CENTURION UNIVERSITY OF TECHNOLOGY AND MANAGEMENT, VIZIANAGARAM

DEPARTMENT OF OPTOMETRY

Pre Board of Studies Meeting

Minutes of Board of Studies Meeting

Date: 15-09- 2024
Venue:Department of Optometry

Agenda:
Course curriculum revision was carried out for the following:

SUBJECT	CODE & CREDIT (T+P+Pj)	MODIFICATIONS/REMARKS
OCULAR ANATOMY	CUTM 1782 (3+1+0)	**Module VI** Anterior and Vitreous Humour changed to Aqueous and Vitreous humour. **Module VII** Anatomy of the optic nerve is repeated twice so it is removed and Optic radiation is added in place of that. **(MODIFICATIONS IN MODULE CONTENTS)**
OPTOMETRIC OPTICS I	CUTM 1787 (3+2+0)	**Module I** Lens equation and Mirror equation are added. **Module VII** Effect of the aberrations with respect to the vision is added. **(MODIFICATIONS IN MODULE CONTENTS)**

OCULAR MICROBIOLOGY & PATHOLOGY	CUTM 1789 (3+1+0)	**Module II** Pathology of sclera is added. **Module IV** Morphology and Pathology caused with respect to Gram negative bacteria **(MODIFICATIONS IN MODULE CONTENTS)**

VISUAL OPTICS II	CUTM 1791 (3+1+0)	**Module I** Accommodation related to hyperopia and presbyopia is removed here as it already exists in Module II. **Module II** Hyperopia and Accommodation is removed as that is covered in accommodation. **Module IV** History of Retinoscopes is added. **(MODIFICATIONS IN MODULE CONTENTS)**

OPTOMETRIC OPTICS II & DISPENSING OPTICS	CUTM 1792 (3+2+0)	**Module VII** Recent advances in the optical dispensing **(MODIFICATIONS IN MODULE CONTENTS)**
CONTACT LENS I	CUTM 1793 (3+2+0)	**Module VI** Follow up visit examine is removed **Module VII** Recent advances in the soft contact lens are added. **(MODIFICATIONS IN MODULE CONTENTS)**

CONTACT LENS II	CUTM 1795 (3+2+0)	**Module I** Comparison of RGP vs SCL added in place of Gas Transmission through contact lenses (Dk, Dk / t , EOP, critical study of measuring techniques and their application to various types of contact lenses. **Module III** Fitting Bifocal lenses, Post fitting care is removed and Disposable lenses, their availability and advantages are added. **Module IV** Fitting assessment is added. **Module VI** Scleral contact lens is removed here as it is repeating in Module VII **Module VII** Recent advances in the RGP Contact Lens is added **(MODIFICATIONS IN MODULE CONTENTS)**
LOW VISION AND REHABILITATION	CUTM 1797 (3+1+0)	**Module VII** Recent advances in Low Vision Management are added. **(MODIFICATIONS IN MODULE CONTENTS)**

BASIC & OCULAR PHARMACOLOGY	CUTM 1798 (3+0+1)	Module IV Recent advances in route of drug administration is added Assignment Adverse effects of ocular drugs on the human body are added. **(MODIFICATIONS IN MODULE CONTENTS)**
PEDIATRIC & GERIATRIC OPTOMETRY	CUTM 1800 (3+1+0)	**Module IV** Spectacle dispensing in the pediatric population is added. **Module VI** How to carry on one's visual task overcoming the problems of aging? is removed **Module VII** Recent advancements in the spectacle dispensing in geriatric Population is added. **(MODIFICATIONS IN MODULE CONTENTS)**

OPTOMETRIC INSTRUMENTS	CUTM 1803 (3+2+0)	**Module II** Fundus biomicroscopy - Direct, Indirect, Principle & is removed as the topic is already covered in Module I **Module V** Interferometry and Tear film lipid mammography is added **(MODIFICATIONS IN MODULE** **CONTENTS)**

CENTURION UNIVERSITY OF TECHNOLOGY AND MANAGEMENT,
ANDHRA PRADESH

SCHOOL OF PARAMEDICS & ALLIED HEALTH SCIENCES

Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities...

BACHELOR OF SCIENCE IN OPTOMETRY

(FOUR YEARS)

2024

SYLLABUS

Preface:

Optometry means a health care profession that is autonomous and concerned especially with examining the eye for defects and faults of refraction, with prescribing correctional lenses or eye exercises, with diagnosing diseases of the eye, and with treating such diseases or referring them for treatment. Optometry as a profession has the primary public health responsibility for eliminating uncorrected refractive error (the leading cause of vision impairment globally). As primary eye care practitioners, optometrists have a vital role in detecting potentially serious eye diseases such as cataract, glaucoma and age-related maculopathy, as well as general health conditions such as hypertension and diabetes, which means optometrists can also help alleviate the burden of other causes of blindness through diagnosis, referral and in some cases co-management. Optometry can and should play a leading role in eye care provision at the primary level, and can also assist at secondary and tertiary levels where possible, working with ophthalmologists and other eye care providers towards the unified goal of combating blindness.

Course Objective:

At the end of optometric training the graduate shall be able to;

1. Perform all the Optometric Techniques
2. Use discretely the essential laboratory services
3. Manage all types of clinical diagnostic ophthalmic methods
4. Demonstrate skills in handling the modern Optometric instruments in laboratory test.
5. Develop leadership qualities to function effectively as a leader in the laboratory environment
6. Render services to the laboratory set up and to communicate effectively with the Ophthalmologists and the hospital management.
7. Development of skill and competency in data processing, reporting and maintenance of records & ophthalmic investigations

Programmed: Bachelor of Science in Optometry (B. Sc. Optometry)

Duration: Four-year Programmed (Including 1 year internship in the last year)

Eligibility: Intermediate Science with Physics, Chemistry & Biology/ Mathematics, or equivalent degree

Examination: Examination rules will be as per guideline of CUTM Examination hand book.

Degree:

The degree of Bachelor of Science in Optometry course of the University shall beconferred on the candidates who have pursued the prescribed course of study for not less four

academic years and have passed examinations as prescribed under the relevant scheme and completed 1 year of compulsory internship in the last year

On successful completion of four years programme, with a minimum course credit of 180 credits, the candidate will be awarded with “Bachelor of Science in Optometry (B. Sc Optometry) from Centurion University

Internship

A candidate must undergo internship for a period of 1 year in a Govt. hospital/ private hospital/ Organization/ Tertiary center, which fulfill the norms decided by the University. Internship is a phase of training wherein a graduate is expected to conduct actual practice of Clinical Optometry and acquires skills under supervision so that he /she may become capable of functioning independently

Project Work

Each Bachelor of Science in Optometry (B. Sc Optometry) students will carry out project work under the supervision of a faculty member (as a primary guide). The progress of project work will be monitored regularly by the Guide

BACHELOR OF SCIENCE IN OPTOMETRY

Course structure

BASKET 1	BASKET 2	BASKET 3	BASKET 4	
School Core Courses	**Discipline Core Courses**	**Ability Enhancement Compulsory Course (AECC) To be selected from University Basket**	**Skill Courses (To be selected from University Basket)**	
SC - 1	DC-1	AECC - I	SFS-1	
SC - 2	DC-2	AECC – II	SFS-2	
SC - 3	DC-3		SFS-3	
SC – 4	DC-4		SFS-4	
	DC-5		SFS-5	
	DC-6		SFS-6	
	DC-7			
	DC-8			
	DC-9			
	DC-10			
	DC-11			
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	DC-23			
	DC-24			
	DC-25			
	DC-26			
	DC-27			
	DC-28			
19 Credits	**131 Credits**	**6 Credits**	**24 Credits**	**180 Credits (Minimum Credits required)**

BASKET I

School Core Courses

Sl. No.	CODE	SUBJECT	SUBJECT TYPE (T+P+Pj)	CREDITS
SC-1	CUTM1760 CUTM1761 CUTM1729	Biology Maths Cell Biology	3+0+1	4
SC-2	CUTM1757	General Anatomy	3+2+0	5
SC-3	CUTM1758	General Physiology	3+2+0	5
SC-4	CUTM1759	Basic Biochemistry	3+2+0	5

BASKET II
Discipline Core Courses

Sl.No.	CODE	SUBJECT	SUBJECT TYPE (T+P+Pj)	CREDITS
DC-1	CUTM1781	GEOMETRIC OPTICS	3+2+0	5
DC-2	CUTM1742	BASIC COMPUTER AND INFORMATION SCIENCE	0+2+0	2
DC-3	CUTM1782	OCULAR ANATOMY	3+1+0	4
DC-4	CUTM1783	OCULAR PHYSIOLOGY	3+1+0	4
DC-5	CUTM1785	INTRODUCTION TO OPTOMETRY	1+1+0	2
DC-6	CUTM1784	PHYSICAL OPTICS	3+1+0	4
DC-7	CUTM1786	VISUAL OPTICS–I	3+2+0	5
DC-8	CUTM1787	OPTOMETRIC OPTICS–I	3+2+0	5
DC-9	CUTM1788	OCULAR DISEASES–I	3+1+0	4
DC-10	CUTM1789	OCULAR MICROBIOLOGY & PATHOLOGY	3+1+0	4
DC-11	CUTM1790	CLINICAL EXAMINATION OF VISUAL SYSTEM LAB	0+2+0	2
DC-12	CUTM1791	VISUAL OPTICS–II	3+2+0	5

DC-13	CUTM1792	OPTOMETRIC OPTICS–II & DISPENCING OPTICS	3+2+0	5
DC-14	CUTM1794	OCULAR DISEASES–II	3+0+1	4
DC-15	CUTM1793	CONTACT LENSES-I	3+2+0	5
DC-16	CUTM1795	CONTACT LENSES-II	3+2+0	5
DC-17	CUTM1796	BINOCULAR VISION–I	3+2+0	5
DC-18	CUTM1797	LOW VISION & REHABILITATION	3+1+0	4
DC-19	CUTM1798	BASIC & OCULAR PHARMACOLOGY	3+0+1	4
DC-20	CUTM1799	BINOCULAR VISION–II	3+2+0	5
DC-21	CUTM1800	PEDIATRIC & GERIATRIC OPTOMETRY	3+1+0	4
DC-22	CUTM1801	SYSTEMIC DISEASES & EYE	3+0+1	4
DC-23	CUTM1802	OCCUPATIONAL OPTOMETRY	2+0+1	3
DC-24	CUTM1805	LAW & OPTOMETRY	2+0+1	3
DC-25	CUTM1804	PUBLIC HEALTH & COMMUNITY OPTOMETRY	2+0+1	3
DC-26	CUTM1803	OPTOMETRIC INSTRUMENTS	3+1+0	4
DC-27	CUTM1809	PROJECT		18
DC-28	CUTM1810	INTERNSHIP		20

NOTE: Along with the School core and Disciple core subjects, the students need to opt for AECC Courses, Skill/ Domain/ Elective courses and value- added courses from the University Basket, as per the requirement by the University

Value Added Courses: Students can choose any suitable skill course offered by the University in semester II/III/IV Note: Skill course & Value-added course, to be opted by the student along with the regular courses, as suggested in the syllabus.

BASKET I
School Core
Courses Cell
Biology

Subject Name	Code	Type	T + P + Pj	Credits
Cell Biology	CUTM1729	Theory+ Project	3+0+1	4

Course Objective:

- Determine the parts of the cell membrane and the cell wall
- Distinguish the types and mechanism of mutation
- Compare and contrast the events of cell cycle and its regulation
- Understand the dynamic character of cellular organelles

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Describe the fundamental principles of cellular biology.
CO 2: Understand the cells growth, division and death.
CO 3: Relate the knowledge with how cellular dysregulation can lead to diseasecondition
CO 4: Utilize the skill in mechanism of cell signaling and how it regulates cellular functions
CO 5: Effectively explaining the knowledge gained through the complete programme.

Course Outline

Module - I

An Overview of Cells: History, Cell theory, Structure and Function of Cell and its Organelles: Biological membranes - Nucleus - Nuclear envelope, Nucleolus, Mitochondria, Chloroplasts, Lysosomes, Gloxysomes and Peroxisomes, endoplasmic reticulum, ribosomes,Golgi complex (Structural organization, function, marker enzymes of the above organelles), Cell types: prokaryotes vs. eukaryotes; from single cell to multi-cellular organism; Different molecules of cell- water, salt and mineral ions etc**.**

Module - II

Cell cycle and its regulation, Cellular communication, and cell mobility: Cell cycle:G0/G1, S, G2 and M phages (Cell Division: Mitosis, meiosis, and cytokinesis); regulation of cell cycle; cell adhesion and roles of different adhesion molecules, gap junctions, Extra-Cellular Matrix (ECM), Cell-cell interaction and cell- ECM interaction, The cytoskeleton, Microtubule- based movement and microfilament -based movement.

Module - III

Cell signaling, Programmed Cell Death (Apoptosis) and Cancer: Hormones and their receptors, cell surface receptor, signaling through G-protein coupled receptors (G-PCR), Tyrosine Kinase, signal transduction pathways, second messengers, regulation of signaling pathways, bacterial and plant two-component systems, bacterial chemo taxis, Intrinsic and Extrinsic apoptotic pathway, Capsize enzyme, Biology and elementary knowledge of development and causes of cancer; Tumor viruses, Oncogenes and tumor suppressor genes.

Suggested Readings:

1. The Cell a Molecular Approach (4th Edition) by Cooper & Hausman https://www.thebiomics.com/books/cell-biology/cell-molecular-approach-cooper-and- hausmn-4th-ed.html
2. Molecular Biology by Friefelder David, Publisher Narosa www.alibris.com/Molecular-Biology-David
3. Introduction to Cell biology by John K Young, World Scientific publishing company www.overdrive.com/.../introduction-to-cell-biology
4. Introduction to biology,3rd tropic edition by D G MacKean www.amazon.com/Introduction-Biology-D-G-Mackean.

GENERAL ANATOMY

Subject Name	Code	Type	T + P + Pj	Credits
General Anatomy	CUTM1757	Theory+ Practice	3+2+0	5

Course Objective:

General anatomy deals with the entire human anatomy with emphasis on different tissues, blood vessels, glands, nerves, and the entire central nervous system.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Understand the structure and position of different organs.

CO 2: Apply the knowledge on how the body maintains homeostasis.

CO 3: Compare inter-relationships, gross, functional, and applied anatomy of various structures in the human body.

CO 4: Make decisions on radiographic identification of different joints, structures and position of bones from skeleton

CO 5: Create a comprehensive anatomical study guide or reference material that organizes and synthesizes information for future learners**.**

Course Outline

Module – I INTRODUCTION:

Introduction to Anatomy: Sub division of anatomy, terms and terminology, systems of the Body. Skeleton: Bones: function of bones, classification of bones, parts of young bone, development of bone, classification of bones, blood supply bone, cartilage, clinical anatomy

Module –2 MUSCLES & JOINTS

Muscle: types of muscles, structure of striated muscle, naming of muscle, fascicular architecture of muscle, actions of muscle, nerve supply.

Joints: Classification, structures of joints, movements, mechanism of lubrication, biomechanics, levers, blood supply, nerve supply, and applied anatomy.

Practice: - Identification of different joints and bones from Charts and Human Skeleton.

Module -3 CIRCULATOTY SYSTEM, LYMPHATIC SYSTEM & SKIN

Circulatory system: Types of circulation of blood, arteries, veins, capillaries, end arteries, applied aspect. Lymphatic system: components, lymph nodes, clinical anatomy Skin: structure of skin, superficial facia, deep facia, clinical aspects

Module -4 UPPER LIMB & LOWER LIMB

(A) Upper extremity: Bony architecture Joints – structure, range of movement Muscles – origin, insertion, actions, nerve supply Major nerves – course, branches and implications of nerve injuries Development of limb bones, muscles and anomalies Radiographic identification of bone and joints Applied anatomy

(B) Lower extremity: Bony architecture Joints – structure, range of movement Muscles – origin, insertion, actions, nerve supply Major nerves – course, branches and implications of nerve injuries Development of limb bones, muscles and anomalies Radiographic identification of bone and joints Applied anatomy

Module -5 THORAX, ABDOMEN & BACK MUSCLES

(A) Thorax: skeleton of thorax, intercostal spaces, pleura, lung, mediastinum, heart: morphology, blood supply, interior of heart, general information about upper respiratory tract (trachea, esophagus, pharynx, and larynx) clinical anatomy.

(B) Abdomen: Anterior and posterior abdominal wall, general information about viscera: stomach, liver, pancreas, duodenum, kidney, ureter, urinary bladder, uterus, and its adnexa.

Practice: -identification of structure, position, and different parts of Lungs, Heart, Kidney from charts, Models.

(C) Back muscles: Superficial layer, Deep muscles of back, their origin, insertion, action and nerve supply. Vertebral column – Structure & Development, Structure & Joints of vertebra Thoracic cage. Radiographic identification of bone and joints Applied anatomy

Practice: - Radiography identification of different architecture joins, structure and position of Bones from Skeleton, Model or PPT.

Module -6 NERVOUS SYSTEM & SPECIAL SENSE ORGANS

Nervous system: parts of nervous system, neurons, peripheral nerves, spinal nerves, summary of cranial nerves, parasympathetic nervous system.

Special sense organs: Structure and function of Visual system, auditory system, gustatory system, olfactory system.

Module -7 HEAD AND NECK & CENTRAL NERVOUS SYSTEM

Head and neck: scalp, facial muscles, cranial skeleton, triangles of neck, parotid region, temporomandibular joint, muscles of mastication, applied.

Central nervous system: General idea about spinal cord, brainstem, cerebrum, cerebellum, ventricular system, diencephalon, blood supply of brain and its applied, meninges and cerebrospinal fluid.

Practice: -

- Identification of structure and different parts of Central nervous system from chart.
- Identification of different blood supply in brain from PPT.
- Demonstration of dissected parts (upper extremity, lower extremity, thoracic & abdominal viscera, face, and brain).

REFERENCE BOOKS

1) Text book Anatomy & Physiology for nurses by Evelyn Pearce, Publisher Faber amp; Faber.
2) Text book Anatomy and Physiology for nurses by Sears, Publisher Edward Arnold.
3) Anatomy & Physiology- by Ross and Wilson, Publisher Elsevier.
4) Anatomy amp; Physiology: Understanding the human body by Clark, Publisher Jones & Bartlett.
5) Anatomy and Physiology for nurses by Pearson, Publisher Marieb& Hoehn.
6) Anatomy and Physiology by N Murgesh, Publisher satya.

GENERAL PHYSIOLOGY

Subject Name	Code	Type	T + P + Pj	Credits
CONTACT **LENSES II**	CUTM1795	Theory+ Practice	3+2+0	5

Course Objective:

General physiology deals with the entire human anatomy with emphasis on different organ systems, their physiological functions with special emphasis on blood and neuro-physiology.

Course Outcome:

After Completion of this course the students will be able to:

CO1: Understand the structure and position of different organs.
CO2: Apply the knowledge on how the body maintains homeostasis.
CO3: Compare inter-relationships, gross, functional, and applied anatomy of various structures in the human body.
CO4: Make decisions on radiographic identification of different joints, structures, and position of bones from skeleton.
CO5: Develop a microscopic-level comprehension of human tissue, including the structure, function, and organization of cells and tissues.

Course Outline:

MODULE-1:

Cell structure & organization Tissue organization, Epithelium, Connective tissue, Collagen fibers, Elastic fibers, Areola fibers, Cartilage–Bone, Contractile tissue–striated–skeletal– cardiac
– Non striated – plain –my epithelial, General principles of cell physiology, Physiology of skeletal muscle

MODULE-2:

Blood: Composition, Volume measurement & variations, Plasma proteins – classification & functions. Red blood cells– development, morphology & measurements – functions & dysfunctions. White blood cells – development – classification, morphology, functions &dysfunctions, Platelets–morphology–development, functions & dysfunctions Clotting–factors–mechanism–anti-coagulants dysfunctions. Blood grouping – classification – importance in transfusion, Rh factor& incompatibility Suspension stability, Osmotic stability.
Reticulo-endothelial system: Spleen, lymphatic tissue, Thymus, bone marrow immune system, cellular, Humoral, autoimmune

MODULE-2:

Digestion: General arrangement; functions and regulations of Salivary digestion, Gastric pancreatic digestion, Intestinal digestion; Liver & bile, Absorption, Motility, Deglutition, Vomiting, Defecation, Functions of large intestine, neuro-humoral regulations of alimentary functions.

MODULE-3:

Excretion: Body fluids– distribution, measurement & exchange, Kidney – structure of nephron– mechanism of urine formation, composition of the urine and abnormal constituents, urinary bladder & micturition. Endocrines: Hormone mechanism–negative feed backs– tropic action– permissive action–cellular action, hypothalamic regulation; hormones, actions & regulations of Thyroid, Adrenal cortex, Adrenal medulla, Parathyroid, Islets of pancreas, Miscellaneous hormones, their actions and regulations, Common clinical disorders.

MODULE-4:

Reproduction: Male reproductive system–control & regulation. Female reproductive system– uterus–ovaries–menstrual cycle–regulation–pregnancy & delivery–breast–family planning Respiration: Mechanics of respiration–pulmonary function tests–transport of respiratory gases- neural and chemical regulation of respiration–hypoxia, cyanosis, dyspnea–asphyxia.

MODULE-5:

Circulation: General principles, Heart: myocardium–innervations– transmission ofcardiac impulse- Events during cardiac cycle–cardiac output. Peripheral circulation: peripheral resistances–arterial blood pressure–measurements–factors, Regulation variations–capillary circulation–venous circulation. Special circulation: coronary cerebral–miscellaneous

MODULE-6:

Environmental Physiology: Body temperature regulation (including skin Physiology). Exposure to low and high atmospheric pressure. Nervous System: Neuron–Conduction of impulse– synapse– receptor.

MODULE-7:

Sensory organization–pathway sand perception, Reflexes–cerebral cortex– functions. Thalamus, Basal ganglia Cerebellum, hypothalamus. Autonomic nervous system– motor control of movements, posture and equilibrium– conditioned reflex, eye hand coordination. Special senses– (Elementary) Olfaction–Taste–Hearing.

Practice:

1) Blood test:
2) Microscope
3) Hemocytometer
4) Blood
5) RBC count
6) Hb
7) WBC count
8) Differential Count

9) Hematocrit demonstration
10) ESR
11) Blood group & Rh. Type
12) Bleeding time and clotting time. Excretion:
1) Examination of Urine
2) Specific gravity
3) Albumin
4) Sugar
5) Microscopic examination for cells and cysts Endocrinology and Reproduction: Dry experiments in the form of cases showing different endocrine disorders.

Reference Book:

1. GJ Tortora, B Derrick son: Principles of anatomy &physiology, 11thedition,
2. John Wiley & SonsInc, New Jersey,2007
3. AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, NewDelhi,2006
4. AC Guyton: Text book of Medical Physiology, 6thedition, Saunders Company, Japan, 1981

BASIC BIOCHEMISTRY

Subject Name	Code	Type	T + P + Pj	Credits
BASIC BIOCHEMISTRY	CUTM1759	Theory + Practice	3+2+0	5

Course Objective:

Biochemistry is the study of biological phenomena at the molecular level. Its aim is to understand the fundamental chemical principles that govern complex biological systems. The program is an interdepartmental major between biology and chemistry that emphasizes the importance of a solid foundation in the natural sciences. The major focuses, however, on disciplines within biology and chemistry, ranging from cell biology and molecular biology to analytical chemistry and physical chemistry.

Course Outcome:

After Completion of this course the students will be able to:

CO1: List out the biochemical pathways leading to metabolism in human body.
CO2: Understanding the significance of biomolecules in metabolic activities.
CO3: Implement the knowledge of transformation of energy by the cells.

CO4: Detect of abnormal range of these molecules from patient sample
CO5: Undertake investigations and perform analyses that provide information about biochemical questions and help to solve biochemical problems.

Course Outline:

MODULE-1:
Carbohydrates: Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function)

MODULE-2:
Proteins: Amino acids, peptides, and proteins (general properties & tests with a few examples likeglycine, tryptophan, glutathione, albumin, hemoglobin, and collagen).

MODULE-3:
Lipids: Fatty acids, saturated and unsaturated, cholesterol and triacylglycerol, phospholipids, andplasma membrane.

MODULE-4:
Vitamins: General with emphasis on A, B2, C, E and inositol (requirements, assimilation and properties), Minerals: Na, K, Ca, P, Fe, Cu and Se. (requirements, availability and properties)

MODULE-5:
Hormones: Hormones and their receptors basic concepts in metabolic regulation with examples, insulin, glucagon, and thyroxin. Metabolism: General whole-body metabolism (carbohydrates, proteins, lipids)

MODULE-6:
Ocular: Various aspects of the eye, viz. tears, cornea, lens, aqueous, vitreous, retina and pigment epithelium rhodopsin. (The important chemicals in each and their roles)

MODULE-7:
Clinical Biochemistry: Blood sugar, urea, creatinine and Bilirubin, cholesterol etc. and significance of their estimation.

Practice:

Quantitative exercises:

1. Abnormal constituents in urine, sugar, proteins, ketones, blood and bile salts

2. Detection of abnormal constituents in urine

Techniques:

Electrophoresis, Chromatography, Preparation of - normal, molar and percentage solutions, buffers, PH determination

Demonstration:

Estimation of blood cholesterol, estimation of alkaline phosphate, salivary amylase (effect of PH

Reference Book:

1. S. Ramakrishnan: Essentials of biochemistry and ocular biochemistry, Annamalai University Publications, Chidambaram, India, 1992
2. S. Ramakrishnan,KGPrasannanandRRajan:TextbookofMedicalBiochemistry, Orien TLongman, Madras, 1990.
3. D.R. Whikehart Biochemis
4. Try of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania,2003

BASKET II

Discipline Core

Course

OCULAR ANATOMY

Subject Name	Code	Type	T + P + Pj	Credits
OCULAR ANATOMY	CUTM1782	Theory+ Practice	3+1+0	4

Course Objective:

- Understand the embryological development and structural anatomy of the eye and its accessory structures.
- Identify and describe the anatomy of the ocular adnexa, lacrimal system, cornea, sclera, and crystalline lens.
- Analyze the macroscopic and microscopic structures of the uveal tract, retina, optic nerve, and visual pathways.

Course Outcome:

After Completion of this course the students will be able to:

CO1: Understand the basic principles of ocular embryology.

CO2: Demonstrate microscopic structures of various tissues in the eye and correlate the structure with the functions.

CO3: Analyze the normal disposition, inter-relationships, gross, functional, and applied anatomy of various structures in the eye and adnexa.

CO4: Appraise the basic structure and connections between the various parts of the central nervous system and the eye to understand the neural connections and distribution.
CO5: Design the eye model with a better understanding of visual information.

Course Outline:

MODULE 1: Embryology and Basic Anatomy

- **Embryology of the Eye:**
  - Formation of optic vesicle & optic stalk
  - Formation of lens vesicle
  - Formation of optic cup
  - Development of retina, optic nerve, crystalline lens, cornea, sclera, choroid, ciliary body, iris, vitreous
  - Development of accessory structures: eyelids, lacrimal apparatus, extraocular muscles, orbit
  - Milestones in eye development
- **Skull & Orbit:**
  - Size, shape, and relations of the orbit
  - Walls, base, and apex of the orbit
  - Orbital fascia and spaces
  - Contents of the orbit

MODULE 2: Ocular Adnexa and Lacrimal System

- **Ocular Adnexa:**
  - Structures of the lids: skin, subcutaneous areolar layer, striated muscle layer, submuscular areolar tissue, fibrous layer, conjunctiva
  - Glands of the lids: Meibomian glands, glands of Zeis, glands of Moll
  - Blood supply, lymphatic drainage, and nerve supply of the lids
- **Conjunctiva:**
  - Palpebral conjunctiva, bulbar conjunctiva, conjunctival fornix
  - Microscopic structure: epithelium, substantia propria
  - Conjunctival glands: Krause's glands, Wolfring's glands, Henle's glands, Manz glands
  - Blood supply and nerve supply
  - Caruncle and plica semilunaris
- **Lacrimal System:**
  - Lacrimal gland: structure, ducts, blood supply, nerve supply
  - Lacrimal passages

MODULE 3: Cornea, Sclera, and Crystalline Lens

- **Cornea:**
  - Layers and peculiarities
  - Blood supply and nerve supply
  - Corneal transparency
- **Sclera:**

- Episclera, sclera proper, lamina fusca
- Blood supply and nerve supply

- Measuring corneal diameter

MODULE 4: Uveal Tract and Humors

- **Uveal Tract:**
  - Iris: macroscopic and microscopic appearance
  - Ciliary body: macroscopic structure
  - Choroid: macroscopic structure
  - Blood supply: short and long posterior arteries, anterior artery
  - Venous drainage
  - Pupillary muscles
- **Aqueous & Vitreous Humors:**
  - Composition, formation, and drainage of aqueous humor
  - Angle of the anterior chamber, trabecular meshwork, canal of Schlemm, Schwalbe's line
  - Main masses of vitreous, base of the vitreous, hyaloidean vitreous, vitreous cells

MODULE 5: Retina, Optic Nerve, and Visual Pathways

- **Retina:**
  - Gross anatomy and microscopic structure of fovea centralis
  - Blood-retinal barrier
- **Optic Nerve and Visual Pathway:**
  - Anatomy of optic nerve, optic chiasma, optic tracts
  - Lateral geniculate body, optic radiations, visual cortex
  - Arrangement of nerve fibers
  - Blood supply of visual pathways (arterial circle of Willis and its branches)
- **Ocular Motor System:**
  - Extraocular muscles, nerve supply, motor nuclei, supranuclear motor centres
  - Cranial nerve innervation: optic, oculomotor, trochlear, abducens, trigeminal, facial nerves

Practice:

- Identifying orbital bones and landmarks using a skull
- Measuring palpebral fissure height
- Eye dissection of bull's eye
- **Crystalline Lens:**
  - Structure: capsule, anterior epithelium, lens fibres
  - Ciliary zonules: structure and arrangement
- Measuring pupil diameter

Reference Books:

1) Basic and Clinical Science Course, American Academy of Ophthalmology (AAO), 1992-93/1993-94.

2) STEPHEN J.H. MILLER: Parsons Diseases of the Eye, Churchill Livingstone. (PDE)
3) JACK J. KANSKI: Clinical Ophthalmology, 2003, Butterworths.

GEOMETRIC OPTICS

Subject Name	Code	Type	T + P + Pj	Credits
GEOMETRIC OPTICS	CUTM1781	Theory+ Practice	3+2+0	5

Course Objective:

- To Develop a thorough understanding of how light behaves as it travels through various media, focusing on the fundamental principles of geometric optics.
- To Investigate the imaging properties of optical systems comprising various surfaces and lenses, including the principles of lens design and function.
- To Examine the role of aperture stops in optical systems, focusing on how they control the amount of light entering the system and influence the overall image quality.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Gain knowledge on properties of light.
CO 2: Analyze distribution of light under various conditions.
CO 3: Evaluate properties of the images formed on the retina by the optics of the eye
CO 4: Investigate orientation and position of the line images and their relation to the cylinder power.
CO 5: Design basic optical concept for visual function.

Course Outline:

Module 1:

Fundamentals of Light and Wave Properties

- **Nature of Light**
  - Light as electromagnetic oscillation
  - Sinusoidal oscillations: amplitude and phase
  - Speed of light in vacuum and other media
  - Refractive index and its wavelength dependence
- **Wave Fronts and Rays**
  - Types of wave fronts: spherical, elliptical, and plane
  - Curvature, vergence, convergence, and divergence of rays
  - Vergence at a distance

Module 2:

Reflection, Refraction, and Basic Optical Devices

- **Principles**
  - Fermat's and Huygens Principles
  - Derivation of reflection and refraction laws (Snell's law)
- **Mirrors**
  - Plane mirrors: height and rotation effects
  - Spherical mirrors: paraxial approximation, sign convention, and vergence equation
  - Imaging by concave and convex mirrors

Module 3:

Optical Properties and Prisms

- **Reflectivity and Transmissivity**
  - Definitions and implications
- **Snell's Law and Refraction**
  - Refraction at a plane surface
- **Glass Slabs and Prisms**
  - Glass slab: displacement without deviation and dispersion
  - Thick prisms: angle, deviation, and refractive index
  - Prisms: angular dispersion, dispersive power, and Abbe's number

Module 4:

Advanced Optical Materials and Surfaces

- **Optical Glasses**
  - Crown and flint glasses, high refractive index materials
- **Thin Prisms**
  - Definition and properties
  - Prism diopter and deviation dependence on refractive index
- **Nodal Planes and Sag Formula**
  - Definitions and applications
- **Spherical Surfaces**
  - Paraxial approximation, vergence equation
  - Imaging by positive and negative powered surfaces
  - Introduction to spherical aberration

Module 5:

Lens Systems and Applications

- **Thin Lenses**
  - Special case of thick lenses, sign conventions

- Imaging by thin convex and concave lenses: image properties for various object positions

- **Lens Systems**
  - Prentice's Rule
  - Systems of two or more thin lenses
  - Front and back vertex powers, equivalent power, and cardinal points
  - Equivalent power calculation using magnification formula

Practice

1) Thick Prism – determination of prism angle and dispersive power; calculation of the refractive index
2) Thin Prism – measurement of deviation; calculation of the prism diopter
3) Image formation by spherical mirrors
4) Convex lens - power determination using lens gauge, power determination using distant object method; power determination using the vergence formula
5) Concave lens – in combination with a convex lens – power determination.
6) Construction of a tabletop telescope – all three types of telescopes.
7) Construction of a tabletop microscope
8) Imaging by a cylindrical lens – relationship between cylinder axis and image orientation
9) Imaging by two cylinders in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinders' powers and orientations
10) Imaging by a spherocylindrical lens – sphere and cylinder in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinder's power and orientation.

BASIC COMPUTER AND INFORMATION SCIENCE

Subject Name	Code	Type	T + P + Pj	Credits
BASIC COMPUTER AND INFORMATION SCIENCE	**CUTM1742**	**Practice**	**0+2+0**	**2**

Course Objective:

- Identify the function of computer hardware components.
- Identify the factors that go into an individual or organizational decision on how to purchase computer equipment.
- Identify how to maintain computer equipment and solve common problems relating to computer hardware.

Course Outcome:

After Completion of this course the students will be able to:

CO1: Identify basic components of a computer system such as hardware, software, and networks.
CO2: Explain the principles of data representation and its significance in computing.
CO3: Apply foundational knowledge to troubleshoot basic computer hardware and software issues.
CO4: Analyze and evaluate different types of computer viruses, malware, and security threats.
CO5: Design and develop a simple program or script to solve a basic computational problem.

Course Outline:

Module 1:

Fundamentals of Computer Systems and Software

- **Introduction to Computers**
  - Characteristics and Block Diagram of a Computer
  - Generations of Computers
  - Types of Input and Output Devices
- **Processor and Memory**
  - The Central Processing Unit (CPU) and its Functions
  - Main Memory (RAM)
  - Storage Devices (Hard Drives, Flash Drives, etc.)

Module 2:

Office Productivity Software

- **Introduction to MS-Word**
  - Components of the Word Window
  - Creating, Opening, and Inserting Files
  - Editing Documents, Page Settings, and Formatting Text
  - Saving, Spell Checking, and Printing Documents
  - Creating and Editing Tables
  - Mail Merge
- **Introduction to Excel**
  - Understanding Worksheets and Cells
  - Entering and Formatting Data
  - Saving Workbooks and Printing Worksheets
  - Creating Graphs and Charts

Module 3:

Operating Systems, Networks, and Internet Basics

- **Introduction to MS-DOS**
  - History and Features of MS-DOS

- MS-DOS Commands (Internal and External)

- **Introduction to Windows**
  - History and Features of Windows Operating System
  - Desktop, Taskbar, Icons, and File Management
  - Working with Folders, Shortcuts, and Windows Operations
- **Computer Networks and Internet**
  - Types of Networks (LAN, MAN, WAN, Internet, Intranet)
  - Network Topologies (Star, Ring, Bus, Mesh, Tree, Hybrid)
  - Internet Basics
    - Definition and Brief History
    - Basic Internet Services (Email, FTP, Telnet, WWW)
    - Web Browsers and Navigating the World Wide

Suggested readings:

1) Objective Computer Awareness
2) Computer Networking (Global Edition)

Ocular Physiology

Subject Name	Code	Type	T + P + Pj	Credits
Ocular Physiology	CUTM1783	T + P	3 + 1 + 0	4

Course Objective:

- Comprehend the physiological processes underlying corneal transparency, hydration, and uveal drainage.
- Understand the formation, circulation, and function of aqueous and vitreous humors.
- Analyze the physiological mechanisms of ocular movements, accommodation, color vision, and visual adaptation.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Understand the normal functioning of all structures of the eye and their interactions.
CO 2: Implement physiological aspects of normal growth and development of the eye.
CO 3: Examine the phenomenon of vision.
CO 4: Evaluating the physiological principles underlying pathogenesis and treatment of diseases of the

CO 5: Judge the abnormal physiology of eye.

Course Outline:

MODULE 1: Basic Ocular Physiology and associated structures

- Anterior segment
- Posterior segment

MODULE 2: Protective Mechanisms and Ocular Movements

- **Protective Mechanisms:**
  - Blinking: muscles and reflexes
  - Lacrimation: glands, tear film chemistry, dynamics

- **Ocular Movements:**
  - Extraocular muscles, function, nerve supply
  - Mechanics and physiology of ocular movements
  - Supra nuclear control

MODULE 3: Cornea ,Uveal tract, Lens Physiology

- **Cornea:**
  - Ultra and histological structure
  - Corneal transparency and hydration
  - Regulation and vascularization
  - Maurice theory and Goldman's theory
- **Lens:**
  - Basic structure and function
  - Transparency and changes with aging
  - Cataract overview
- **Uveal Tract:**
  - Overview and uveal meshwork
  - Uveo-scleral drainage, Schlemm's canal

Aqueous and Vitreous Humor Physiology

- **Aqueous Humor:**
  - Formation, drainage, and circulation
  - Rates of production and flow
  - Functions
- **Vitreous Humor:**
  - Composition and distribution
  - Physiology and function
  - Optical role

MODULE 4: Retina, Optic Nerve, and Ocular Circulation

- **Retina:**
  - Structure and organization
  - Functions of rods and cones
- **Optic Nerve:**
  - Physiology, papilledema, optic atrophy
- **Ocular Circulation:**
  - Vascular structure, blood-ocular barriers

- Regulation

MODULE 5: Accommodation, Color Vision, and Visual Physiology

- **Accommodation:**
  - Mechanisms, nervous control
  - Changes with age (presbyopia)
- **Color Vision:**
  - Physiological, photochemical, neurological basis
  - Theories (Granit, Young-Helmholtz)
  - Color defects and blindness
- **Visual Physiology:**
  - Visual acuity, contrast sensitivity
  - Light and dark adaptation

Practice:

- Eye movements
- Blink rate measurement
- External eye examination using torchlight
- Pupil examination

Reference Books:

4) Basic and Clinical Science Course, American Academy of Ophthalmology (AAO), 1992-93/1993-94.
5) STEPHEN J.H. MILLER: Parsons Diseases of the Eye, Churchill Livingstone. (PDE)
6) JACK J. KANSKI: Clinical Ophthalmology, 2003, Butterworths.

INTRODUCTION TO OPTOMETRY

Subject Name	Code	Type	T + P + Pj	Credits
INTRODUCTION TO OPTOMETRY	CUTM1785	Theory + Practice	1+1+0	2

Course Objective:

- Covers the fundamental components and scope of optometry, including its principles, ethics, and key terminologies.
- Explores the role and importance of national and international optometry associations and their contributions to the profession.
- Introduces various optometric instruments, visual acuity charts, basics of retinoscopy, and other refraction devices, emphasizing practical application and assessment methods.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Understand optometry as a profession and its scope in future awareness of the terms used in optometry.

CO 2: Apply knowledge to test visual acuity of people and handle retinoscope comfortably.

CO 3: Value the concept of vision screening and the purpose of different instruments used in optometry.

CO 4: Evaluate the professional standards in health practice.

CO 5: Reconstruct the skills of enquiry in specific subject and develop different approaches to problem-solving as well as identify the limitations of knowledge.

Course Outline:

Module I: Foundations of Optometry

- **History and Basic Principles of Optometry:**
- Explore the historical development and fundamental principles that underpin the field of optometry.
- **Ethics, Terminology, and Scope:**
- Discuss the ethical considerations in optometry practice, key terminologies used, and the comprehensive scope of the profession.

Module II: Professional Practice in Optometry

- **Optometry Associations and Professional Groups:**
  - Understand the roles and significance of state, national, and international optometry associations in shaping the profession.
- **Visual Assessment and Instrumentation:**
  - Cover the components and techniques involved in visual assessment, including an introduction to essential optometry instruments and vision screening methods.

Module III: Clinical Optometry Techniques

- **Visual Acuity and Refraction:**
  - Focus on visual acuity charts, construction standards, and the use of trial boxes in visual acuity testing.
  - Conduct practical workshops on the construction of visual acuity charts.
- **Retinoscopy and Refractometry:**
  - Learn the basics of retinoscopy and refractometry techniques using key instruments like the retinoscope, optometers, and auto refractometer.
  - Engage in practical sessions to explore various methods and reflex characteristics in the laboratory.

Practice:

- Visual function assessment in the laboratory
- Exploring different instrumentation in the laboratory

REFERENCE BOOKS:

1) Primary Care Optometry: Anomalies of Refraction and Binocular Vision, Book by Theodore P. Grosvenor.
2) Borish's Clinical Refraction 2nd Edition, Book by William Benjamin.

PHYSICAL OPTICS

Subject Name	Code	Type	T + P + Pj	Credits
PHYSICAL OPTICS	CUTM1784	Theory+Practice	3+1+0	4

Course Objective:

- To thoroughly explore light as a wave and its interaction with various forms of matter.
- To focus on specific optical phenomena such as interference, diffraction, polarization, and scattering.
- They will learn the underlying principles and mathematical frameworks that govern these phenomena.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Gain knowledge on properties of light.

CO 2: Able to analyze distribution of light under various conditions.

CO 3: Apply the knowledge of waves, colour, frequency, photon energy, phase difference, optical coherence and coherent sources using monochromatic light sources of light.

CO 4: Evaluate resolution of an instrument.

CO 5: Develop skills in refractive and reflective surfaces

Course Outline:

Module 1:

Fundamentals of Light and Electromagnetic Waves

- **Nature of Light**
  - Light as Electromagnetic Oscillation
  - Wave Equation and Sinusoidal Oscillations
  - Transverse Nature of Light
  - Concepts of Frequency, Wavelength, Amplitude, and Phase
- **Sources of Light**
  - Introduction to the Electromagnetic Spectrum

Module 2:

Polarization of Light

- **Polarized Light**
  - Linearly Polarized Light
  - Circularly Polarized Light
  - Intensity of Polarized Light
  - Malus's Law
  - Polarizers, Analyzers, and Methods of Producing Polarized Light
  - Brewster's Angle

Module 3:

Birefringence and Interference

- **Birefringence**
  - Ordinary and Extraordinary Rays
  - Relationship between Amplitude and Intensity

Module 4:

Interference Phenomena

- **Coherence and Interference**
  - Constructive and Destructive Interference
  - Fringes and Fringe Width
  - Interference in Double Slits, Multiple Slits, and Gratings

Module 5:

Diffraction and Optical Resolution

- **Diffraction**
  - Diffraction by a Circular Aperture
  - Airy's Disc
- **Resolution of Optical Instruments**
  - Resolution Criteria such as Raleigh's Criterion
- **Scattering and Lasers**
  - Raleigh Scattering and Tyndall Effect
  - Basics of Fluorescence, Phosphorescence, and Lasers
  - Coherence, Population Inversion, Spontaneous Emission, and Einstein's Theory of Lasers

- **Radiometry**
  - Solid Angle and Radiometric Units
  - Photopic and Scotopic Luminous Efficiency and Efficacy Curves
  - Photometric Units
  - Inverse Square Law of Photometry and Lambert's Law
- **Other Units of Light Measurement**
  - Retinal Illumination and Practical Applications

Practice:

1) Gratings – determination of grating constant using Sodium vapour lamp; determination of wavelengths of light from Mercury vapor lamp
2) Circular Apertures – measurements of Airy's disc for apertures of various sizes
3) Verification of Malus' Law using a polarizer – analyzer combination
4) Demonstration of birefringence using Calcite crystals
5) Measurement of the resolving power of telescopes.
6) Newton's rings
7) Demonstration of fluorescence and phosphorescence using crystals and paints

REFERENCE BOOKS:

1) Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.
2) Keating NM. P, Geometric, Physical and Visual Optics, Butterworth- Heinemann, Massachusetts, USA, 2002.
3) Subrahmanyan N, BrijLal, A text book of Optics, S. Chand Co Ltd, New Delhi, India, 2003.

VISUAL OPTICS I

Subject Name	Code	Type	T + P + Pj	Credits
VISUAL OPTICS I	CUTM1786	T + P	3+2+0	5

Course Objective:

This course will be taught in two consecutive semesters:

- Geometric Optics is the study of light and its behavior as it propagates in a variety of media. Specifically, the phenomena of reflection and refraction of light at boundaries between media and subsequent image formation will be dealt with in detail.
- Reflections at plane and spherical surfaces and refractions at plane, spherical, cylindrical and toric surfaces will be studied in this course.
- Attention will be given to the system of surfaces and/or lenses and their imaging properties. The effect of aperture stops on the quality of images, such as blur and aberrations, depth of field and depth of focus, will also be studied.

Course Outcome:

After Completion of this course the students will be able to:

CO1: Understand the knowledge of mirrors and lenses.
CO 2: Apply skills in refractive and reflective surfaces
CO 3: Implement properties of the images formed on the retina by the optics of the eye.
CO 4: Evaluate different types of lenses and frames.
CO 5: Develop different types of lenses

Course Outline:

Module I:

Fundamentals of Geometrical Optics and Light

- Review of Geometrical Optics: Vergence and power, Conjugacy, Object space and image space, Sign convention, Spherical refracting surface
- Optical Elements: Spherical mirror; catoptric power, Cardinal points, Magnification, Light and visual function

Module II:

Optical Phenomena and Clinical Relevance

- Optical Phenomena: Fluorescence, Interference, Diffraction, Polarization, Birefringence, Dichroism
- Aberrations: Aberration and application, Spherical and Chromatic

Module III:

Optics of Ocular Structures and Measurements

- Ocular Structures: Cornea and aqueous, Crystalline lens, Vitreous, Schematic and reduced eye
- Measurements of Optical Constants: Corneal curvature and thickness, Keratometry, Curvature of the lens and ophthalmophakometry, Axial and axis of the eye

Module IV:

Vision Science and Visual Performance

- Basic Aspects of Vision: Visual Acuity, Light and Dark Adaptation, Color Vision, Spatial and Temporal Resolution, Color vision & theories
- Measuring Visual Performance: Science of Measuring visual performance and application to Clinical Optometry, Contrast Sensitivity

Module V:

Refractive Anomalies and Conditions

- Refractive Anomalies: Etiology, Contributing variability and their ranges, Population distributions, Optical component measurements, Growth of the eye in relation to refractive errors
- Refractive Conditions: Emmetropia, Ametropia types, Correction of Refractive errors, Myopia, Hyperopia, Astigmatism types, Axial versus refractive ametropia

Practical:

- Amplitude of accommodation- pushup method, minus to blur, Keratometry
- Contrast Sensitivity
- Retinoscope Basics- spherical Ametropia

Reference Books:

1) Clinical Optics, Andrew R Elkington& Helena J Frank - Blackwell Scientific Publications Oxford – London
2) Clinical Visual optics Arthur G Bennett Ronald B Rabbetts -Butterworth- Heinemann Second edition 1989
3) Visual Optics and Refraction- A clinical approach David D Michaels: The C.V. Mosby Co., 1985.
4) Optics and Refraction A User-friendly guide David Miller 1991 Gower Medical Publishing.

OPTOMETRIC OPTICS I

Subject Name	Code	Type	T + P + Pj	Credits
OPTOMETRIC OPTICS I	CUTM1787	T + P	3+2+0	5

Course Objective:

- Understand the theory, materials, types, advantages, and disadvantages of spectacle lenses and frames.
- Learn when and how to prescribe spectacles, including the considerations for different types of lenses and frames.
- Gain knowledge on the construction, design, and application of lenses, with a focus on the methods of calculating their power and optical effects.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Understand techniques such as measurement of lens power, lens centration using conventional techniques. Transposition of various types of lenses.

CO 2: Identify different forms of lenses (equi-convex, planoconvex, periscopic, etc.)

CO 3: Implement concept of final checking of finished spectacle with frame adjustments, delivery, and follow-up

CO 4: Develop lens verification and axis marking and fitting of all lens types

CO 5: Design basic optical concept for visual function

Course Outline:

MODULE-I:

Fundamentals of Optics

- Introduction
- Light, Mirror, Reflection, Refraction, and Absorption
- Basic principles and applications in optometry

MODULE-II:

Prisms and Their Applications

- Prisms
- Definition, properties, and refraction through prisms
- Thickness difference, Base-apex notation, uses, nomenclature, and units
- Sign conventions, Fresnel's prisms, rotary prisms

MODULE-III:

Lenses and Lensometry

- Lenses
- Definition, units, and terminology
- Introduction to spectacle lenses, forms of lenses
- Spherical, cylindrical, and spherocylindrical lenses
- Vertex distance and vertex power, effectivity calculations

MODULE-IV:

Transpositions and Prismatic Effects

- Transpositions and Prismatic Effects

- Simple, toric, and spherical equivalent transpositions
- Prismatic effect, centration, decentration, and Prentice rule
- Prismatic effect of plano-cylinder and sphero-cylinder lenses

MODULE-V:

Advanced Lens Concepts and Aberrations

- Advanced Lens Concepts
- Spherometer & sag formula
- Edge thickness calculations
- Magnification in high plus lenses, minification in high minus lenses
- Tilt-induced power in spectacles
- Aberrations in ophthalmic lenses

Practice:

- Prismatic effects
- Lensometry, hand neutralization
- Simple & toric transpositions
- Spherometer, edge thickness calculations

Reference Books:

1) Clinical Optics: T E Fannin& T Grosvenor, 2nd edition
2) M. JALIE: Principles of Ophthalmic Lenses, Edn. 3, 1994.
3) CLIFFORD W BROOKS & IRVIN M BORISH: System for Ophthalmic Dispensing

OCULAR DISEASES I

Subject Name	Code	Type	T + P + Pj	Credits
OCULAR DISEASES I	CUTM1788	Theory +Practice	3+1+0	4

Course Objective:

- Identify and describe the pathophysiology and clinical manifestations of common anterior segment ocular diseases.
- Develop diagnostic skills and treatment strategies for conditions affecting the cornea, lens, and anterior chamber.
- Understand the impact of systemic diseases on the anterior segment and their ocular manifestations.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Understand etiology, epidemiology, symptoms, signs, course sequelae of ocular diseases.
CO 2: Investigate different eye health.
CO 3: Implement diagnostic approach, and management of ocular diseases.
CO 4: Evaluate many ocular eye diseases.

CO 5: Create awareness among people for many infectious eye diseases.

Course Outline:

MODULE I: Orbit and Periorbital Disorders

- **Applied Anatomy of the Orbit:**
  - Structure and function
- **Proptosis:**
  - Classification, causes, investigations
- **Orbital Conditions:**
  - Enophthalmos
  - Developmental anomalies (Craniosynostosis, craniofacial dysostosis, hypertelorism, median facial cleft syndrome)
  - Orbital inflammations (Preseptal cellulitis, orbital cellulitis, orbital periostitis, cavernous sinus thrombosis)
  - Grave's ophthalmopathy
  - Orbital tumors (Dermoids, capillary hemangioma, optic nerve glioma)
  - Orbital trauma and fractures
  - Orbital surgery (Orbitotomy)
  - Approach to a patient with proptosis

MODULE II: Eyelids and Lacrimal System

- **Applied Anatomy of the Eyelids:**
  - Structure and function
- **Eyelid Conditions:**
  - Congenital anomalies (Ptosis, coloboma, epicanthus, distichiasis, cryptophthalmos)
  - Edema (Inflammatory, solid, passive)
  - Inflammatory disorders (Blepharitis, external hordeolum, chalazion, internal hordeolum, molluscum contagiosum)
  - Position anomalies (Trichiasis, ectropion, entropion, symblepharon, blepharophimosis, lagophthalmos, blepharospasm, ptosis)
  - Tumors (Papilloma, xanthelasma, hemangioma, basal cell carcinoma, squamous cell carcinoma, sebaceous gland melanoma)
- **Lacrimal System:**
  - Applied anatomy
  - Tear film and dry eye (Sjogren's Syndrome)
  - The watering eye (Etiology, clinical evaluation)
  - Dacryocystitis
  - Swelling of the lacrimal gland (Dacryoadenitis)

MODULE III: Conjunctiva and Cornea (Part I)

- **Conjunctiva:**
  - Applied anatomy

    - Inflammations (Bacterial, chlamydial, viral conjunctivitis; allergic and granulomatous conjunctivitis)
    - Degenerative conditions (Pinguecula, pterygium, concretions)
    - Symptomatic conditions (Hyperemia, chemosis, ecchymosis, xerosis, discoloration)
    - Cysts and tumors
- **Cornea:**
    - Applied anatomy and physiology
    - Congenital anomalies (Megalocornea, microcornea, cornea plana, congenital cloudy cornea)
    - Inflammations (Topographical classifications: Ulcerative)

MODULE IV: Cornea (Part II)

- **Corneal Inflammation:**
    - Etiological classifications: Infective, allergic, trophic, traumatic, idiopathic
- **Corneal Degenerations:**
    - Classifications and examples (Arcus senilis, Vogt's white limbal girdle, Hassall-Henle bodies, lipoid keratopathy, band-shaped keratopathy, Salzmann's nodular degeneration, droplet keratopathy, pellucid marginal degeneration)
- **Corneal Dystrophies:**
    - Examples (Reis-Bückler dystrophy, recurrent corneal erosion syndrome, granular dystrophy, lattice dystrophy, macular dystrophy, cornea guttata, Fuchs' endothelial dystrophy, congenital hereditary endothelial dystrophy)
- **Additional Corneal Conditions:**
    - Keratoconus, keratoglobus, corneal edema, corneal opacity, corneal vascularization
- **Corneal Surgery:**
    - Penetrating keratoplasty

MODULE V: Uveal Tract and Sclera

- **Uveal Tract:**
    - Applied anatomy
    - Classification and etiology of uveitis
    - Pathology of uveitis
    - Types of uveitis: Anterior, posterior, purulent, endophthalmitis, panophthalmitis, pars planitis
    - Tumors (Melanoma)
- **Sclera:**
    - Episcleritis and scleritis
- **Clinical Examination:**
    - Examination techniques for uveitis and scleritis

Practice:

- Slit lamp examination of the adnexa
- Slit lamp examination of the adnexa
- Slit lamp examination of the cornea

Reference Books:

7) Basic and Clinical Science Course, American Academy of Ophthalmology (AAO), 1992-93/1993-94.
8) STEPHEN J.H. MILLER: Parsons Diseases of the Eye, Churchill Livingstone. (PDE)
9) JACK J. KANSKI: Clinical Ophthalmology, 2003, Butterworths.

OCULAR MICROBIOLOGY AND PATHOLOGY

Subject Name	Code	Type	T + P + Pj	Credits
OCULAR MICROBIOLOGY AND PATHOLOGY	CUTM1789	Theory	3+1+0	4

Course Objective:

- Equip optometry students with essential knowledge and skills in microbiology and pathology to accurately identify and understand various ocular disorders.
- Train technicians to apply correct procedures in laboratory investigations, ensuring accurate interpretation of tests in relation to the underlying pathology.
- Develop an understanding of the sensitivity, specificity, and limitations of various investigations, enabling technicians to make informed decisions in their practice.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Understand the insights of general microbiology and pathology. **CO 2**: Apply the knowledge in identification of pathogenic diseases of eye

CO 3: Examine conditions associated with ocular infections

CO 4: Evaluate systemic diseases of retina.

CO 5: Investigate different microscopical examinations

Course Outline:

Module 1:

Introduction to Microbiology and Microbial Growth

- **Introduction to Microbiology**
  - Types of Microorganisms
  - Physiology of Microorganisms
- **Microbial Growth and Control**
  - Nutrition, Enzymes, Metabolism, and Energy
  - Microbial Growth
  - Sterilization and Disinfection in the Laboratory
  - Control of Microbial Growth (Antimicrobial Methods and Chemotherapy)
  - Microbes vs. Humans: Infection Development, Disease Process, Pathogenicity, and Virulence

Module 2:

General Pathology and Ocular Infections

- **General Pathology Principles**
  - Pathophysiology of Ocular Angiogenesis
  - Ocular Infections
  - Pathology of Cornea and Conjunctiva
  - Pathology of Uvea and Glaucoma
  - Pathology of Retina

Module 3:

Ocular Bacteriology

- **Gram-Positive Bacteria**
  - Staphylococcus aureus
  - Staphylococcus epidermis
  - Streptococcus
  - Propionic Bacterium
  - Actinomyces
  - Nocardia
- **Gram-Negative Bacteria**
  - Pseudomonas
  - Haemophilus
  - Brucella
  - Neisseria
  - Moraxella

Module 4:

Pathology and Systemic Disease Impact on Eyes

- **Pathology Related to Systemic Diseases**
  - Pathology of Retina in Systemic Diseases/Disorders
  - Pathology of Eyelids and Adnexa
  - Pathology of Orbital Space-Occupying Lesions
- **Specific Pathologies**

- Pathology of the Optic Nerve
- Retinoblastoma
- Pathology of Lens

Module 5:

Microbial and Parasitic Infections Affecting Eyes

- **Spirochetes and Virology**
  - Treponema
  - Leptospiraceae
  - Classification of Viruses in Ocular Disease
  - Rubella, Adenovirus, Oncogenic Viruses (HPV, HBV, EBV, Retroviruses), HIV
- **Fungi and Parasites**
  - Yeasts
  - Filamentous and Dimorphic Fungi
  - Intracellular Parasites (Chlamydia)
  - Protozoa (Toxoplasmosis, Acanthamoeba)
  - Helminths (Toxocariasis, Filariasis, Onchocerciasis, Trematodes)

Reference Books:

1) Microbiology: M J Pelczaretal., 1999

1) BURTON G.R.W: Microbiology for the Health Sciences, St. Louis, J.P. Lippincott Co.,3rdEdn.,1988.
2) Pathology: CORTON KUMAR AND ROBINS (V EDITION) Pathological Basis of the Disease, 2004.
3) Pathology of the eye & orbit: K S Ratnagar, 1997
4) MACKIE &Mc CARTNEY Practical Medical Microbiology
5) SYDNEY M. FINEGOLD & ELLEN JO BARON: Diagnostic Microbiology (DM)
6) Sherris Medical Microbiology- Editors Kenneth J Ryan /C.George Ray :An Introduction to InfectiousDiseases 4th Edition 2003
7) CORTON KUMAR AND ROBINS (IV EDITION) : Pathological Basis of the Disease, 1994
8) S R Lakhani Susan AD & Caroline JF: Basic Pathology: An introduction to the mechanism of disease, 1993.
9) ANDERSON J. R: Muir's Text Book of Pathology, Edn. 12, 1987.
10) ROMINIC AND SOOD: CLINICAL PATHOLOGY, Medical Laboratory Technicalmanual

CLINICAL EXAMINATION OF VISUAL SYSTEM LAB

Subject Name	Code	Type	T + P + Pj	Credits
Clinical examination of Visual system Lab	CUTM1790	Practice	0 + 2 + 0	2

Course Objective:

- Develop skills in comprehensive history taking and external examination to assess ocular health and identify abnormalities.
- Perform detailed assessments of pupil reactions, ocular adnexa, and anterior segment using specialized techniques such as the swinging flashlight test and slit lamp examination.
- Conduct and interpret various diagnostic tests for tear film stability, macular function, and visual field assessment to support clinical decision-making.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Understand the purpose of each test, its indications and contraindications.

CO 2: Apply various clinical tests in step-by-step procedures

CO 3: Organize environment and documentation of the findings.

CO 4: Evaluate the patient care performance independently

CO 5: Design and develop different kinds of tests used in identifying underlying eye conditions

Course Outline:

Module 1: History Taking and External Examination

- **History Taking**: Patient history related to ocular symptoms and medical background.
- **External Examination**: Hirschberg's corneal light reflex (HBT), Facial symmetry and head position evaluation.

Module 2: Pupil Examination and Stereopsis Testing

- **Pupil Examination**: Swinging flashlight test (RAPD).
- **Stereopsis Testing**: Titmus fly test

Module 3: Tear Film and Macular Function Tests

- **Tear Film Tests**: Shrimers I & II, Tear Break-Up Time (TBUT), Non-Invasive Tear Break-Up Time (NIBUT), RoPlas, Fluorescein Disappearance Test (FDDT), and Tear Meniscus Height (TMH) tests
- **Macular Tests**: Amsler grid test, Photostress test
- **Worth 4 Dot Test**
- **Visual Field**: Confrontation technique

Reference Books:

1) Clinical Procedures in Primary Eye Care, book by David B Elliot, 5th edition
2) Primary Care Optometry: Anomalies of Refraction and Binocular Vision, Book by Theodore P. Grosvenor

VISUAL OPTICS II

Subject Name	Code	Type	T + P + Pj	Credits
VISUAL OPTICS II	CUTM1791	T + P	3+2+0	5

Course Objective:

- Understand the concept of the eye functioning as an optical instrument, including its various optical components.
- Study the different types of refractive errors that affect vision.
- Learn the clinical approach to diagnosing and managing various types of refractive errors.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Understand the advanced knowledge of mirrors and lenses.
CO 2: Implement properties of the images formed on the retina by the optics of the eye.
CO 3: Evaluate different types of lenses and frames.
CO 4: Develop different types of lenses
CO 5: Design basic optical concept for visual function.

Course Outline:

MODULE-I:
Myopia, Hyperopia, and Presbyopia

Myopia

- Recent myopia development, control, and pathological myopia
- Pseudo myopia and recent advancements in refractive errors

Hyperopia and Presbyopia

- Accommodation related to hyperopia & presbyopia
- Different types of refraction, drugs, and administration

MODULE-II:
Accommodation and Special Cases in Retinoscopy

- Accommodation
- Range and amplitude of accommodation, variation with age
- Anomalies of accommodation

- Far and near points of accommodation
- Hypermetropia and accommodation

MODULE-III:

Convergence and Objective Refraction

Convergence

- Types, measurements, and anomalies
- Relationship between accommodation & convergence, AC/A ratio

Objective Refraction

- Static & dynamic streak retinoscopy
- Principles, procedures, difficulties, and interpretation of findings
- Dynamic retinoscopy and near retinoscopy
- Cycloplegic refraction

MODULE-IV:

Subjective Refraction and Ocular vs. Spectacle Refraction

Subjective Refraction

- Review of subjective refractive methods
- Determining astigmatism using different methods
- Duo chrome, binocular balancing
- Difficulties in subjective and objective tests and their avoidance

Ocular vs. Spectacle Refraction

- Ocular accommodation vs. spectacle accommodation
- Spectacle magnification and relative spectacle magnification
- Retinal image blur, depth of focus, and depth of field

MODULE-V:

Anisometropia, Aniseikonia, and Special Refractive Conditions

Special Refractive Conditions

- Anisometropia, aniseikonia, amblyopia, aphakia, and pseudophakia
- Night myopia and Purkinje shift

Practice:

- Retinoscopy for simple, compound & oblique astigmatism
- Retinoscopy in special cases - media opacities, irregular astigmatism
- Presbyopia correction methods, accommodative reserve, balancing relative accommodation, cross-grid test
- Subjective refraction and binocular balancing

Reference Books:

1) Clinical Optics, Andrew R Elkington& Helena J Frank - Blackwell Scientific Publications Oxford – London
2) Optics and Refraction A User-friendly guide David Miller 1991 Gower Medical
3) Clinical Visual optics Arthur G Bennett Ronald B Rabbetts -Butterworth- Heinemann Second edition 1989
4) Visual Optics and Refraction- A clinical approach David D Michaels: The C.V. Mosby Co., 1985.

OPTOMETRIC OPTICS II & DISPENSING OPTICS

Subject Name	Code	Type	T + P + Pj	Credits
OPTOMETRIC OPTICS II & DISPENSING OPTICS	CUTM1792	T + P	3+2+0	5

Course Objective:

- Gain a comprehensive understanding of the theory behind spectacle lenses, including their materials, types, advantages, and disadvantages.
- Gain a comprehensive understanding of the theory behind spectacle lenses, including their materials, types, advantages, and disadvantages.
- Explore the crucial role that optometrists play within optical settings, including their responsibilities in lens selection, fitting, and patient education.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Understand different types of materials used to make lenses and its characteristics

CO 2: Operate the tool power for grinding process

CO 3: Compare different lens designs–Bifocals, progressive lens, Tinted, Protective & Special lenses, Spectacle frames –manufacture process & materials

CO 4: Develop spectacle prescription, Counselling the patient, lens edge thickness calculation & lens measurements and selection.

CO 5: Design basic optical concept for visual function.

Course Outline:

Module 1:

Introduction to Lens Manufacture and Prescription Basics

- **Introduction to Lens Manufacture**
  - Ophthalmic Blanks
  - Surfacing, Polarising, Glazing
  - Lens Designs Compatible with Contemporary Eye Frames
- **Components of Spectacle Prescription**
  - Components and Transposition
  - Add and Near Power Relation

Module 2:

Measurements and Frame Selection

- **Measurements for Spectacles**
  - Measuring Inter-Pupillary Distance (IPD) for Distance & Near
  - Bifocal Height
- **Frame Selection**

- Based on Spectacle Prescription
- Professional Requirements, Age Group, Face Shape

Module 3:

Lens and Frame Markings, Ordering, and Neutralization

- **Lens and Frame Markings**
  - Pupillary Centers, Bifocal Heights, Progressive Markings
  - Recording and Ordering of Lenses (Power, Add, Diameter, Material Type, Lens Enhancements)
- **Neutralization**
  - Hand Neutralization & Lensometer Use
  - Axis Marking

Module 4:

Dispensing and Counseling

- **Final Checking and Dispensing of Spectacles**
  - Counseling on Wearing & Maintaining Spectacles
  - Accessories: Bands, Chains, Boxes, Selvets, Cleaners, Screwdriver Kit

Module 5:

Faults, Repairs, and Special Types of Spectacles

- **Faults in Spectacles**
  - Detection and Correction of Lens and Frame Fitting Issues
  - Patient Complaints: Description, Detection, and Correction
- **Spectacle Repairs**
  - Tools, Methods, Soldering, Riveting, Frame Adjustments
- **Special Types of Spectacle Frames**
  - Industrial Safety Glasses, Welding Glasses

Practice

- Lensometer Use: Sphere-Cylinder, Bifocals, Prisms
- Frame Measurements
- IPD Measurements & Pupilometer
- Lens Measurements and Selection: Single Vision, Bifocal
- Facial Measurements
- Find out the Meridian & Optical Center of Ophthalmic Lens
- Frame Availability in Indian Market
- Visit to Lens Manufacturing Workshops

Reference Boo 12ks:

1) CLIFFORD W BROOKS & IRVIN M BORISH: System for Ophthalmic Dispensing.
3. M.Jalie: Ophthalmic lenses and dispensing.

2) Clinical Optics: T E Fannin& T Grosvenor, 2nd edition
3) M. JALIE: Principles of Ophthalmic Lenses, Edn. 3,
4) Jalie MO: Ophthalmic lens and Dispensing, 3rd edition, Butterworth –Heinemann, 2008
5) Troy E. Fannin, Theodore Grosvenor: Clinical Optics, 2nd edition, Butterworth Heinemann, 1996
6) C W Brooks, IM Borish: System for Ophthalmic Dispensing, 3rdedition, Butterworth - Heinemann, 2007
7) Michael P Keating: Geometric, Phisical& Visual Optics, 2nd edition, Butterworth – Heinemann, 2002

OCULAR DISEASES - II

Subject Name	Code	Type	T + P + Pj	Credits
OCULAR DISEASES II	**CUTM1794**	**Theory**	**3+0+1**	**4**

Course Objective:

- Understand the pathophysiology, clinical presentation, and diagnostic approaches for common posterior segment ocular diseases.
- Develop skills in the management and treatment of retinal disorders, choroidal diseases, and optic nerve pathologies.
- Analyze the impact of systemic diseases on the posterior segment and their ocular manifestations.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Understand etiology, epidemiology, symptoms, signs, course sequelae of ocular diseases.
CO 2: Implement diagnostic approach, and management of ocular diseases.
CO 3: Investigate different eye health.
CO 4: Evaluate many ocular eye diseases.
CO 5: Awareness among people for many infectious eye diseases.

Course Outline:

Module 1: Retina and Vitreous

- **Applied Anatomy and Congenital Disorders**:
  - Optic Disc: Coloboma, Drusen, Hypoplasia, Medullated Nerve Fibers.
  - Persistent Hyaloid Artery.
- **Inflammatory Disorders**:
  - Retinitis: Acute Purulent, Bacterial, Viral, Mycotic.
  - Retinal Vasculitis (Eales's Disease).
- **Vascular Disorders**:
  - Retinal Artery Occlusion (Central Retinal Artery Occlusion).
  - Retinal Vein Occlusion (Ischemic, Non-Ischemic, Branch Retinal Vein Occlusion).

Module 2: Retinal Degenerations and Macular Disorders

- **Retinal Degenerations**:
  - Retinitis Pigmentosa.
  - Lattice Degenerations.
- **Macular Disorders**:
  - Solar Retinopathy.
  - Central Serous Retinopathy.
  - Cystoid Macular Edema.
  - Age-Related Macular Degeneration.
- **Retinal Detachment and Tumors**:
  - Retinal Detachment: Rhegmatogenous, Tractional, Exudative.
  - Retinoblastoma.

Module 3: Ocular Injuries

- **Terminology and Classification**:
  - Closed Globe Injury: Contusion, Lamellar Laceration.
  - Open Globe Injury: Rupture, Laceration, Penetrating Injury, Perforating Injury.
- **Mechanical Injuries**:
  - Extraocular Foreign Body.
  - Blunt Trauma.
  - Perforating Injury.
  - Sympathetic Ophthalmitis.
- **Non-Mechanical Injuries**:
  - Chemical Injuries.
  - Thermal, Electrical, and Radiational Injuries.
  - Clinical Approach to Ocular Injury Patients.

Module 4: Lens and Cataract

1. **Applied Anatomy and Physiology**:
   - Clinical Examination.
   - Classification of Cataract.
2. **Congenital and Acquired Cataracts**:
   - Congenital and Developmental Cataract.
   - Acquired Cataract: Senile, Traumatic, Complicated, Metabolic, Electric, Radiational, Toxic.
3. **Cataract Management and Lens Displacement**:
   - Non-Surgical and Surgical Measures.
   - Complications of Cataract Surgery.
   - Lens Displacement: Subluxation, Displacement, Lens Coloboma, Lenticonus, Microspherophakia.

Module 5: Neuro-Ophthalmology and Glaucoma

1. **Clinical Neuro-Ophthalmology**:
   - Anatomy of Visual Pathway.
   - Lesions of the Visual Pathway.
   - Pupillary Reflexes and Abnormalities.
   - Optic Neuritis, Anterior Ischemic Optic Neuropathy, Papilledema, Optic Atrophy.
2. **Neuro-Ophthalmic Conditions**:
   - Cortical Blindness.
   - Malingering.
   - Nystagmus.
   - Clinical Examination Techniques.
3. **Glaucoma**:
   - Applied Anatomy and Physiology of Anterior Segment.
   - Clinical Examination.
   - Definition and Classification of Glaucoma.
   - Pathogenesis of Glaucomatous Ocular Damage.
   - Types of Glaucoma: Congenital, Primary Open Angle, Ocular Hypertension, Normal Tension, Primary Angle Closure, Secondary.
   - Management: Medications, Laser Interventions, Surgical Techniques.

Reference Books:

1) Basic and Clinical Science Course, American Academy of Ophthalmology (AAO), 1992-93/1993-94.
2) STEPHEN J.H. MILLER: Parsons Diseases of the Eye, Churchill Livingstone. (PDE)
3) JACK J. KANSKI: Clinical Ophthalmology, 2003, Butterworths.

CONTACT LENS- I

Subject Name	Code	Type	T + P + Pj	Credits
CONTACT LENS I	**CUTM1793**	**Theory+ Practice**	**3+2+0**	**5**

Course Objective:

- Understand the basics of contact lenses
- List the important properties of contact lenses and Finalize the CL design for various kinds of patients
- Recognize various types of fitting and explain all the procedures to patient.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Explain the basic skills in fitting contact lens.
CO 2: Identify and manage the adverse effects of contact lens
CO 3: Differentiate between different contact lens and their uses in different practices.
CO 4: Evaluate the contact lens design for various kinds of patients
CO 5: Create awareness about advantages of contact lenses over spectacles

Course Outline:

Module 1:

Introduction to Contact Lenses

- **Introduction to Contact Lenses**
  - Definition, Classification/Types
  - History of Contact Lenses
- **Optics of Contact Lenses**
  - Review of Anatomy & Physiology
  - Tear Film, Cornea, Lids & Conjunctiva

Module 2:

Contact Lens Materials and Properties

- **Contact Lens Materials**
  - Introduction and Properties

- **Physiological Properties**
    - DK, Lonicity, Water Content
- **Physical Properties**
    - Elasticity, Tensile Strength, Rigidity
- **Optical Properties**
    - Transmission, Refractive Index

Module 3:

Indications, Contraindications, and Pre-Fitting Examination

- **Indications and Contraindications**
- **Parameters/Designs of Contact Lenses & Terminology**
- **RGP Contact Lens Materials**
    - Manufacturing Rigid and Soft Contact Lenses (Various Methods)
- **Pre-Fitting Examination**

Module 4: Astigmatism Correction and Contact Lens Fitting

- **Correction of Astigmatism with RGP Lenses**
    - Types of Fit: Steep, Flat, Optimum (Spherical and Toric Cornea)
- **Calculation and Finalizing Contact Lens Parameters**
    - Ordering Contact Lenses and Writing a Prescription
    - Checking and Verifying Contact Lenses

Module 5:

Handling, Maintenance, and Follow-Up

- **Handling Instructions**
    - Insertion & Removal Techniques
- **Care and Maintenance**
    - Cleaning Agents & Importance
    - Rinsing Agents & Importance
    - Disinfecting Agents & Importance
    - Lubricating & Enzymatic Cleaners
- **Follow-Up Visit Examination**
    - Complications of RGP Contact Lenses

Practice:

- **Practice**:
    - Measurement of Ocular Dimensions (Cornea, Pupil, and Lid Characteristics)
    - Slit Lamp Examination of Tear Film – Blink Rate and TBUT, Schirmer's Test
    - History Taking for Contact Lenses
    - Vertex Distance Calculations
    - Selection of Contact Lens Parameters
    - Use of Keratometer
    - Fitting and Assessment of Soft Contact Lenses (Steep, Flat, Optimal Fit)
    - Writing Contact Lens Prescriptions
    - Do's and Don'ts of Contact Lens Handling

- Insertion & Removal of Soft Contact Lenses
- Teaching Patients to Insert and Remove Contact Lenses
- Contact Lens Handling, Cleaning, & Maintenance
- Case Discussions on Follow-Up Visits and Complications

Reference Books:

1) IACLE modules 1 – 10
2) CLAO Volumes 1, 2, 3
3) Anthony J. Phillips: Contact Lenses, 5thedition, Butterworth-Heinemann, 2006
4) Contact Lens Practise., Nathan Efron, Elsevier, third edition

CONTACT LENSES II

Subject Name	Code	Type	T + P + Pj	Credits
CONTACT LENSES II	CUTM1795	Theory+ Practice	3+2+0	5

Course Objective:

- Students will gain in-depth theoretical understanding of contact lenses, covering topics such as polymer chemistry.
- Integration of Theoretical Learning with Clinical Practice by integrating theoretical knowledge with clinical practice, students learn to apply their understanding to real-world scenarios.
- This integration ensures that students are well-prepared to provide effective optometric care involving contact lenses.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Understand the advanced skills in fitting contact lens.
CO 2: Identify and manage the adverse effects of contact lens.
CO 3: Differentiate between different contact lens and their uses in different practices.
CO 4: Evaluate the contact lens design for various kinds of patients
CO 5: Create awareness about advantages of contact lenses over spectacles

Course Outline:

Module 1:

Contact Lens Materials, Design, and Gas Transmission

- **Soft Contact Lens Polymer Chemistry**
  - Detailed Study
- **Contact Lens Terminology and Design**

    - Revision and Overview
    - Aspheric, Toric, Multifocal Designs
- **Gas Transmission Through Contact Lenses**
    - Dk, Dk/t, EOP (Edge Oxygen Permeability)
    - Critical Study of Measuring Techniques and Applications
- **Adaptive Symptoms of RGP Contact Lenses**

Module 2:

Pre-Fitting Considerations and Fitting Techniques

- **Pre-Fitting Considerations for Soft Contact Lenses (SCL)**
- **Fitting Philosophies for Soft Contact Lenses**
- **Fitting Toric Lenses**
    - RGP and Soft Contact Lenses

Module 3:

Contact Lens Parameters, Bifocal Lenses, and Post-Fitting Care

- **Calculation and Finalizing Soft Contact Lens (SCL) Parameters**
- **Fitting Bifocal Lenses**
- **Post-Fitting Care and Follow-Up**

Module 4:

Advanced Contact Lens Types and Techniques

- **Soft Toric Contact Lenses**
    - Stabilization Techniques and Parameter Selection

Module 5:

Specialty Fittings and Management

- **Diffractive Vision and Aspheric Contact Lenses**
- **Therapeutic Contact Lenses**
- **Contact Lenses as Prosthetics**
- **Cosmetic Contact Lenses**
- **Different Types of Contact Lenses**
    - Extended Wear, Disposable and Frequent Replacement Contact Lenses
    - Scleral and Transition Contact Lenses
- **Specialty Fittings**
    - Pediatric and Geriatric Contact Lens Fitting
    - Post-Refractive Surgery and Post-Corneal Grafting Contact Lens Fitting
    - Corneal Scars Contact Lens Fitting, Orthokeratology
    - Management of Presbyopia with Contact Lenses

Practice

- Fitting and Assessment of Soft Toric Contact Lenses - Axis Stabilization
- Selection of RGP Contact Lens Parameters

- Static and Dynamic Fitting and Assessment of Contact Lenses - Steep, Flat, Optimal Fit
- Insertion & Removal of RGP Contact Lenses
- Teaching Techniques of RGP, Scleral Lens, Contact Lens Handling, Cleaning & Maintenance
- Special RGP Fittings Case Discussions (Aphakia, Pseudophakia, Keratoconus)
- Writing Contact Lens Prescriptions
- Bifocal Contact Lens Fitting

REFERENCE BOOKS:

1) IACLE modules 1 - 10
2) CLAO Volumes 1, 2, 3
3) Anthony J. Phillips: Contact Lenses, 5thedition, Butterworth-Heinemann, 2006
4) Contact Lens Practise., Nathan Efron, Elsevier, third edition

BINOCULAR VISION I

Subject Name	Code	Type	T + P + Pj	Credits
BINOCULAR VISION I	CUTM1796	Theory + Practice	3+2+0	5

Course Objective:

- Understand the theoretical aspects of normal binocular vision, space perception, and their clinical applications.
- Study the gross anatomy and physiology of extraocular muscles and their role in binocular movement coordination.
- Learn about binocular optical defects and how they affect vision, along with strategies for their diagnosis and management.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Understand the concepts of grades of Binocular vision and Fundamental theories of binocular vision.

CO 2: Apply knowledge in binocular muscle coordination and integration of motor and sensory system into binocular vision.

CO 3: Identify non strabismic anomalies related to accommodation

CO 4: Evaluate different types of strabismic anomalies - horizontal, vertical, torsional, paralytical& mechanical restrictive.

CO 5: Create differential binocular visual condition practice in daily basis.

Course Outline:

MODULE-I:
Fundamentals of Binocular Vision and Space Perception
Basics of Binocular Vision

- Space perception, Cyclopean eye, evolution and advantages of binocular vision
- Grades of binocular vision: simultaneous perception, fusion, stereopsis
- Visual direction, retino-motor value, egocentric localization
- Corresponding points and normal retinal correspondence

MODULE-II:
Binocular Vision Anomalies and Testing
Binocular Vision Anomalies

- Horopter and Panum's fusional area
- Physiologic diplopia, fixation disparity, and theories of binocular vision
- Physiologic basis of fusion, binocular rivalry, suppression, and confusion
- Blind spot syndrome, eccentric fixation

MODULE-III:
Stereopsis and Depth Perception
Stereopsis and Depth Perception

- Neurophysiology of stereopsis, local and global stereopsis, and fusion
- Depth perception: non-stereoscopic clues, monocular cues and their types
- Influence of accommodation and convergence on depth perception

MODULE-IV:
Ocular Movements and Binocular Integration
Ocular Movements and Anatomy

- Integration of motor and sensory systems into binocular vision
- Anatomy of extraocular muscles: Rectii, Obliques, and LPS
- Innervation and blood supply of extraocular muscles
- Physiology of ocular movements: Center of rotation, Axes of Fick, Actions
- Laws of ocular motility: Donder's, Listing's, Sherrington's, Hering's laws

MODULE-V:
Binocular Defects and Management
Binocular Defects

- Influence of binocular optical defects: visual acuity, anisometropia, aniseikonia, geometric optical effects of spectacles
- Binocular muscular coordination: orthophoria, uniocular and binocular movements
- Fixation and its field, saccadic and pursuit movements, versions and vergence
- Amblyopia: Classification, etiology, investigation, and management
- Nystagmus: Classification, etiology, investigation, and management

Practice:

- Synoptophore for fusion, stereopsis, and simultaneous perception
- Worth four dot test, red filter test, Bagolini test
- Stereopsis evaluation tests, near point of accommodation (NPA), near point of convergence (NPC)
- Extraocular motility test, Hirschberg test
- Bruckner test, saccades and pursuit test, neutral density filters

References Books:

1. Scott B Steinman; Barbara A Steinman; Ralph P Garzia: Foundations of binocular visiona clinical perspective, 2000, New York: McGraw-Hill publishers
2. Pradeep Sharma: Strabismus simplified, First edition,1999, Modern publishers.
3. Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
4. Gunter K. V. Nooden: Binocular vision & Ocular motility_ Theory and management of strabismus, Sixth edition, 2002, Mosby Company
5. Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers.

Subject Name	Code	Type	T + P + Pj	Credits
LOW VISION AND REHABILATION	CUTM1797	Theory + Practice	3+1+0	4

LOW VISION AND REHABILITATION

Course Objective:

- Understand the epidemiology of visual impairment and the different types of low vision devices, including their optical principles.
- Learn the clinical approach to managing low vision patients, including the use of assistive devices for those who are totally visually challenged.
- Master the art of prescribing low vision devices, training patients in their use, and implementing other rehabilitation measures.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Define Low Vision and Clinical examination of Low vision subjects, Optical, Non-Optical, Electronic, and Assistive devices.

CO 2: Identify Low Vision subjects with Low vision devices.

CO 3: Execute identification of low vision patients.

CO 4: Evaluate low vision patients with low vision devices.

CO 5: Construct proper skills and abilities

.

Course Outline:

MODULE-I:
Introduction to Low Vision and Examination Techniques
Introduction

- Definition & Classification of Low Vision
- Causes of Low Vision
- Optometrist's role in Low Vision management

Examination of a Low-Vision Patient

- Case history and visual acuity (distant and near)
- Charts, measurement, and documentation
- Refraction: significance and technique
- Diagnostic procedures in low vision examination
- Pre-clinical evaluation: prognostic & psychological factors; psycho-social impact

MODULE-II:
Low Vision Aids and Magnification
Types of Low-Vision Aids

- Optics & Characteristics of low vision aids
- Magnification principles
- Galilean vs. Keplerian telescopes
- Spectacle magnifiers, hand magnifiers, stand magnifiers, CCTV, Bioptic telescopes
- Accessory low-vision aids

MODULE-III:
Selection and Training for Low-Vision Aids
Selection and Training

- Selection of low vision aids for distance, intermediate & near
- Guidelines & training for using various aids

MODULE-IV:
Pathological Conditions and Specific Low-Vision Aids
Pathological Conditions

- Choices of tests & aids for various pathological conditions
- Conditions causing overall blurring of the visual field
- Conditions causing central and peripheral field defects
- Light, glare, and contrast management in low-vision care
- Rehabilitation for children with low vision

MODULE-V:
Genetics, Rehabilitation, and Special Investigations
Genetics and Rehabilitation

- Genetics and the rehabilitation of visually handicapped individuals
- Common conditions leading to low vision and their special investigations
- Rehabilitation methods

Practice:

- Case history, visual acuity measurement & documentation, refraction and recording
- Application, trial & selection of devices (optical and non-optical)
- Training patients to use low-vision aids effectively
- Pediatric and geriatric low-vision care
- Selection, trial & dispensing of visual aids, special investigations, and rehabilitation methods

REFERENCE BOOKS:

Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4thedition, Butterworth-Heinemann, 1998

1) Sarika G, Sailaja MVSE Vaithilingam: practice of Low vision –A guide book, Medical Research Foundation, 2015.
2) Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann,1999
3) Helen Farral: optometric Management of Visual Handicap, Blackwell scientific publications, 1991
4) A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinnemann, 2007

BASIC & OCULAR PHARMACOLOGY

Subject Name	Code	Type	T + P + Pj	Credits
BASIC & OCULAR PHARMACOLOGY	CUTM1798	Theory + project	3+0+1	4

Course Objective:

- Understand the fundamental principles of pharmacology as applied to ophthalmic medications.
- Identify and classify common drugs used in the treatment of ocular conditions.
- Demonstrate knowledge of mechanisms of action, side effects, and contraindications of ophthalmic drugs.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Understand the basic principle of pharmacokinetics & Pharmacodynamics.

CO 2: Implement commonly used ocular drugs, mechanism, indications, contraindications, drug dosage in disease treatment.

CO 3: Analyze various drugs mechanisms and their reactions. **CO 4**: Relate pharmacology in treatment of many ocular diseases. **CO 5**: Create awareness about the usage of ocular drugs

Course Outline:

MODULE 1: Pharmacokinetics:

- Drug absorption
- Distribution
- Metabolism
- Excretion

MODULE 2: Pharmacodynamics:

- Drug Handling
- Drug Effects
- Concentration-Response Relationship

MODULE 3: Ocular Pharmacology and Drug Delivery

- Ocular Drug Handling
- Conjunctival Sac Residence
- Drug Vehicles
- Advanced Delivery Systems

MODULE 4: Ocular drugs and effects

- Anti- Glaucoma medication
- Tear substitutes
- Ocular diagnostics drugs
- Anti-infection drugs

MODULE 5: Sympathetic and parasympathetic drug , Effects of Various Drugs on the Eyes

- Neurotransmitters
- Glucocorticoids

- Immunosuppressive Agents
- Local Anesthetics
- Ocular Toxicity

Projects:

1. Pharmacokinetics of Drugs
2. Pharmacodynamics of Drugs
3. Drug receptor interactions
4. Different types of delivery methods of ocular medications
5. Ocular drugs and its effects on parasympathetic nervous system
6. Ocular drugs and its effects on sympathetic nervous system
7. Drugs used for IOP

Reference Book:

1) Zimmerman: Text Book of Ocular Pharmacology,1999
2) Bartlett and Jaanus: Clinical Ocular Pharmacology
3) S P RANG, M M DALE, RITTER – Pharmacology, Ed.3 Churchill 1995.
4) K D TRIPATHI: Essentials of Medical Pharmacology. 4th Ed.,2003
5) T S MAUGER & E L CRAIG - MOSBY'S - OCULAR DRUG HANDBOOK
6) Clinical Ocular Pharmacology – 5th edition - Jimmy D. Bartlett, Siret D. Jaanus.

BINOCULAR VISION II

Subject Name	Code	Type	T + P + Pj	Credits
BINOCULAR VISION II	**CUTM1799**	**Theory + Practice**	**3 + 2 + 0**	**5**

Course Objective:

- Understand the classification and etiology of both strabismus and non-strabismus binocular vision anomalies.
- Learn the necessary investigations and diagnostic procedures for identifying binocular vision anomalies.
- Gain knowledge on the management and treatment options for both strabismus and non-strabismus binocular vision anomalies.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Identify non strabismic anomalies related to accommodation & convergence

CO 2: Differentiate different types of strabismic anomalies - horizontal, vertical, torsional, paralytical & mechanical restrictive

CO 3: Evaluate necessary investigations & its interpretation

CO 4: Provide the appropriate management of the anomalies

CO 5: Create differential binocular visual condition practice in daily basis.

Course Outline:

MODULE-I:

Neuro-Muscular Anomalies and Horizontal Strabismus

Neuro-Muscular Anomalies

- Classification and etiological factors
- Factors affecting heterophoria and heterotropia

Horizontal Strabismus

- Esotropia: classification, investigations, diagnosis, management, and treatment
- Exotropia: classification, investigations, diagnosis, management, and treatment
- A-V phenomenon, microtropia

MODULE-II:

Vertical and Torsional Strabismus

Vertical Strabismus

- Classification, investigations, diagnosis, management, and treatment

Torsional Strabismus

- Classification, investigations, diagnosis, management, and treatment

MODULE-III:

Paralytic and Restrictive Strabismus

Paralytic Strabismus

- Acquired and congenital
- CN III, IV, VI palsies: nerve pathways, clinical characteristics, investigations, management, and treatment

Restrictive Strabismus

- Musculo-fascial anomalies
- Mobius syndrome, Brown Superior oblique sheath syndrome, Duane's retraction syndrome, strabismus fixus, congenital muscle fibrosis

MODULE-IV:
Binocular Investigations and Non-Strabismic Anomalies
Binocular Investigations for Differential Diagnosis

- History and symptoms, compensatory head posture
- Diplopia charting, Hess chart, synoptophore, cover test, forced duction test, forced generation test

Non-Strabismic Anomalies

- Accommodation & convergence: types, methods of measurement
- Anomalies of accommodation: aetiology and management
- Components of convergence: methods of measurement
- Anomalies of convergence: aetiology and management

MODULE-V:
Comprehensive Management and Advanced Testing
Comprehensive Management

- Integrated approaches for managing neuro-muscular anomalies and strabismus
- Tailored treatment plans for individual cases based on differential diagnosis

Advanced Testing and Rehabilitation

- Use of advanced diagnostic tools and techniques
- Rehabilitation strategies for complex cases
- Case studies and real-world applications

Practice:

- 4 prism base out test, Krimsky test, modified Krimsky
- Maddox wing, Maddox rod, double Maddox rod
- Bielschowsky Park 3 step test
- Diplopia charting, Hess screen, cover/uncover test, alternate cover test, 9 gaze prism
- AC/A, CA/C ratio, NRA, PRA, NPA, NPC, NFV, PFV, AF, VF, dynamic retinoscopy
- Comprehensive evaluation and management plan

Reference Books:

1) Scott B Steinman; Barbara A Steinman; Ralph P Garzia: Foundations of binocular visiona clinical perspective, 2000, New York: McGraw-Hill publishers
2) Pradeep Sharma: Strabismus simplified, First edition,1999, Modern publishers.
3) Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
4) Gunter K. V.Nooden: Binocular vision & Ocular motility_ Theory and management of strabismus, Sixth edition, 2002, Mosby Company
5) Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers.

PEDIATRIC & GERIATRIC OPTOMETRY

Subject Name	Code	Type	T + P + Pj	Credits
PEDIATRIC & GERIATRIC OPTOMETRY	CUTM1800	Theory + Practice	3+1+0	4

Course Objective:

- Students will learn about the general physiological changes that occur with aging, such as changes in vision, hearing, mobility, and cognition.
- They will study ocular physiological changes, including presbyopia, decreased tear production leading to dry eye syndrome, and increased susceptibility to conditions like cataracts, glaucoma, and age-related macular degeneration.
- They will understand common systemic diseases that affect older adults, such as hypertension, diabetes, and cardiovascular diseases, and their impact on ocular health.

Course Outcome:

After Completion of this course the students will be able to:

CO 1- Gain theoretical knowledge and basic practical skill in handling the advanced instruments.

CO 2: Demonstrate knowledge and counsel the elderly

CO 3: Support dispensing spectacles with proper instructions.

CO 4: Prepare and dispense lenses.

CO 5: Develop practical knowledge for handling instruments independently

Course Outline:

Module 1:

Developmental Anatomy and Prenatal Factors

- History and Genetic Factors
- Prenatal Systems and Factors
- Postnatal Factors
- Normal Prenatal Development and Embryology
- Tissue Origin of Various Eye Structures

Module 2:

Anomalies of Development and Genetic Disorders

- **Anomalies of Prenatal and Postnatal Development**
- **Genetic Origins of Eye Disorders**
  - Albinism, Nystagmus, Buphthalmos, Macular Disorders, Color Deficiencies, Retinitis Pigmentosa, Ectopia Lentis
- **Acquired Disorders**
  - Microcornea, Macrocornea, Microphthalmos, Ptosis, Distichiasis, Coloboma, Aniridia, Pupil Displacement, Retinopathy of Prematurity, Congenital Glaucoma, Congenital Cataract

Module 3:

Visual Assessment and Ocular Anatomy

- **Visual Acuity Testing in Children**
  - Objective and Subjective Methods
- **Normal Anatomy and Pathology of**
  - Orbit, Eyelids, Lacrimal System, Conjunctiva, Cornea, Sclera, Anterior Chamber, Uveal Tract, Pupil, Lens, Vitreous, Fundus, Oculomotor System

Module 4:

Refractive Errors, Binocular Vision, and Amblyopia

- Measurement of the Refractive System
- Determining Binocular Status
- Tests for Strabismus, Heterophoria, Amblyopia, Fixation Disorders
- Compensatory Treatment and Remedial Therapy for
  - Myopia, Pseudomyopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia
- Remedial and Compensatory Treatment for Strabismus and Nystagmus

Module 5:
Ocular Aging and Geriatric Eye Care

- **Structural and Anatomical Changes of the Eye**
- **Physiological Changes of the Eye**
- **Management of Common Ocular Diseases in the Elderly**
    - Cataract, Glaucoma, Macular Disorders, Vascular Diseases
- **Special Considerations in Ophthalmic Dispensing for the Elderly**
- **Management of Visual Problems Related to Aging**
- **Use of Contact Lenses in the Elderly**

Practice

- History Taking of Pediatric and Geriatric Patients
- Vision Assessment in Children
- Cycloplegic Refraction and Post-Mydriatic Tests

REFERENCE BOOKS:

1. OP Sharma: Geriatric Care –A textbook of geriatrics and Gerontology, viva books, NewDelhi, 2005
2. VS Natarajan: An update on Geriatrics, SakthiPathipagam, Chennai, 1998
3. DE Rosenblatt, VS Natarajan: Primer on geriatric Care A clinical approach to the olderpatient, Printers Castle, Cochin, 2002
4. Paediatric Optometry - JEROME ROSNER, Butterworth, London 1982
5. Paediatric Optometry –William Harvey/ Bernard Gilmartin, Butterworth – Heinemann,2004
6. Binocular Vision and Ocular Motility - VON NOORDEN G K Burian Von Noorden's,2nd Ed., C.V. Mosby Co. St. Louis, 1980.
7. Assessing Children's Vision. By Susan J Leat, Rosalyn H Shute, Carol A Westall.45Oxford: Butterworth-Heinemann, 1999.
8. Clinical pediatric optometry. LJ P BD Moore, Butterworth- Heinemann, 1993.

SYSTEMIC DISEASES AND EYE

Subject Name	Code	Type	T + P + Pj	Credits
SYSTEMIC DISEASES AND EYE	CUTM1801	Theory	3+0+1	4

Course Objective:

- Understand the impact of systemic diseases on eye health and function.
- Explore the mechanisms by which systemic medications affect ocular tissues.
- Identify and manage ocular complications arising from systemic diseases and treatments.

Course Outcome:

After Completion of this course the students will be able to:

CO 1- Define common systemic conditions: diagnostic approach, Completions, and management options

CO 2: Identify ocular findings of the systemic conditions

CO 3: Demonstrate First Aid knowledge in different health conditions

CO 4: Examine different eye diseases related to systemic conditions.

CO 5: Assemble the probable cause of abnormal function related to systemic health.

Course Outline:

Module 1: Hypertension and Diabetes

- **Hypertension:** Definition, classification, epidemiology, clinical examination, complications, and management.
- **Hypertensive Retinopathy:** Effects of hypertension on the eyes.
- **Diabetes Mellitus:** Classification, pathophysiology, clinical presentations, diagnosis, management, and complications.
- **Diabetic Retinopathy:** Effects of diabetes on the eyes.

Module 2: Thyroid Disease and Ocular Cancer

- **Thyroid Disease:** Physiology, testing, hyperthyroidism, thyroiditis, thyroid tumors, and Grave's Ophthalmopathy.
- **Ocular Cancer:** Tumors of the retina (retinoblastoma) and eyelids (squamous cell carcinoma, basal cell carcinoma, malignant melanoma).

Module 3: Ocular Manifestations of Infections

- **Viral Infections:** AIDS and ocular involvement, herpes and ocular manifestations.
- **Bacterial Infections:** Tuberculosis and ocular tuberculosis.
- **Parasitic Infections:** Ocular cysticercosis, onchocerciasis.

Module 4: Ocular Manifestations of Autoimmune Diseases

- **Autoimmune Diseases:** Connective tissue disease, rheumatoid arthritis, systemic lupus erythematosus, scleroderma, polymyositis and dermatomyositis, Sjogren's syndrome, Behcet's syndrome, eye and connective tissue disease.

Module 5: Nutritional Deficiencies and Other Conditions

- **Nutritional Deficiencies:** Xerophthalmia, deficiencies in vitamins A, D, E, K, B1, B2, C.

- **Other Conditions:** Anemia (diagnosis, clinical evaluation, consequences, sickle cell disease, treatment, ophthalmologic considerations), ocular myasthenia gravis, kwashiorkor.

Projects

1. Hypertension & Hypertensive retinopathy
2. Diabetes & Diabetic retinopathy
3. Grave's Ophthalmopathy
4. Ocular Manifestations of viral infections
5. Ocular Manifestations of bacterial infections
6. Ocular Manifestations of parasitic infections
7. Ocular manifestations of nutritional deficiencies

Reference book:

1) AK Khurana, Textbook for Ophthalmology
2) Parson's Diseases of the Eye

OCCUPATIONAL OPTOMETRY

Subject Name	Code	Type	T + P + Pj	Credits
OCCUPATIONAL OPTOMETRY	CUTM1802	Theory+ Project	2+0+1	3

Course Objective:

- Understand the general aspects of occupational health and the specific visual function demands in various jobs.
- Learn to perform visual task analysis and understand the visual standards required for different occupations.
- Study occupational hazards, safety measures, and the role of the optometrist in ensuring visual health across different occupations through classroom sessions and project presentations.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Understand visual demands associated with various tasks and activities performed at work places.

CO 2: Identify occupational causes of visual and eye problems

CO 3: Evaluate occupational causes of visual and eye problems

CO 4: Make suitable corrective lenses and eye protective wear for visual requirements, standards for different jobs

CO 5: Create awareness among the different work areas.

Course Outline:

MODULE-I:
Introduction to Occupational Health and Safety

- Introduction
- Occupational health, hygiene, and safety
- International bodies: ILO, WHO, National bodies
- Acts and Rules: Factories Act, WCA, ESI Act

MODULE-II:
Occupational Hazards and Protective Measures
Occupational Hazards

- Physical, chemical, and biological hazards
- Recognition, evaluation, and control
- Preventive and protective methods at the workplace
- Accident analysis
- Personal protective equipment: General and eye-specific

MODULE-III:
Occupational Ocular Injuries and Medical Monitoring
Ocular Injuries and Disease Prevention

- Mechanical, non-mechanical, and chemical injuries
- Prevention of occupational diseases
- Medical examination and medical monitoring

MODULE-IV:
Visual Ergonomics and Radiation Effects
Visual Ergonomics

- Visual display units and ergonomics
- Computer vision syndrome
- Contact lens and work

Radiation and Light

- Electromagnetic radiation and its effects on the eye
- Light: Definitions, units, sources, advantages, disadvantages, and standards
- Colour: Definition, theory, coding, defects, vision tests
- Welding and its effects on the eye

MODULE-V:
Vision Standards, Special Groups, and Industrial Screening
Visual Task Analysis and Standards

- Visual task analysis and testing for vision standards
- Driving and eye requirements
- Industrial vision screening: Modified clinical method and industrial vision test

Special Occupational Groups

- Sports, chemical and mineral industries, goldsmiths, etc.
- Role of optometrists in promoting general and visual health and safety at work

Projects:

1. Article presentation on Computer vision Syndrome and visual ergonomics
2. Presentation on Hazards from mobile radiations and Welding
3. Presentation on occupation screenings and eye protection for different jobs
4. Visual demands and role of optometrists in different occupations

REFERENCE BOOKS:

1) PP Santanam, R Krishnakumar, Monica R. Dr. Santanam's textbook of Occupational optometry. 1st edition, Published by Elite School of optometry, unit of Medical Research Foundation, Chennai, India, 2015
2) R V North: Work and the eye, Second edition, Butterworth Heinemann, 2001
3) G Carson, S Doshi, W Harvey: Eye Essentials: Environmental & Occupational Optometry, Butterworth-Heinemann, 2008
4) G W Good: Occupational Vision Manual available in the website: www.aoa.org.

LAW AND OPTOMETRY

Subject Name	Code	Type	T + P + Pj	Credits
LAW & OPTOMETRY	CUTM1805	Theory	2+0+1	3

Course Objective:

Medical ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice". Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum[58].

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Understand the regulations formulated by statutory bodies of medical council.
CO 2: Apply local, state, and federal standards and regulations for the control and use of healthinformation.
CO 3: Analyze the role of various policies in formation of law related to medical practice.
CO 4: Evaluate the professional standards in health practice
CO 5: Create a comprehensive ethical code or guideline for a healthcare institution that aligns with legal standards and best practices.

Course Outline:

Module 1

Medical ethics - Definition - Goal – Scope. History, role of world medical association, declaration of Geneva. Basic principles of medical ethics –

Confidentiality. Autonomy and informed consent - Right of patients

Module 2

Introduction to Code of conduct: Duties of doctors, Duties of an Optometrist, Duties of doctors/ ophthalmologist Duties during consultation, Duties of doctors to the public and paramedical professions

Module 3

Misconduct and violation of the code of ethics, punishment and disciplinary action. Legalhurdles in medical practice - Individual, state & national level. Malpractice and negligence -Rational and irrational drug therapy Errors in medical practice.

Module 4

Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege, communication - Release of medical information - Unauthorized disclosure - retention of, medical records - other various aspects. Legal issues: How to defend a case, specify legal issues, importance of case laws & calculation of compensation

Module 5

Professional Indemnity insurance policy. Care of the terminally ill- Euthanasia. Organ transplantation

Module 6

Miscellaneous issues: Legal issues in immunization, junk food, medical education,medical tourism. Telemedicine and electronic consultations

Module 7

Role of government, community/social organizations. New legal development inoptometry

Projects: Case discussion & case study presentations.

REFERENCE BOOKS:

1) Reflections on Medical law and Ethics in India by B. Sandeepa bhat, publisher, Easternlaw house.
2) The role of optometrists in India: An integral part of an eye health team.

PUBLIC HEALTH & COMMUNITY OPTOMETRY

Subject Name	Code	Type	T + P + Pj	Credits
PUBLIC HEALTH & COMMUNITY OPTOMETRY	CUTM1804	Theory+ Practice	2+0+1	3

Course Objective:

- Gain an introduction to the foundational concepts and basic sciences underpinning public health optometry.
- Understand the epidemiology of vision problems, including the prevalence, causes, and impact of various visual impairments.
- Emphasize the specific vision health challenges and epidemiological trends related to vision problems within the Indian context.

Course Outcome:

After Completion of this course the students will be able to:

CO 1- Understand Community based eye care in India.
CO 2: Solve various eye diseases
CO 3: Organize health education programmes in the community
CO 4: Support for optometry and its vast service.
CO 5: Design communication materials on eye and vision care for the benefit of the public

Course Outline:

MODULE-I:

Public Health Optometry and Disease Prevention

Public Health Optometry

- Concepts and implementation
- Stages of diseases

- Dimensions, determinants, and indicators of health

Disease Prevention

- Levels of disease prevention
- Levels of healthcare patterns
- Epidemiology of blindness: Defining blindness and visual impairment

MODULE-II:

Eye Care in Primary Health and Community Programs

Primary Health Care

- The role of the eye in primary health care
- Contrasting clinical and community health programs

Community Eye Care Programs

- Community-based rehabilitation programs

MODULE-III:

Nutritional Blindness and Screening Initiatives

Nutritional Blindness

- Nutritional blindness with reference to Vitamin A deficiency
- Vision 2020: The Right to Sight

Screening for Eye Diseases

- Strategies and methodologies for screening eye diseases

MODULE-IV:

Health Agencies and Optometrist's Role

Health Agencies and Programs

- National and international health agencies
- National Programme for Control of Blindness (NPCB)
- Role of an optometrist in public health

Organization and Management of Eye Care Programs

- Service delivery models
- Health manpower planning and health economics

MODULE-V:

Evaluation, Tele Optometry, and School Eye Health

Evaluation and Assessment

- Evaluation and assessment of health programs
- Optometrist’s role in school eye health programs

Tele Optometry and Communication

- Basics of Tele optometry and its application in public health
- Information, education, and communication for eye care programs

Project –

Blindness

NPCB

Role of an optometrist in Public Health

Basics of Tele Optometry and its application in Public Health

OPTOMETRIC INSTRUMENTS

Subject Name	Code	Type	T + P + Pj	Credits
OPTOMETRIC INSTRUMENTS	CUTM1803	Theory	3+1+0	4

Course Objective:

- Gain proficiency in the operation and application of essential optometric instruments for eye examinations.
- Understand the principles and mechanisms underlying various diagnostic tools used in optometry.
- Develop the ability to accurately interpret results from optometric instruments to diagnose and manage ocular conditions.

Course Outcome:

After Completion of this course the students will be able to:

CO1: Gain theoretical knowledge and basic practical skill in handling the advanced instruments.

CO 2: Demonstrate knowledge and counsel the elderly

CO 3: Support dispensing spectacles with proper instructions.

CO 4: Prepare and dispense lenses.

CO 5: Develop practical knowledge for handling instruments independently.

Course Outline:

Module 1: Basic Optometric Instrumentation

- **Slit Lamp:** Types, mechanical design, illumination techniques, accessories, color coding.
- **Color Vision:** Theories, arrangement tests, interpretation, and clinical significance.
- **Auto Keratorefractometers and Abberometer**

Module 2: Retinal Diagnostics

- **Ophthalmoscopy:** Direct and indirect, optical principles, types, instrumentation, characteristics, and uses.
- **Slit Lamp Ophthalmoscopy:** (+90D, 78D), fundus photography, fundus biomicroscopy (direct and indirect), and OCT.
- **B-Scan and Electrodiagnostic Instruments:** ERG, VEP, EOG, FFA, Amsler grid test.

Module 3: Glaucoma Diagnostics

- **Gonioscopy and Tonometry:** Types, principles, standardization (Schiotz, Applanation, NCT), measurement, documentation, and interpretation.
- **Perimetry:** Static and kinetic visual field examination, results, interpretation, and analysis with emphasis on HVF and Octopus.
- **Pachymetry**

Module 4: Corneal Diagnostics

- **Keratometry:** Principles, types (Bausch & Lomb, Javal-Schiotz), measurement, documentation, and interpretation.
- **Corneal Topography:** Principles, types, Placido's disc, ORBSCAN interpretation, and results.
- **Advanced Corneal Imaging:** AS-OCT, specular microscopy, and introduction to refractive laser procedures.

Module 5: Cataract and Neuro Imaging

- **Cataract Diagnostics:** A-Scan, Potential Acuity Meter, Brightness Acuity Test.
- **Neuro Imaging:** Basics of CT and MRI scans.

PROJECT

Subject Name	Code	Type	T + P + Pj	Credits
Project	CUTM1809	Project	0+0+18	18

Course Objective:

- To contribute to the advancement of knowledge in the field of optometry by conductingoriginal research or exploring innovative approaches in vision science, ocular health, orclinical optometry.
- To apply theoretical knowledge gained during the academic coursework to real-worldoptometry scenarios.
- To develop skills in data collection techniques, data analysis, and interpretation, whichare essential for evidence-based practice in optometry.
- To present findings and results in a clear, concise, and professional manner.
- To develop effective communication skills through oral presentations, written reports,and visual aids.

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Identify health gaps specific to a community.
CO 2: Demonstrate critical thinking in solving eye related issues.
CO 3: Recognize specific eye health and their prevalence.
CO 4: Evaluate case studies.
CO 5: Design and address a research problem.

Course Outline:

Ocular Microbiology & Pathology: -

1) Investigation of the epidemiology a[6] n[3] d pathology of ocular infectious diseases.

2) Emerging antibiotics resistance and treatment outcomes in any ocular microbial

infection.

3) Impact of biofilm on the recovery and treatment of ocular infections.
4) Mechanism of interspecies signaling in ocular infections.
5) Role of infection control and prevention in Reducing ocular infections and antibioticresistance.

General Anatomy and Nutrition:-

1) Vitamin 'A' Deficiency sometime creates no. of serious ocular disorders.
2) Neurology is completely related with visualization.
3) 'Diabetes'/'Hypertension' are the alarm for ocular disorder.
4) Is nutrition play important role in ocular disorder
5) Ocular surface

physiology and pathology.

Ocular diseases: -

1) Ocular allergy
2) Ocular surface innervation
3) Genetic predisposition to ocular disease.
4) Animal models of ocular disease.
5) Retinal anatomy, physiology, and pathology.

Internship

Subject Name	Code	Type	T + P + Pj	Credits
Internship	CUTM1810	-	0+0+20	20

Course Objective:

- To gain hands-on clinical experience in conducting comprehensive eye examinations, including visual acuity testing, refraction, binocular vision assessments, and ocular healthevaluations. '
- To become familiar with advanced optometric instrumentation and technology used inthe field of optometry.
- To operate specialized diagnostic tools, imaging devices, and diagnostic instruments, enhancing their skills in evaluating ocular health and providing accurate diagnosis.
- To develop effective patient interaction and communication skills

Course Outcome:

After Completion of this course the students will be able to:

CO 1: Select relevant scientific literature.

CO 2: Execute appropriate data collection techniques and tools.

CO 3: Analyze data with appropriate statistical techniques.
CO 4: Value the theoretical knowledge with practical.
CO 5: Design a research proposal.

Course Outline:

Internship: -

1) Case record
2) Lab management and ethics
3) Evaluation -Guide(internal)
4) Industries guide (external)
5) University-project report/ Viva