Tinted lenses
- Radiation and the eye
- Lens material and fabrications
- Introduction to lens making
- Frame material and types
- Bifocal and trifocal
- Multifocals optical properties and fitting
- Lens affectivity
- Effect of working distance and vertex distance on the refractive power of lenses
- Spectacle fitting
- Factors to be considered in lens and frame slection
- Focimetery
- Ophthalmic use of tinted and photochromic lenses
- Measurement of IPD
- Ophthalmic prism and lens decentration

BMT-6896 BMT-6895 OPD Training in Orthoptics

Thesis