CENTURION UNIVERSITY OF TECHNOLOGY AND MANAGEMENT, ODISHA

SCHOOL OF PARAMEDICS AND ALLIED HEALTH SCIENCES

BACHELOR OF OPTOMETRY/

BACHELOR OF SCIENCE IN OPTOMETRY

2021

COURSE SYLLABUS

SEMESTER	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)
I	SC-1 SC-2 SC-3	DC-1		SFS-1
II	SC-4	DC-2 DC-3 DC-4 DC-5	AECC-I AECC-II	SFS-2
III		DC-6 DC-7 DC-8 DC-9 DC-10 DC-11	AECC-III	SFS-3
IV		DC-12 DC-13 DC-14 DC-15		SFS-4
V		DC-16 DC-17 DC-18 DC-19		SFS-5
VI		DC-20 DC-21 DC-22 DC-23 DC-24 DC-25 DC 26		SFS-5
VII & VIII		DC-27 DC-28		
Minimum Credits required (180 Credits)	**19 Credits**	**142 Credits**	**6 Credits**	**20 Credits**

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+1+0	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
Biology

Subject Name	Code	Type	T + P + Pj	Credits
Biology	CUTM1760	**Theory + Project**	**3 + 0 + 1**	**4**

Course Objectives

- The course defines the basic biological concepts and processes. It enables the student to study the levels of organization and related functions in plants and animals. It helps to identify the characteristics and basic needs of living organisms

Learning outcome

- Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles. They will understand how these cellular components are used to generate and utilize energy in cells

Module-1

Biology & Its Branches; Scientific methods in Biology; Scope of biology; Characters of living organisms (growth and reproduction, adaptation, survival, death).

Module -2

Origin and Evolution of life - Theories of Evolution; Evidence of Evolution; Sources of Variations (mutation, recombination, genetic drift, migration, natural selection); Concept of species; Speciation and Isolation (geographical and reproductive); Origin of species.

Project: theories of evaluation

Module -3

Diversity of living organisms, Systematic; Need, history biosystematics; binomial nomenclature; Two kingdom system, Five kingdom System, their merits and demerits, status of bacteria and virus.

Project: binomial nomenclature

Module -4

Cell as a basic unit of life - discovery of cell, cell theory, cell as a self - contained unit; prokaryotic and eukaryotic cell; unicellular and multicellular organisms;

Project : kingdom system

Module -5

Ultrastructure of prokaryotic and eukaryotic cell - cell wall, cell membrane - unit membrane concept (Fluid-Mosaic model); membrane transport; cellular movement (exocytosis, endocytosis).

Project: different types of cells

Module -6

Cell organelles and their functions- nucleus, mitochondria, plastids, endoplasmic reticulum, Gogli complex, lysosomes, microtubules, centriole, vacuole, cytoskeleton,

Project: cell organelles and thier functions

Module 7

Cilia and flagella, ribosomes. Molecules of cell; inorganic and organic materials -water, salt, mineral ions, carbohydrates, lipids, amino acids, proteins,; vitamins, hormones and steroids.

Suggested Readings

1) EXPLORING BIOLOGY VOL-1, 2017-18 EDITION, By SANJAY SHARMA – SUDHAKAR BANERJEE.
2) Molecular biology of the cell by Alberts Bruce, publisher Garland Science
3) Molecular Biology by Friefelder David, Publisher Narosa

MATHEMATICS

Subject Name	Code	Type of course	T+P+Pj	Credits
MATHEMATICS	CUTM1761	Theory	**3+0+1**	4

Objectives

- To understand the concepts matrices, progressions, trigonometry, two dimensional geometry and calculus.
- To solve linear equations representing physical systems.
- To understand the importance of calculus and their applications.

Learning outcome

- To represent linear systems by matrices and solve them for unknown variables.
- To evaluate nth terms, trigonometric ratios, locus and to solve differential equations.

Module I: Matrices

Introduction, types of matrices, Scalar multiple of a matrix and multiplication of matrices, Transpose of a matrix, Determinants,

Module II

Adjoint of a matrix, Inverse, Application of determinants to solve simultaneous equations (Cramer's Rule)

Module III: Arithmetic andGeometric Progression:

Introduction, Arithmetic Progression, Sum of n terms of an arithmetic progression, Geometric Progression, Sum of n terms of Geometric Progression.

Module IV: Trigonometry

Introduction, Trigonometric ratios and the relations, Trigonometric ratios of compound angles,

(Sin (A+B), Cos (A+B), Tan (A+B) formulae only), Trigonometric ratios of multiple angle

(Sin 2A, cos2A, tan 2A), Heights and distances.

Module V: Co –ordinate Geometry

Distances between points-Area of a triangle, Co-ordinates of a point dividing a given segment in a given ratio – locus -equation to a straight line in different forms-Angle between straight lines-point of intersection.

Module VI: DIFFERENTIAL CALCULUS

Simple concepts of functions, limits, Continuity and Differentiation, Differentiation, First order derivatives of elementary functions.

Module VII: INTGRAL CALCULUS Indefinite integrals, Integration as on inverse process of differentiation, integration by substitution, integration by parts, integration of algebraic function. Definite integrals.

Differential equations: Formation of a differential equation, order and degree, solution of first order differential equations (Variables separable method).

Projects:

Matrices

Trigonometry

co-ordinate Geometry

TEXT BOOKS

- Intermediate first- and second-year mathematics by Telugu Akademi, A. P State in Institute of Telugu language, Hyderabad.
- Higher Engineering Mathematics by DR. B. S. Grewal. 44th Edition

CUTM1729- Cell Biology

Subject Name	Code	Type of course	T-P-Pj	Prerequisite
Cell Biology	CUTM1729	Theory+ Project	3-0-1	Fundamental Science

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

Learning outcome

- Describe the fundamental principals cellular biology
- Develop a deeper understanding of cell structure and how it relates to cell functions.
- Understand how cells grow, divide, and die and how these important processes are regulated.
- Understand cell signaling and how it regulates cellular functions. Also how its dis-regulation leads to cancer and other diseases.

Course Outline

Module –I (12 Hr)

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 (14 Hr)

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 (14 Hr)

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 chemotaxis, Intrinsic and Extrinsic apoptotic pathway,

Caspase enzyme, Biology and elementary knowledge of development and causes of cancer;

Tumor viruses, Oncogenes and tumor suppressor genes.

Suggested Readings:

9. 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
10. Molecular Biology by Friefelder David, Publisher Narosa www.alibris.com/Molecular-Biology-David
11. Introduction to Cell biology by John K Young, World Scientific publishing company www.overdrive.com/.../introduction-to-cell-biology
12. Introduction to biology,3rd tropic edition by D G Maackean www.amazon.com/Introduction-Biology-D-G-Mackean/.

GENERAL ANATOMY

Subject Name	Code	Type of course	T+P+Pj	Credits
GENERAL ANATOMY	CUTM1757	Theory	**3+2+0**	5

Description

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

Learning outcome

At the end of the semester, the student should be able to:

1) Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the human body.
2) Identify the microscopic structures of various tissues, and organs in the human body and correlate the structure with the functions.
3) Comprehend the basic structure and connections between the various parts of the central nervous system so as to analyze the integrative and regulative functions on the organs and systems.

Module -1 INTRODUCTION TO ANATOMY AND SKELETON

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

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.

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 and diagrams.

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 of course	T+P+Pj	Credits

GENERAL PHYSIOLOGY	CUTM1758	Theory	**3+2+0**	5

Description

- 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.

Learning outcome

- At the end of the course the student will be able to: • Explain the normal functioning of various organ systems of the body and their interactions. • Elucidate the physiological aspects of normal growth and development. • Describe the physiological response and adaptations to environmental stresses. • Know the physiological principles underlying pathogenesis of disease.

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, dyspnoea–asphyxia.

MODULE-5:

Circulation: General principles, Heart: myocardium–innervations– transmission of cardiac 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:

a) Examination of Urine
b) Specific gravity
c) Albumin
d) Sugar
e) Microscopic examination for cells and cysts

Endocrinology and Reproduction:

a. Dry experiments in the form of cases showing different endocrine disorders.

Textbook:

1. GJ Tortora, B Derrick son: Principles of anatomy &physiology, 11thedition,
2. John Wiley &Sons Inc, New Jersey,2007

Reference Book:

1. AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, NewDelhi,2006
2. AC Guyton: Text book of Medical Physiology, 6thedition, Saunders Company, Japan, 1981

BASIC BIOCHEMISTRY

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

Description

- 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.

Learning outcome

- Biochemistry helps in clinical diagnosis, understanding pathology of diseases, treatment of diseases, designing of drugs and understanding their metabolism and manufacture of various biological products like amino acids, proteins, antibiotics, hormones, enzymes, nutrients, etc. It is expected that the students become conversant with the Fundamentals of Biochemistry which can be applied in clinical diagnosis of the metabolic disorders.

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 like glycine, tryptophan, glutathione, albumin, hemoglobin and collagen).

MODULE-3:

Lipids**:** Fatty acids, saturated and unsaturated, cholesterol and triacylglycerol, phospholipids and

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:

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

ii 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, etc.).

Textbook:

1. S. Ramakrishnan: Essentials of biochemistry and ocular biochemistry, Annamalai University Publications, Chidambaram, India, 1992

Reference Book:

1. S. Ramakrishnan, KG Prasannanand R Rajan: Text book of Medical Biochemistry, Orien T Longman, Madras, 1990.
2. D.R. Whikehart Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania,2003

BASKET II
Discipline Core Course
CUTM1782-OCULAR ANATOMY

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

Objective

- Understand the detailed anatomy of the orbit
- Attain clear idea on anatomy of eyeball and
- Understand the detailed anatomy of cranial nerves associated with ocular functions.

Learning outcome

At the end of the course, the student should be able to:

- Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa.
- Identify the microscopic structures of various tissues in the eye and correlate the structure with the functions.
- Comprehend the basic structure and connections between the various parts of the centra nervous system and the eye so as to understand the neural connections and distribution.
- To understand the basic principles of ocular embryology

MODULE-1:

Embryology – Formation of optic vesicle & optic stalk, formation of lens vesicle, formation of optic cup, changes associated to mesoderm, development of various structure of eye ball – retina, optic nerve, crystalline lens, cornea, sclera, choroid, ciliary body, iris, vitreous. Development of accessory structures of eyeball – eyelids, lacrimal apparatus, extraocular muscles, orbit. Milestones in the development of the eye

Skull & orbit-Size, shape & relations, walls of the orbit, Base of the orbit, Apex of orbit. Orbital fascia →Fascial bulbi, Fascial sheaths of extraocular muscles, intermuscular septa. Spaces of orbit → Orbit fat & reticular tissue - Apertures at the base of orbit- Contents of the orbit.

Practice:

- Orbital bones and landmarks using Skull
- Palpebral fissure height
- Eye dissection of bull's eye

MODULE-2

Ocular Adnexa & lacrimal system - a. Structures of the lids: - Skin, Subcutaneous Areolar Layer, Layer of Striated muscle, Submuscular Areolar Tissue, Fibrous Layer, Conjunctiva. Glands of the Lids- Meibomian Glands, Glands of Zela and Glands of Moll. Blood Supply of the Lids, Lymphatic Drainage of the Lids, Nerve Supply of the Lids. Conjunctiva - Palpebral Conjunctiva, Bulbar Conjunctiva, Conjunctival Fornix, Microscopic Structure of the conjunctiva - Epithelium, Substantia Propria. Conjunctival Glands→ Krause's Glands, Wofring's Glands, Henley's Glands, Manz Glands. Blood Supply of the Conjunctiva, Nerve Supply of the Conjunctiva, Caruncle, Plica Semilunaris. (a) Lachrymal gland, (b) Palpebral part, (c) Duets of lachrymal gland, (d) structure of the lachrymal gland, (e) Blood supply & nerve supply of the lachrymal gland, (f) lachrymal passages.

MODULE-3

Cornea & Sclera – - (a) Layers & peculiarities, (b). Blood supply & nerve supply of cornea. (c) Corneal Transparency, Anterior, posterior & middle apertures. Episcleral. Sclera proper. Lamina fusca. Blood supply of the sclera. Nerve supply of the sclera.

Crystalline lens - (a) Structure. of lens →capsule, Ant. Epithelium, lens fibers (structured & zonal arrangement), (b). Ciliary zonules →structure gross appearance, (c). Arrangement of zonules fibers.

Practice:

- Corneal diameter

MODULE-4

Uveal Tract → (a). Iris macroscopic & microscopic appearance. (b) Ciliary body – Macroscopic structure. (c). Choroid - Macroscopic structure. (d) Blood supply to uveal structure- short & Long Posterior artery & Anterior Artery. (e). Venous drainage. Pupillary muscles.

MODUEL-5

Anterior & 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. Hyaloid vitreous. Vitreous cells.

MODULE-6

Retina & its vascular supply → (a). Gross anatomy, (b). Microscopic structure of fovea centralizes, (c). Blood retinal barrier. (d.) Anatomy of optic nerve, (e). Anatomy of optic nerve, (f.) optic chiasma optic tracts, (g) Lateral Geniculate body, (h). Optic radicalism (i). Visual cortex, (j). Arrangement of nerve fibers. (K). Blood supply of visual pathways (Arterial circle of Willis & its branches).

Practice:

- Pupil diameter

MODULE-7

The Ocular motor system → Extraocular muscles, nerve supply, motor nuclei, supra nuclear motor centers.

Cranial nerve Innervation & Visual Pathway – Afferent pathway, Efferent pathway. Optic, Oculomotor, Trochlear, Abducens, Trigeminal, Facial nerves – formation, course, distribution and innervations of ocular structures, visual pathway

Textbook:

1. L. A. Remington: Clinical Anatomy of the Visual System, Second edition, Elsevier Butterworth Heinemann, Missouri, USA, 2005.
2. AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006

Reference Book:

1. RD Ravindran: Physiology of the eye, Arvind eye hospitals, Pondicherry,2001
2. PL Kaufman, A Alm: Adler's Physiology of the eye clinical application,10th edition, Mosby, 2002

CUTMAP1781-GEOMETRIC OPTICS

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

Description

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

Learning outcome

- The objective of this course is to equip the students with a thorough knowledge of mirrors and lenses. At the end of this course, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.

Module 1

Nature of light –light as electromagnetic oscillation; ideas of sinusoidal oscillations; amplitude and phase; speed of light in vacuum and other media; refractive index. Wave fronts–spherical, elliptical and plane; Curvature and vergence; rays; convergence and divergence in terms of rays and vergence; vergence at a distance. Refractive index; its dependence on wavelength.

Module 2

Fermat's and Huygen's Principle –Derivation of laws of reflection and refraction (Snell's law) from these principles. Plane mirrors –height of the mirror; rotation of the mirror. Reflection by a spherical mirror –paraxial approximation; sign convention; derivation of vergence equation. Imaging by concave mirror, convex mirror.

Module 3

Reflectivity; transmissivity; Snell's Law, Refraction at a plane surface. Glass slab; displacement without deviation; displacement without dispersion. Thick prisms; angle of prism; deviation produced by a prism; refractive index of the prism. Prisms; angular dispersion; dispersive power; Abbe's number.

Module 4

Definition of crown and flint glasses; materials of high refractive index. Thin prism –definition; definition of Prism diopter; deviation produced by a thin prism; it dependence on refractive index.

Module 5

Nodal Planes. sag formula. Paraxial approximation; derivation of vergence equation. Imaging by a positive powered surface and negative powered surface. Refraction by a spherical surface; sign convention; introduction to spherical aberration using image formed by a spherical surface of a distance object

Module 6

Thin lens as a special case of thick lens; review of sign convention 1 23. Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions 2 24. Imaging by a thin concave lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions 2 25.

Module 7

Prentices Rule. System of two thin lenses; review of front and back vertex powers and equivalent power, review of six cardinal points. System of more than two thin lenses; calculation of equivalent power 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

CUTM1742- BASIC COMPUTER AND INFORMATION SCIENCE

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

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.
- Identify how software and hardware work together to perform computing tasks and how software is developed and upgraded
- Identify different types of software, general concepts relating to software categories, and the tasks to which each type of software is most suited or not suited.

Learning outcome

- Understand the fundamental hardware components that make up a computer's hardware and the role of each of these components.
- Understand the difference between an operating system and an application program, and what each is used for in a computer.
- Describe some examples of computers and state the effect that the use of computer technology has had on some common products

Course Outline

Module- I

Introduction to computer: introduction, characteristics of computer, block diagram of computer, generations of computer. Types of Input output devices. Processor and memory: The Central Processing Unit (CPU), main memory. Storage Devices.

Module- II

Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.

Module- III

Introduction to MS-DOS: History of DOS, features of MS-DOS, MS-DOS Commands (internal and external). Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.). Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid). Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.

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

Objective

Ocular physiology deals with the physiological functions of each part of the eye.

Learning outcome

At the end of the course, the student should be able to:

1. Explain the normal functioning of all structures of the eye and their interactions
2. Elucidate the physiological aspects of normal growth and development of the eye
3. Understand the phenomenon of vision
4. List the physiological principles underlying pathogenesis and treatment of diseases of the eye

MODULE-1

Cornea: Brief idea about ultra & histological structure of cornea. Corneal transparency & hydration, Regulation of corneal transparency & hydration. Corneal vascularization. Maurice theory & Goldman's theory Uveal tract: Brief idea about uvea. Uveal meshwork. Uveo-scleral drainage. Schlemm's canal switch. 3. Lens: Basic idea about human lens. Function of lens. Lens transparency. Lens culture. Changes in ageing lens. Cataract – overview.

Practice: Pupil Examination

MODULE-2

Aqueous humour: Formation of Aqueous humour. Drainage & circulation of Aqueous Humor. Rates of production & flow. Functions of Aqueous humour. Vitreous Humour: Composition & distribution of vitreous humour, Physiology & function of vitreous humour, Optical role of vitreous humour.

Practice: External eye examination - Torch light examination

MODULE-3

Retina: Retinal structure-layers of retina. Brief idea about rod & cones. Organization of retina. Function of retina. Optic Nerve: Physiology of optic nerve. Papilledema of optic nerve. Optic atrophy. Ocular Circulation: Vascular structure of the eye – ocular circulation, blood-ocular barrier (Blood-retinal, blood Vitreous & blood aqueous barrier). Regulation of ocular circulation.

MODULE-4

Protective Mechanism of the eye Blinking – muscles of lead closer & lid opening (orbecularisocculli, levatorpalpebre, Muller's muscle, blinking reflexes. Lacrimation – i) Lacrimal glands ii) Pre corneal tear film iii) Chemistry of lachrymal secretion tear film iv) Tear film dynamics (secretion of tear, formation of tear, retention & redistribution of tear, displacement phenomena, evaporation from tear film, drying & breakup of tear film, dynamic events during blinking, elimination of tear.)

Practice: Blink rate

MODULE-5

The ocular motor system – Extra ocular muscles their function & nerve supply Mechanics of actions of extra ocular muscles -cross sectional area of muscle, length of muscle. Arc of contact, muscle plane, Muscle axis of rotation. Physiology of ocular movement – Basic Kinematics, (position of gaze, Fick's axes) d. Ocular Movement (monocular and Binocular). Supra nuclear control of eye movements. e. Ocular movements - i) Monocular Movements (Adduction, Abduction, supraduction, Infraduction, Incycloduction, excycloduction) ii) Binocular Movements –VERSIONS- (saccadic & pursuit movement, position maintenance movements, stabilization movements & their characteristics). VERGENCES – (Convergence, divergence, vertical vengeance), Intraocular pressure – Features of normal IOP, Factors influencing the IOP,Control of IOP, and Measurement of IOP. Pupil – Normal pupil, Physiological changes in pupil size – Isocoria, Pupillary unrest, Hippies. Pupillary reflex – Light reflex, Near reflex, Darkness reflex, Psycho sensory reflex, Lid closure reflex

Practice: Eye movements

MODULE-6

Accommodation – Far point, near point, range & amplitude of Accommodation Mechanism of accommodation – Increased tension theory, Relaxation theory, Role of lens capsule, Gullstrand mechanical model of accommodation, Stimulus for accommodation Ocular changes in accommodation. Changes in accommodation with arc (Presbyopia) Nervous mechanism for accommodation Color vision. Physiological, Photochemical & neurological basis of color vision b. Electrophysiology of color vision c. Granit's modulator and dominator theory, Purkinje phenomenon. Young-Helmholtz theory d. Types of color defects e. Color blindness f. Neural analysis.

MODULE-7

Geniculate cortex: Structure of geneculate cortex. Electrophysiology Physiology of vision – Visual acuity – visual angle, Components of Visual acuity (Minimum visible, Resolution, Recognition Hyperacidity), Factors affecting, Measurement of visual acuity. Contrast Sensitivity – Types- (spatial &temporal contrast sensitivity), Neural Mechanism, Measurement of contrast sensitivity (Arden gratings, Cambridge low contest gratings, Pelli – Robson chart Light & Dark adaptation – Dark adaptation curve, Mechanism of dark adaptation, Factors influencing dark adaptation, Time course of light adaptation, Mechanism of light adaptation, Rod vs. cone light adaptation.Parkinje shift of spectral sensitivity.

TEXT BOOK:

L A Remington: Clinical Anatomy of the Visual System, Second edition, Elsevier Butterworth Heinemann, Missouri, USA, 2005.

REFERENCE BOOKS:

AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006

INTRODUCTION TO OPTOMETRY

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

Objective

This subject deals with the basic components & scope of optometry, national and international associations of optometry, various optometric instrumentations, visual acuity charts, basics of retinoscopy and other refraction devices.

Learning outcome

At the end of the course students will be thorough in the following aspects:

- Understand what is optometry as a profession and its scope in future
- Awareness on terms used in optometry
- Understand the purpose of different instruments used in optometry
- Able to test visual acuity of people
- Able to handle retinoscope comfortably
- Understand the concept of vision screening

Contents of module
MODULE-I: History & Basic principles of optometry **MODULE-II:** Optometry terminology, Components and Scope of Optometry **MODULE-III:** Optometry associations & groups (state, national & international) **MODULE-IV:** Components of visual assessment, Visual functions *Practice:* Visual function assessment in the laboratory **MODULE-V:** Introduction to optometry instruments, Vision Screening *Practice:* Exploring different instrumentation in the laboratory **MODULE-VI:** Visual acuity charts & Optotypes, Construction & testing standards of various visual acuity charts, Trail box *Practice:* Visual acuity testing of participants in the laboratory, Exploring the components of trail box in the laboratory *Workshop:* Construction of visual acuity charts (1.5 hours) **MODULE-VII:** Basics of Retinoscope, Optometers, Autorefractometers Practice: Exploring retinoscopy methods and reflex characteristics in the laboratory
Textbooks/References:

1. Primary Care Optometry: Anomalies of Refraction and Binocular Vision, Book by Theodore P. Grosvenor

2. Borish's Clinical Refraction 2nd Editio, Book by William Benjamin

PHYSICAL OPTICS

Subject Name	Code	Type of course	T + P + Pj	Credits

PHYSICAL OPTICS	CUTM1784	Theory + Practice	3+1+0	4

Objective

This course will be taught in one semester. Physical Optics is the study of light, its properties and its interaction with matter. Specifically, the phenomena of interference, diffraction, polarization and scattering will be dealt with in detail.

Learning outcome

The objective of this course is to equip the students with a thorough knowledge of properties of light. At the end of this course, students will be able to predict the distribution of light under various conditions.

Module 1

Nature of light –light as electromagnetic oscillation –wave equation; ideas of sinusoidal oscillations –simple harmonic oscillation; transverse nature of oscillation; concepts of frequency, wavelength, amplitude and phase. Sources of light; Electromagnetic Spectrum.

Module 2

Polarized light; linearly polarized light; and circularly polarized light. Intensity of polarized light; Malus'Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle.

Module 3

Birefringence; ordinary and extraordinary rays. Relationship between amplitude and intensity.

Module 4

Coherence; interference; constructive interference, destructive interference; fringes; fringe width. Double slits, multiple slits, gratings.

Module 5

Diffraction; diffraction by a circular aperture; Airy's disc. Resolution of an instrument (telescope, for example); Raleigh's criterion.

Module 6

Scattering; Raleigh's scattering; Tyndall effect. Fluorescence and Phosphorescence. Basics of Lasers –coherence; population inversion; spontaneous emission; Einstein's theory of lasers

Module 7

Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units. Inverse square law of photometry; Lambert's law. Other units of light measurement; retinal illumination;

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

TEXT BOOK:

Subrahmanyan N, BrijLal, A text book of Optics, S. Chand Co Ltd, New Delhi, India, 2003.

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.

CUTM1786-VISUAL OPTICS I

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

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 indetail.
- 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.

Learning outcome

The objective of this course is to equip the students with a thorough knowledge of mirrors and lenses. At the end of this course, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.

Module-I

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

Module-II

Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Bi-refringence, Dichroism Aberration and application Spherical and Chromatic

Module-III (9hrs)

Optics of Ocular Structure Cornea and aqueous Crystalline lens Vitreous Schematic and reduced eye

Practice: Amplitude of accommodation- pushup method, minus to blur

Module-IV (10 hrs.)

Measurements of Optical Constants of the Eye: Corneal curvature and thickness, Keratometry, Curvature of the lens and ophthalmophakometry, Axial and axis of the eye.

Practice: Keratometry

Module V (6 hours)

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

Practice: Contrast Sensitivity

Module-VI (10hrs)

Refractive anomalies and their causes Etiology of refractive anomalies Contributing variability and their ranges Populating distributions of anomalies. Optical component measurements Growth of the eye in relation to refractive errors

Module-VII (8 hrs)

Refractive conditions: Emmetropia, Ametropia types, Correction of Refractive errors, Myopia, Hyperopia& astigmatism types. Axial versus refractive ametropia.

Practice: Retinoscope Basics- spherical Ametropia

Text Books:

1. Clinical Visual optics Arthur G Bennett Ronald B Rabbetts -Butterworth- Heinemann Second edition 1989
2. Visual Optics and Refraction- A clinical approach David D Michaels: The C.V. Mosby Co., 1985.

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 Publishing

CUTM1787-OPTOMETRIC OPTICS I

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

Objective

1. This course deals with understanding the theory behind spectacles lenses and frame and their materials, types, advantages and disadvantages, calculations involved
2. When and how to prescribe. It will impart construction, design application and development of lenses, particularly of the methods of calculating their power and effect

Course outcome

1. Measurement of lens power, lens centration using conventional techniques
2. Transposition of various types of lenses
3. Knowledge to identify different forms of lenses (equi-convex, planoconvex, periscopic, etc.)
4. Knowledge to select the tool power for grinding process.
5. Measurement of surface powers using lens measure.
6. Method of laying off the lens for glazing process.
7. Ophthalmic prism knowledge –effects, units, base-apex notation, compounding and resolving prisms.

Module-I (6 hrs)

Introduction – Light, Mirror, Reflection, Refraction and Absorption.

Module-II (9 hrs.)

Prisms – Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel's prisms, rotary prims

Practice: Prismatic effects

Module-III (9hrs)

Lens: Definition, units, terminology. Introduction to spectacle lenses, forms of lenses, Spherical, cylindrical and Spherocylindrical lenses, Vertex distance and vertex power, Effectivity calculations

Practice: Lensometry, Hand neutralization

Module IV (8 hours)

Transpositions – Simple, Toric and Spherical equivalent, Prismatic effect, centration, decent ration and Prentice rule, Prismatic effect of Plano-cylinder and sphero-cylinder lenses.

Practice: Simple &Toric transpositions

Module-V (9 hrs.)

Spherometer& Sag formula, Edge thickness calculations, Magnification in high plus lenses, Minification in high minus lenses

Practice: Spherometer, Edge thickness calculations

Module VI (6 hrs.)

Tilt induced power in spectacles.

Module-VII (9 hrs.)

Aberration in Ophthalmic Lensess

Text Books:

1. Clinical Optics: T E Fannin& T Grosvenor, 2nd edition
2. M. JALIE: Principles of Ophthalmic Lenses, Edn. 3, 1994.

Reference Books:

1. CLIFFORD W BROOKS & IRVIN M BORISH: System for Ophthalmic Dispensing

CUTM1788 - OCULAR DISEASES I

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

Objective

1. Understands ocular diseases affecting various parts of the eyes.
2. Detailed understanding on clinical signs and symptoms, cause, pathophysiological mechanism, diagnostic approach, differential diagnosis and management aspects of the ocular diseases.

Learning outcome

At the end of the course the students will be knowledgeable in the following aspects of ocular diseases:

1. Etiology
2. Epidemiology
3. Symptoms
4. Signs
5. Course sequelae of ocular diease
6. Diagnostic approach and
7. Management of the ocular diseases.

Module-I (9 Hours)

Orbit:AppliedAnatomy,Proptosis(Classification,Causes,Investigations),Enophthalmos,Developme nt Anomalies Craniosynostosis craniofacial Dysostosis, Hypertelorism, Median facial cleft syndrome),Orbital Inflammations (Preseptal cellulites, Orbital cellulitis Orbital Periostitis, cavernoussinus,Thrombosis),Grave'sOphthalmopathy,Orbitaltumors(Dermoids,capillaryhaemangi oma, Optic nerve glioma),Orbital blowout fractures, Orbital surgery (Orbitotomy), Orbital tumors, Orbital trauma, Approach to a patient with proptosis

Module-II (9 hours)

Lids: Applied Anatomy, Congenital anomalies (Ptosis, Coloboma, Epicanthus, Distichiasis, Cryptophthalmos), Edema of the eyelids (Inflammatory, Solid, Passive edema), Inflammatory disorders (Blepharitis, External Hordeolum, Chalazion, Internal hordeolum, Molluscum Contagiosum), Anomalies in the position of the lashes and Lid Margin (Trichiasis, Ectropion, Entropion, Symblepharon, Blepharophimosis, Lagophthalmos, Blepharospasm, Ptosis). Tumors (Papilloma's,

Xanthelasma, Hemangioma, Basal carcinoma, Squamous cell carcinoma, sebaceous gland melanoma).

Practice: Slit lamp examination of adnexa

Module-III (8 hours)

Lacrimal System: Applied Anatomy, Tear Film, The Dry Eye (Sjogren's Syndrome)

The watering eye (Etiology, clinical evaluation), Dacryocystitis, Swelling of the Lacrimal gland (Dacryoadenitis).

Conjunctiva: Applied Anatomy, Inflammations of conjunctiva (Infective conjunctivitis – bacterial, chlamydial, viral, Allergic conjunctivitis, Granulomatous conjunctivitis), Degenerative conditions (Pinguecula, Pterygium, Concretions), Symptomatic conditions (Hyperemia, Chemosis, Ecchymosis, Xerosis, Discoloration), Cysts and Tumors.

Module-IV (9 hours)

Cornea: Applied Anatomy and Physiology, Congenital Anomalies(Megalocornea, Microcornea, Cornea plana, Congenital cloudy cornea), Inflammations of the cornea. (Topographical classifications: Ulcerative).

Practice:

- Slit lamp examination of cornea.

Module-V (9 hours)

Etiological classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic, Degenerations(classifications, Arcus senilis, Vogt's white limbal girdle, Hassal-henle bodies, Lipoid Keratopathy, Band shaped keratopathy, Salzmann's nodular degeneration, Droplet keratopathy, Pellucid Marginal degeneration), Dystrophies (Reis Buckler dystrophy, Recurrent corneal erosion syndrome, Granular dystrophy, Lattice dystrophy, Macular dystrophy, cornea guttate, Fuch's epithelial endothelial dystrophy, Congenital hereditary endothelial dystrophy) ,

Module-VI (8 hours)

Keratoconus, Keratoglobus, Corneal oedema, Corneal opacity, Corneal vascularization, Penetrating Keratoplasty

Module-VII (9 hours)

Uveal Tract and Sclera: Applied Anatomy, Classification of uveitis, Etiology, Pathology, Anterior Uveitis, Posterior Uveitis, Purulent Uveitis, Endophthalmitis, Pan ophthalmitis, Pars

Planitis, Tumors of uveal tract (Melanoma), Episcleritis and scleritis, Clinical examination of Uveitis and Scleritis

Text Books:

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

Reference Books:

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

CUTM1789 – OCULAR MICROBIOLOGY AND PATHOLOGY

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

Description

- This course provides an overview of the essential knowledge and skills in Microbiology and Pathology to identify the disorders which is required for an optometry technician to perform their work effectively. It helps in applying the correct procedures to laboratory investigations and interpretation of tests in terms of the underlying pathology, as well as an understanding of the sensitivity, specificity and limitations of certain investigations.

Learning outcome

- The candidates should demonstrate fundamental knowledge and insight into general microbiology and pathology. Knowledge and understanding should be demonstrated in the areas of general medical disorder and how they can affect. Course concepts will focus on the cause, development and progress of disease, and how the eye is affected. They are able to demonstrate an understanding of how knowledge of pathological processes can be utilized in the investigation, management and prevention of disease.

Module-1

Introduction to Microbiology: Types of Microorganisms, Physiology of Microorganisms – Nutrition, Enzymes, Metabolism and energy, Microbial Growth, Sterilization and disinfection in the laboratory, Control of Microbial Growth – Antimicrobial methods and Chemotherapy, Microbes versus Humans- The development of Infection, the disease process, pathogenicity and virulence.

Module-2

General Pathology: Principles, Pathophysiology of Ocular Angiogenesis, Ocular Infections, Pathology of cornea and Conjunctiva, Pathology of Uvea, Glaucoma Retina

Module-3

Ocular Bacteriology-Gram positive, (Staphylococcus auras, Staphylococcus epidermis, Streptococcus, propionic bacterium, actinomyces Nocardia) Bacteria including acid fast bacilli, Mycobacterium tuberculosis, Mycobacterium leprae)

Module-4

Ocular Bacteriology – Gram negative Bacteria (pseudomonas, haemophiles, Brucella, Neisseria, Moraxella).

Module-5

Pathology of retina in systemic disease/disorders, Pathology of eyelids and adnexa, Pathology of orbital space occupying lesions

Module-6

Spirochetes (Treponema, Leptospira), Virology: Classification of Viruses in Ocular Disease, Rubella, Adenovirus, Oncogenic Viruses (HPV, HBV, EBV, Retroviruses), HIV, Fungi: Yeasts, Filamentous, Dimorphic, Intracellular parasites – Chlamydia, Protozoa (Toxoplasmosis, Acanthamoeba,) Helminths (Toxocariasis, Filariasis, Onchocerciasis, Trematodes)

Module-7

Pathology of the optic nerve, Retinoblastoma, Pathology of Lens.

Text Books:

1. Microbiology: M J Pelczaretal., 1999
2. BURTON G.R.W: Microbiology for the Health Sciences, St. Louis, J.P. Lippincott Co.,3rd Edn.,1988.
3. Pathology: CORTON KUMAR AND ROBINS (V EDITION) Pathological Basis of the Disease, 2004.
4. Pathology of the eye & orbit: K S Ratnagar, 1997

Reference Books:

1. MACKIE &Mc CARTNEY Practical Medical Microbiology
2. SYDNEY M. FINEGOLD & ELLEN JO BARON: Diagnostic Microbiology (DM)
3. Sherris Medical Microbiology- Editors Kenneth J Ryan /C. George Ray: An Introduction to Infectious Diseases 4th Edition 2003
4. CORTON KUMAR AND ROBINS (IV EDITION): Pathological Basis of the Disease, 1994
5. S R Lakhani Susan AD & Caroline JF: Basic Pathology: An introduction to the mechanism of disease, 1993.
6. ANDERSON J. R: Muir's Text Book of Pathology, Edn. 12, 1987.
7. ROMINIC AND SOOD: CLINICAL PATHOLOGY, Medical Laboratory Technical manual

CUTM1790 – 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

Objective

This course deals with the basic clinical optometry procedures involving comprehensive evaluation from history taking to slit lamp examination.

Learning outcomes

At the end of the course the students will have practical knowledge on the purpose of each test, its indications and contraindications and will be able to perform various clinical tests in step-by-step procedures and set- up the required environment and also learn the interpretation and documentation of the findings.

Contents of module

1. History taking

2. External examination - HBT, Facial symmetry and Headposition
3. Pupil examination- Swinging flashlight test & RAPD grading; Stereopsis testing - Titmus fly test
4. Ocular adnexa & anterior segment- slit lamp examination
5. Tear film tests- Shrimers I & II, TBUT, NIBUT, ROPLAS, FDDT, TMH
6. Macular tests- Amsler grid, Photostress test
7. Worth 4 dot test, Visual field - confrontation

Textbooks/Reference:

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

CUTM1791-VISUAL OPTICS II

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

Objective

This course deals with the concept of eye as an optical instrument and thereby covers different optical components of eye, types of refractive errors, clinical approach in diagnosis and management of various types of refractive errors.

Learning outcome

Upon completion of the course, the student should be able:

1. To understand the fundamentals of optical components of the eye
2. To gain theoretical knowledge and practical skill on visual acuity measurement, objective and subjective clinical refraction.

Module-1 (9 hrs.)

Recent myopia development, myopia control, pathological myopia, pseudo myopia Recent advancements in refractive errors Accommodation related to hyperopia & Presbyopia Different types of refraction, drugs and administration Practice: Retinoscopy for simple, compound & Oblique astigmatism

Module-2 (8 hours)

Accommodation, Presbyopia Hypermetropia and accommodation Range and amplitude of accommodation, variation of accommodation with age. Anomalies of accommodation Accommodation: Far and near points of accommodation

Practice: Practice of Retinoscopy in special cases - media opacities, irregular astigmatism

Module-3 (9hrs)

Convergence types, measurement and anomalies. Relationship between accommodation & convergence, AC/A ratio

Module-4 (8hrs)

Objective Refraction: Static & Dynamic Streak retinoscopy Principle, procedure, difficulties and interpretation of findings Dynamic retinoscopy and near retinoscopy Cycloplegic refraction

Practice: Presbyopia correction and methods: Accommodative reserve, balancing the relative accommodation and Cross Grid test

Module-5 (8hrs) Subjective Refraction:

Review of subjective refractive methods, Finding out the astigmatism in different methods, Duo chrome, binocular balancing, Difficulties in subjective and objective tests and their avoidance

Practice: Subjective Refraction, Binocular balancing

Module-6 (6hrs)

Ocular refraction versus spectacle refraction, Ocular accommodation versus spectacle accommodation, Spectacle magnification and relative spectacle magnification, Retinal image blur; depth of focus and depth of field,

Module-7 (8hrs)

Anisometropia, Aniseikonia, Amblyopia, Aphakia and Pseudophakia Night myopioa and purkinje shift

Text Books:

1. Clinical Visual optics Arthur G Bennett Ronald B Rabbetts -Butterworth- Heinemann Second edition 1989
2. Visual Optics and Refraction- A clinical approach David D Michaels: The C.V. Mosby Co., 1985.

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

OPTOMETRIC OPTICS II & DISPENSING OPTICS

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

Objective

This course deals with understanding the theory behind spectacle lenses and frames, their materials, types, advantages and disadvantages, calculations involved, when and how to prescribe. It will impart knowledge on design, application and development of lenses, particularly of the methods of calculating their power and effect. In addition, deals with role of optometrists in optical set-up

Skills/knowledge to be acquired at the end of this course:

1. To select the tool power for grinding process
2. Different types of materials used to make lenses and its characteristics
3. Lens designs–Bifocals, progressive lens
4. Tinted, Protective & Special lenses
5. Spectacle frames –manufacture process & materials

Learning Outcome

6. Art and science of dispensing spectacle lens and frames based on the glass prescription.
7. Reading of spectacle prescription. Counselling the patient
8. Lens edge thickness calculation
9. Frame & lens measurements and selection
10. Writing spectacle lens order
11. Facial measurements - Interpupillary distance measurement and measuring heights (single vision, multifocal, progressives)
12. Lens verification and axis marking and fitting of all lens types
13. Final checking of finished spectacle with frame adjustments
14. Delivery and follow-up
15. Troubleshooting complaints and handling patient's questions

Module 1

Introduction to lens manufacture, Ophthalmic Blanks, surfacing, polarising, glazing, Lens designs – compatible to contemporary eye frames

Practice: Find out the meridian & optical center of ophthalmic lens

Module 2

Components of spectacle prescription & transposition, Add and near power relation Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height

Practice: lensometer- sph-cyl, bi focals, prisms

Module 3

Frame selection –based on spectacle prescription, professional requirements, age group, face shape. Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings

Recording and ordering of lenses (power, add, diameter, material type, lens enhancements) Neutralization –Hand &lensometer, axis marking

Practice: Frame measurements

IPD measurements & Pupilometer

Module 4

Final checking & dispensing of spectacles to customers, counseling on wearing & maintaining of spectacles, Accessories –Bands, chains, boxes, slevets, cleaners, screwdriver kit

Practice: lens measurements and selection: single vision, bifocal

Module 5

Faults in spectacles (lens fitting, frame fitting, patient's complaints, description, detection and correction) Spectacle repairs –tools, methods, soldering, riveting, frame adjustments

Module 6

Special types of spectacle frame Industrial safety glasses, Welding glasses

Module 7

Final Checking & dispensing of spectacles to customers, counselling on wearing & maintain of spectacles, Accessories- bands, chains, selvets, cleaners Frame availability in Indian market, Visit to lens manufacturing workshops Practice:Facial measurements

Text Books:

1. Clinical Optics: T E Fannin& T Grosvenor, 2nd edition
2. M. JALIE: Principles of Ophthalmic Lenses, Edn. 3,

Reference Books:

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

TEXT BOOK/REFERENCE BOOKS:

1. Jalie MO: Ophthalmic lens and Dispensing, 3rd edition, Butterworth –Heinemann, 2008
2. Troy E. Fannin, Theodore Grosvenor: Clinical Optics, 2nd edition, Butterworth Heinemann, 1996
3. C W Brooks, IM Borish: System for Ophthalmic Dispensing, 3rdedition, Butterworth - Heinemann, 2007
4. Michael P Keating: Geometric, Phisical& Visual Optics, 2nd edition, Butterworth –

Heinemann, 2002

CUTM1794 – OCULAR DISEASES

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

Objective

1. This course deals with various ocular diseases affecting various parts of the eyes.
2. It covers clinical signs and symptoms, cause, pathophysiological mechanism, diagnostic approach, differential diagnosis and management aspects of the ocular diseases.

Learning outcome

At the end of the course the students will be knowledgeable in the following aspects of ocular diseases: knowledge on

1. Etiology
2. Epidemiology
3. Symptoms
4. Signs
5. Course sequelae of ocular diseases
6. Diagnostic approach, and
7. Management of the ocular diseases.

Module 1 (12hrs)

Retina and Vitreous: Applied Anatomy , Congenital and Developmental Disorders (Optic Disc: Coloboma , Drusen, Hypoplasia, Medullated nerve fibers; Persistent Hyaloids Artery) ,Inflammatory disorders (Retinitis : Acute purulent , Bacterial, Virus, mycotic) ,Retinal Vacuities (Eales's), Retinal Artery Occlusion (Central retinal Artery occlusion) , Retinal Vein occlusion (Ischemic, Non Ischemic , Branch retinal vein occlusion)

Module 2 (6 hrs)

Retinal degenerations: Retinitis Pigmentosa, Lattice degenerations, Macular disorders: Solar retinopathy, central serous retinopathy, cystoid macular edema, Age related macular degeneration, Retinal Detachment: Rhegmatogenous, Tractional, Exudative), Retinoblastoma

Module 3(6 hours)

Ocular Injuries: Terminology: Closed globe injury (contusion, lamellar laceration) Open globe injury (rupture, laceration, penetrating injury, perforating injury), Mechanical injuries (Extra ocular foreign body, blunt trauma, perforating injury, sympathetic ophthalmitis), Non Mechanical Injuries (Chemical injuries, Thermal, Electrical, Radiational), Clinical approach towards ocular injury patients.

Module 4 (12 hrs)

Lens: Applied Anatomy and Physiology, Clinical examination, Classification of cataract, Congenital and Developmental cataract, Acquired (Senile, Traumatic, Complicated, Metabolic, Electric, radiational, Toxic), Morphological: Capsular, Sub capsular, Cortical, Supra nuclear, Nuclear, Polar, Management of cataract (Non-surgical and surgical measures; preoperative evaluation, Types of surgeries,), Complications of cataract surgery.
Displacement of lens: Subluxation, Displacement, Lens coloboma, Lenticonus, Micro-sperophakia.

Module 5(6 hrs)

Clinical Neuro-ophthalmology: Anatomy of visual pathway, Lesions of the visual pathway, Pupillary reflexes and abnormalities (Amaurotic light reflex, Efferent pathway defect, Wernicke's hemianopic pupil, Marcus Gunn pupil. Argyll Robertson pupil, Adie's tonic pupil), Optic neuritis, Anterior Ischemic optic neuropathy, Papilledema, optic atrophy

Module-6 (6hrs)

Clinical Neuro-ophthalmology: Cortical blindness, Malingering, Nystagmus, Clinical examination.

Module 7 (9 hours)

Glaucoma : Applied anatomy and physiology of anterior segment, Clinical Examination, Definition and classification of glaucoma, Pathogenesis of glaucomatous ocular damage, Congenital glaucoma ,Primary open angle glaucoma ,Ocular hypertension , Normal Tension Glaucoma , Primary angle closure glaucoma (Primary angle closure suspect, Intermittent glaucoma, acute congestive, chronic angle closure) , Secondary Glaucoma ,Management : common medications, laser intervention and surgical technique

Projects:

1. Presentation on various retinal pathology conditions using fundus images.
2. Presentation on Visual Pathway, Lesions and associated field defects.
3. Diagrammatic demonstration on Dynamics of Aqueous Humour Outflow.
4. Presentation on Grading of Cataractous Lens

Text Books:

1. Basic and Clinical Science Course, American Academy of Ophthalmology
2. J J KANSKI : Clinical Ophthalmology Butterworths, 4th Ed, 2004 (JJK)

Reference Books:

1. Ophthalmology: A.K. Khurana, 2000
2. Ophthalmolos (Theory & Practical) : SatyenNabar& P Samant, 2000
3. BarieOphthalmology:RenuJogi (1999)
4. MILLER S J H : Parson's Diseases ofthe Eye, 18th Ed., Churchill Livingstone, 2003.

CUTM1793 – CONTACT LENS- I

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

Objectives

- Understand the basics of contact lenses
- List the important properties of contact lenses
- Finalise the CL design for various kinds of patients

- Recognize various types of fitting
- Explain all the procedures to patient
- Identify and manage the adverse effects of contact lens

Learning outcome

- Attain clear idea on the basics of contact lenses and properties of contact lenses
- Ability to finalize the CL design for various kinds of patients and Recognize various types of fitting.
- Ability to identify and manage the adverse effects of contact lens
- Ability to fit and Explain all the procedures of Contact Lens fitting to patient.

MODULE-1(6 hours)

Introduction to contact lenses, Definition, Classification/ Types, History of Contact Lenses Optics of Contact Lenses, Review of Anatomy & physiology of Tear film Cornea, Lids & conjunctiva

Practice:

- Measurement of ocular dimensions(cornea, pupil and lid characteristics)
- Slit lamp examination of tear film – Blink rate and TBUT, Schimers test
- History taking for contact lenses
- Vertex distance calculations

MODULE-2: (9 hours)

Introduction to CL materials, Properties of CL materials, Physiological (DK, lonicity, Water content) Physical (Elasticity, Tensile strength, Rigidity), Optical (Transmission, Refractive index)

MODULE-3 (9 hours)

Indications and Contraindications, Parameters/ Designs of Contact Lenses & Terminology RGP contact Lens materials, Manufacturing Rigid and Soft Contact Lenses- various methods Pre-fitting examination

Practice:

- Selection of contact lens parameters
- Radioscope &Keratometer& V guage

MODULE-4 (9 hours)

Correction of Astigmatism with RGP lens, Types of fit- Steep, Flat, Optimum- on spherical cornea with spherical lenses.Types of fit- Steep, Flat , Optimum- on Toric cornea with spherical lenses. Calculation and 414inalizing Contact lens parameters, ordering of contact Lenses- writing a prescription. Checking and verifying Contact lenses.

Practice :

- Fitting and assessment of soft contact lenses-steep, flat. Optimal fit.
- Writing contact lens prescriptions.

MODULE-5 (9 hours)

Common Handling Instructions, Insertion & Removal Techniques

Practice :

- Do's and Don'ts
- Insertion & removal of soft contact lenses.
- Teaching the patient to insert and remove contact lenses, Contact lens handling, cleaning & maintenance.

MODULE-6 (8 hours)

Care and Maintenance, Cleaning agents & Importance, Rinsing agents & Importance, Disinfecting agents & importance, Lubricating & Enzymatic cleaners, Follow up visit examine

MODULE-7 (10 hours)

Follow up visit examination
Complications of RGP contact lenses

Practice:

- Case Discussions

Text Books

1. Contact Lens Practise., Nathan Efron, **,** Elsevier, third edition

Reference Books:

1. IACLE modules 1 – 10
2. CLAO Volumes 1, 2, 3
3. Anthony J. Phillips: Contact Lenses, 5thedition, Butterworth-Heinemann, 2006

CUTM1795-CONTACT LENSES II

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

Objective

- The subject provides the student with suitable knowledge both in theoretical and practical aspects of Contact Lenses.

Learning outcome

Upon completion of the course, the student should be able to:

1. Understand the basics of contact lenses
2. List the important properties of contact lenses
3. Finalise the CL design for various kinds patients
4. Recognize various types of fitting
5. Explain all the procedures to patient
6. special cases CL fitting
7. Identify and manage the adverse effects of contact lens

Module 1

- Soft Contact Lens related Polymer Chemistry (detailed study)
- Contact Lens Terminology: A revision, Contact Lens Design (aspheric Toric Multifocal)
- Gas Transmission through contact lenses (Dk, Dk / t , EOP, critical study of measuring techniques and their application to various types of contact lenses
- Adaptive symptoms of RGP contact Lenses

Module 2

- Pre fitting considerations for SCL
- Fitting Philosophies for SCL
- Fitting **Toric** lenses (RGP and Soft)

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.

Module 3

- Calculation and finalizing SCL parameters
- Fitting Bifocal lenses, Post fitting care

Practice :

- Writing contact lens prescriptions.
- Bifocal contact lens fitting

Module 4

- Soft toric CL
- Stabilization techniques, parameter selection

Module 5

- Diffractive vision and Aspheric contact lenses, Therapeutic contact lenses, Contact lenses as prosthetics, Cosmetic contact lenses

Practice

- Fitting cosmetic contact lenses.
- Bandage contact lenses

Module 6

- Different types of CL: Extended wear contact lenses, Disposable and frequent replacement contact lenses, Scleral contact lens, transition contact lens

Practice

- Scleral lenses

Module 7

- Specialty fittings: Pediatric, Post refractive surgery
- Post corneal grafting contact CL fitting, Pediatric and geriatric contact lens fitting, corneal scars Contact Lens fitting
- Scleral contact lenses, Orthokeratology
- Management of presbyopia with contact lens

Practice

- Insertion & removal of RGP contact lenses.
- Teaching techniques of RGP, Scleral lens, Contact lens handling, cleaning & maintenance
- Special RGP fittings case discussions (aphakia, Pseudophakia and Keratoconus)

Text Books

1. Contact Lens Practise., Nathan Efron, **,** Elsevier, third edition

Reference Books:

1. IACLE modules 1 - 10
2. CLAO Volumes 1, 2, 3
3. Anthony J. Phillips : Contact Lenses, 5thedition, Butterworth-Heinemann, 2006

CUTM1796 – BINOCULAR VISION I

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

Objective

- This course provides theoretical aspects of Binocular Vision and its clinical application. It deals with fundamentals of normal binocular vision and space perception, gross anatomy and physiology of extra ocular muscles, binocular movement coordination and binocular optical defects.

Learning outcome

At the end of the course students will be able to understand the following concepts,

1. Grades of Binocular vision
2. Fundamental theories of binocular vision
3. Binocular muscle coordination
4. Integration of motor and sensory system into binocular vision
5. Depth perception
6. Binocular optical defects
7. Basic binocular evaluation

Contents of module

MODULE-I : (5 hours)

Space perception, Cyclpean eye

Evolution of binocular vision & Advantages of binocular vision

Grades of binocular vision-simultaneous perception, fusion, Stereopsis

Visual direction, Retino motor value, Egocentric localization

Corresponding point and normal retinal correspondence

Practice: Synoptophore for fusion, stereopsis and simultaneous perception

MODULE-II:

Horopter &Panum's fusional area

Physiologic diplopia

Fixation disparity

Theories of binocular vision

Physiologic basis of fusion

Binocular rivalry

Suppression & Confusion

Blind spot syndrome

Eccentric Fixation

Practice: Worth four dot test, Red filter test, Bagolini test

MODULE-III:

Dichoptic stimulation and its types

Stereopsis- neurophysiology of stereopsis, local and global stereopsis and fusion,

Depth perception- non stereoscopic clues to the perception of depth under binocular condition, monocular cues and its types

Influence of accommodation and convergence on depth perception

Practice: stereopsis evaluation tests, NPA, NPC

MODULE-IV:

Integration of the motor and sensory system into binocular vision

Anatomy of Extra Ocular Muscles - Rectii, Obliques and LPS, Innervation & Blood Supply

Physiology of Ocular movements - Center of rotation, Axes of Fick, Action, Laws of ocular motility - Donder's and Listing's law, Sherrington's law, Hering's law

Practice: Extra ocular motility test, Hirschberg test

MODULE-V:

Influence of binocular optical defects- visual acuity, anisometropia, anisokenia, geometric optical effects of spectacles

Practice: Bruckner test

MODULE-VI:

Binocular muscular co-ordination - orthophoria

Uniocular & Binocular movements – Fixation & its field, saccadic & pursuits, Version &Vergence

Practice: Saccades and pursuit test

MODULE-VII:

Amblyopia: Classification, Aetiologia, Investigation, Management
Nystagmus: Classification, aetiologia, Investigation, Management

Practice: Neutral density filters

Textbooks/References:

1. Scott B Steinman; Barbara A Steinman; Ralph P Garzia: Foundations of binocular vision _a 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

CUTM1797-LOW VISION AND REHABILITATION

Subject Name	**Code**	**Type of course**	**T+P+Pj**	**Credits**

LOW VISION AND REHABILATION	CUTM1797	Theory + Practice	3+1+0	4

Objective

- Understand the epidemiology aspect of visual impairment, types of low vision devices and its optical principles, clinical approach of the low vision patients, assistive devices for totally visually challenged, art of prescribing low vision devices and training the low vision patients and other rehabilitation measures.

Learning outcome

At the end of the course, the student will be knowledgeable in the following:

1. Definition and epidemiology of Low Vision
2. Clinical examination of Low vision subjects
3. Optical, Non-Optical, Electronic, and Assistive devices.
4. Training for Low Vision subjects with Low vision devices
5. Referrals and follow-up

Module-1 (6 hours)

Introduction

1. Definition & Classification
2. Causes of Low Vision
3. Optometrist's role in Low Vision management

Module 2 (9 hours)

1. Examination of a Patient with Low vision

   Case history

2. Visual acuity

- Distant vision – Charts, measurement & Documentation
- Near vision - Charts, measurement & Documentation
- Refraction – Significance & Technique

3. Diagnostic procedures in low vision examination

4. Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psycho-social impact of low vision

Practice :

- Case history
- Visual acuity measurement & Documentation
- Refraction and recording

Module 3: (6 hours)

1. Types of low vision aids – Optics & Characteristics of Low vision aids
2. Magnification
3. Galilean telescope Vs Keplarian Telescopes
4. Spectacle magnifiers
5. Hand Magnifiers
6. Stand Magnifiers
7. CCTV
8. Bioptic telescopes
9. Accessory low vision aids

Practice :

1. Application, trail & selection of devices: Optical devices
2. Application, trail & selection of devices: Non - optical devices

Module 4: (9 hours)

- Selection of Low vision aids for distance, intermediate & near
- Guidelines & training to use various aids

Module 5: (8 hours)

- Choices of tests & Aids in various pathological conditions
- Conditions causes overall blurring of the visual field
- Conditions causes central field defects
- Conditions causes peripheral field defects

Module 6 (8 hours)

- Light, glare & Contrast in Low vision care & Rehabilitation
- Children with low vision

Practice :

1. Pediatric and Geriatric low vision

Module 7

- Genetics
- Rehabilitation of visually handicapped

Practice :

1. Common conditions that lead to low vision and their special ivestigations
2. Rehabilitation methods
3. Selection, trial & dispensing of visual aids

TEXT BOOKS:

1. Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth-Heinemann, 1998
2. Sarika G, Sailaja MVSE Vaithilingam: practice of Low vision –A guide book, Medical Research Foundation, 2015.

REFERENCE BOOKS:

1. Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999
2. Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991
3. A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinnemann, 2007

CUTM1798 – BASIC & OCULAR PHARMACOLOGY

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

Objective

- This course covers the actions, uses, adverse effects and mode of administration of drugs, especially related to eyes.

Learning outcome

At the end of the course the students will acquire knowledge in the following aspects-

1. Basic principle of pharmacokinetics & Pharmacodynamics

2. Commonly used ocular drugs, mechanism, indications, contraindications, drug dosage and adverse effects.

Module-1(8 hours)
Pharmacokinetics: Drug absorption, distribution, metabolism and excretion

Module-2 (8 hours)

Pharmacodynamics: Drug Handling by the body – effect of drug and the relationship between drug concentration and response, Drug – Receptor interactions

Module-3 (8hrs)

Ocular Pharmacology: Drug Handling by cells and Tissues – Pharmacokinetics, and Pharmacodynamics– specific to ocular – surface and intraocular conditions

Module-4 (6hrs)

Delivery methods of Ocular Medication: Residence in the conjunctival sac, drug vehicles affect drug delivery, advanced ocular delivery systems, Reconstituting the tear film: Tear Substitutes ,

Module-5 (6hrs)
Ocular Drugs and the Autonomic Nervous system: Parasympathetic (anti muscaranic) and Sympathetic

Module-6(6hrs)

Intraocular pressure Drugs (Anti Glaucoma Drugs), Eicosanoids: prostaglandins, thromboxanes and leukotrienes, Serotonin

Module: 7 (6hrs)

Neurotransmitter; Glucocorticoids, Immunosuppressive agents, Local Anesthetics, Ocular Toxicity from systemic administration of Drugs supervised setting.

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

Text Books

1. K D TRIPATHI : Essentials of Medical Pharmacology. 4th Ed.,2003
2. T S MAUGER & E L CRAIG - MOSBY'S - OCULAR DRUG HANDBOOK
3. Clinical Ocular Pharmacology – 5th edition - Jimmy D. Bartlett, Siret D. Jaanus.

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.

CUTM1799 – BINOCULAR VISION II

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

Objective

This course provides knowledge on both strabismus & non strabismus binocular vision anomalies, its classification, etiology, necessary investigations, diagnosis and management.

Learning outcome

On completion of the course, students will be able to

- Differentiate different types of strabismic anomalies - horizontal, vertical, torsional, paralytical& mechanical restrictive.
- Identify non strabismic anomalies related to accommodation & convergence
- Perform necessary investigations & its interpretation
- Provide the appropriate management

Contents of module

Module I

Neuro-muscular anomalies- Classification and etiological factors

Factors affecting Heterophoria & Heterotropia

Module II

Horizontal strabismus

Esotropia - classification, investigations, diagnosis, management & treatment

Exotropia - classification, investigations, diagnosis, management & treatment

A - V phenomenon, Microtropia

Practice: 4 prism base out test, Krimsky test, modified krismky

Module III

Vertical strabismus - classification, investigations, diagnosis, management & treatment

Torsional strabismus - classification, investigations, diagnosis, management & treatment

*Practice:*Maddox wing, Maddox rod, Double Maddox rod

Module IV

Paralytic Strabismus - Acquired and Congenital

CN III, IV, VI plasies -nerve pathways, clinical characteristics, investigations, management & treatment

*Practice:*Bielschowsky park 3 step test

Module V

Restrictive Strabismus- Musculo fascial anomalies, Mobius syndrome, Brown Superior oblique sheath syndrome, Duane's retraction syndrome, Strabismus fixus, Congenital muscle fibrosis

Module VI

Binocular investigations for differential diagnosis - History and symptoms, Compensatory head Posture, Diplopia Charting, Hess chart, synoptophore, Cover test, Forced duction test, forced generation test etc.

Practice: Diplopia charting, Hess screen, Cover/Uncover test, Alternate cover test, 9 gaze prism

Module VII

Non-Strabismic anomalies - Accommodation & Convergence

Types of accommodation & its methods of measurement, Anomalies of accommodation – aetiology and management

Components of Convergence & its methods of measurement, Anomalies of Convergence – aetiology and management

Practice: AC/A, CA/C ratio, NRA, PRA, NPA, NPC, NFV, PFV, AF, VF, Dynamic retinoscopy

Textbooks/References:

1. Scott B Steinman; Barbara A Steinman; Ralph P Garzia: Foundations of binocular vision _a 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 - CUTM1800

Subject Name	Code	Type of course	L-P-Pj	Credits
PEDIATRIC & GERIATRIC OPTOMETRY	CUTM1800	Theory + Practice	3+1+0	4

Objectives

- Understanding the 'general and ocular physiological changes of ageing, common geriatric systemic and ocular diseases, clinical approach of geriatric patients, pharmacological aspects of ageing, and spectacle dispensing aspects in ageing patients.

Learning outcome

The student on taking this course should

- Be able to identify, investigate the age-related changes in the eyes.
- Be able to counsel the elderly
- Be able to dispense spectacles with proper instructions.
- Adequately gained knowledge on common ocular diseases.

MODULE-1

History, Genetic factors, Prenatal systems Prenatal factors Postnatal factors Normal prenatal development & Embryology Tissue origin of the various structure of the eye

Practice

- History taking of Pediatric and Geriatric patients

MODULE-2 (16 lectures)

Anomalies of prenatal & postnatal development Genetic origin: Albinis, Nystagmus, Buphthalmos, Macula disorders, Color Deficiencies, Retinitis pigmentosa, Ectopia Lentis Acquired: Micro cornea, Macro cornea, Microphthalmos, Ptosis, Distichiasis, Coloboma, Aniridia, Pupil displacement, Retinopathy of prematurity, congenital glaucoma, congenitalcatarac.

MODULE-3

Visual Acuity Testing In Children – Objective & Subjective Normal appearance, pathology and structural anomalies of: Orbit Eyelids Lacrimal system Conjunctiva Cornea Sclera Anterior chamber, uveal tract, pupil Lens, vitreous, fundus Oculomotor system.

Practice:

- Vision Assessment in children
- Cycloplegic refraction & Post mydriatic tests

MODULE-4

- 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 & compensatory treatment for strabismus & nystagmus.

MODULE-5

- Structural & Anatomical changes of the eye.
- Physiological changes of the eye
- Aphakia, pseudophakia –its correction

Practice

- Refraction in pediatric cases -anisometropia, amblyopia, malingarence, stabismus, nystagmus, aphakia
- Neuro- Optometric Evaluation & Rehabilitation
- Evaluation, Diagnosis & Optometric management of children with mental retardation, C.P, Dyslexia

MODULE-6

- Ocular diseases common in the old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye
- Special considerations in the ophthalmic dispensing to the elderly
- Management of visual problems of aging
- How to carry on one's visual task overcoming the problems of aging?
- Contact lens in elderly.

MODULE-7

- Optometric Examination of older adults
- Introduction to geriatric medicine – epidemiology , need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebrovascular disease, Diabetes, COPD).
- Low vision causes, management and rehabilitation in geriatrics.

Practice

- Multiple Sensory Motor Handicaps
- Refraction in geriatric cases
- pediatric & geriatric case discussions

TEXT BOOKS:

1. A.J. ROSSENBLOOM Jr& M.W.MORGAN: Vision and Aging, Butterworth-Heinemann, Missouri, 2007.
2. 1. Pediatric Opthalmology,
3. 2. Vision And Aging, Rosenbloom And Morgan.

REFERENCE BOOKS:

1. OP Sharma: Geriatric Care –A textbook of geriatrics and Gerontology, viva books, New Delhi, 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 older patient, Printers Castle, Cochin, 2002

PAEDIATRIC TEXT BOOKS:

1. Paediatric Optometry - JEROME ROSNER, Butterworth, London 1982
2. Paediatric Optometry –William Harvey/ Bernard Gilmartin, Butterworth – Heinemann, 2004

REFERENCE BOOKS:

1. Binocular Vision and Ocular Motility - VON NOORDEN G K Burian Von Noorden's, 2nd Ed., C.V. Mosby Co. St. Louis, 1980.
2. Assessing Children's Vision. By Susan J Leat, Rosalyn H Shute, Carol A

Westall.45 Oxford: Butterworth-Heinemann, 1999.
3. Clinical pediatric optometry. LJ Press, BD Moore, Butterworth- Heinemann, 1993

CUTM1801 SYSTEMIC DISEASES AND EYE

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

Objective

- This course deals with definition, classification, clinical diagnosis, complications and management of various systemic diseases. In indicated cases ocular manifestations also will be discussed.

Learning outcome

At the end of the course, students should get acquainted with the following:

1. Common Systemic conditions: Definition, diagnostic approach, complications and management options
2. Ocular findings of the systemic conditions
3. First Aid knowledge

Module 1 (8 hrs)

Hypertension - Defination, classification, Epidemiology, Clinical examination, Complications, and management. Hypertensive retinopathy.

Diabetes Mellitus - Classification, Pathophysiology, Clinical presentations, diagnosis, management & Complications. Diabetic Retinopathy

Module 2 (6hrs)

Thyroid Disease - Physiology, Testing for thyroid disease, hyperthyroidism, Thyroiditis, Thyroid tumors - , Grave's Ophthalmopathy

Module 3 (6hrs)

Ocular cancer – Tumors of retina - Retinoblastoma, Tumors of lids - squamous cell carcinoma, basal cell carcinoma, malignant melanoma

Module 4 (8hrs)

Ocular Manifestations of systemic diseases: Viral infections – AIDS and Ocular involvement in AIDS, Herpes and Ocular manifestations; Bacterial Infections – Tuberculosis and ocular tuberculosis; Parasitic Infections – Ocular cystecercosis, Onchocerciasis

Module 5 (8hrs)

Ocular Manifestations of Autoimmune diseases– Connective Tissue Disease, Rheumatic arthritis, Systemic lupus erythematosus, Scleroderma, Polymyositis and dermatomyositis, Sjogren syndrome, Bechet's syndrome, Eye and connective tissue disease

Module 6 (6hrs)

Ocular Manifestations of Nutritional Deficiencies – Xerophthalmia, Vitamin A,D,E,K, B1, B2, C Deficiency, Vitamin D Deficiency, Vitamin E Deficiency.

Module 7 (6hrs)

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 defeciencies

Text books:

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

CUTM1802-OCCUPATIONAL OPTOMETRY

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

Objective

This course deals with general aspects of occupational health, Visual function demands in various jobs, visual task analysis, visual standards, occupational hazards, occupational safety and role of optometrist in different occupations through classroom sessions and project presentations.

Learning outcome

At the end of the course students will be knowledgeable in the following aspects:

- In visual requirements of jobs
- In effects of physical, chemical and other hazards on eye and vision
- To identify occupational causes of visual and eye problems
- To be able to prescribe suitable corrective lenses and eye protective wear
- To set visual requirements, standards for different jobs

Contents of module

MODULE-I :

Introduction to Occupational health, hygiene and safety, international bodies like ILO, WHO, National bodies etc. Acts and Rules - Factories Act, WCA, ESI Act.

MODULE-II:

Occupational hazards- physical, chemical & biological; Recognition, evaluation and control, preventive/protective methods at workplace; Accident analysis; Personal protective equipment-General & Eye

MODULE-III:

Occupational ocular injuries - mechanical, non mechanical and chemical; Prevention of occupational diseases; Medical examination/medical monitoring

MODULE-IV: Visual Display Units; Visual Ergonomics; Computer vision syndrome; Contact

lens and work

MODULE-V: Electromagnetic Radiation and its effects on Eye; Light – Definitions and units, Sources, advantages and disadvantages, standards; Colour – Definition, Colour theory, colour coding, colour defects, colour Vision tests; Welding and eye

MODULE-VI: Visual Task Analysis; Testing for vision standards; Driving and eye; Industrial Vision Screening – Modified clinical method and Industrial Vision test

MODULE-VII: Special occupational groups - sports, chemical & mineral industries, goldsmiths, etc; Role of Optometrists – promotion of general and visual health and safety of people 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

Text Books/Reference:

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

MODULE-I (17 lectures)

1. Introduction to Occupational health, hygiene and safety, international bodies like ILO, WHO, National bodies etc.
2. Acts and Rules - Factories Act, WCA, ESI Act.
3. Electromagnetic Radiation and its effects on Eye
4. Light – Definitions and units, Sources, advantages and disadvantages, standards
5. Colour – Definition, Colour theory, colour coding, colour defects, colour Vision tests
6. Occupational hazards and preventive/protective methods
7. Task Analysis

MODULE-II (12 lectures)

1. Industrial Vision Screening – Modified clinical method and Industrial Vision test
2. Vision Standards – Railways, Roadways, Airlines
3. Visual Display Units
4. Contact lens and work

Module III

Presentation work to students on occupation screenings and eye protection for different jobs

TEXT BOOKS:

1. PP Santanam, R Krishnakumar, Monica R. Dr. Santanam's text book 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

REFERENCE BOOKS:

1. G W Good: Occupational Vision Manual available in the following website: www.aoa.org
2. N.A. Smith: Lighting for Occupational Optometry, HHSC Handbook Series, Safchem Services, 1999
3. J Anshel: Visual Ergonomics Handbook, CRC Press, 2005
4. G Carson, S Doshi, W Harvey: Eye Essentials: Environmental & Occupational Optometry, Butterworth-Heinemann, 2008

CUTM1805-LAW AND OPTOMETRY

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

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.

Module 1

1. Medical ethics - Definition - Goal - Scope.
2. History, role of world medical association, declaration of Geneva
3. Basic principles of medical ethics – Confidentiality
4. 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

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

Module 4

1. 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.
2. Legal issues: How to defend a case, specify legal issues, importance of case laws & calculation of compensation

Module 5

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

Module 6

1. Miscellaneous issues: Legal issues in immunization, junk food, medical education,

medical tourism
2. Telemedicine and electronic consultations

Module 7

1. Role of government, community/ social organizations
2. New legal development in optometry

Projects: Case discussion & case study presentations

References:

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

CUTM1804- PUBLIC HEALTH & COMMUNITY OPTOMETRY

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

Objective

- Introduction to the foundation and basic sciences of public health optometry with an emphasis on the epidemiology of vision problems especially focused on Indian scenario.

Learning outcome

At the end of the course students will be be knowledgeable in the following areas:

1. Community based eye care in India.
2. Prevalence of various eye diseases
3. Developing Information Education Communication materials on eye and vision care for the benefit of the public
4. Organize health education programmes in the community
5. Vision screening for various eye diseases in the community and for different age groups.

MODULE-1 (6 lectures)

Public Health Optometry: Concepts and implementation, Stages of diseases, Dimensions, determinants and indicators of health

Module II

Levels of disease prevention and levels of health care patterns, Epidemiology of blindness – Defining blindness and visual impairment

Module III

Eye in primary health care, Contrasting between Clinical and community health programs

Module IV

Community Eye Care Programs, Community based rehabilitation programs

Module V

Nutritional Blindness with reference to Vitamin A deficiency, Vision 2020: The Right to Sight

Screening for eye diseases

Module VI

National and International health agencies, NPCB, Role of an optometrist in Public Health, Organization and Management of Eye Care Programs – Service Delivery models, Health manpower and planning & Health Economics

Module VII

Evaluation and assessment of health program, Optometrist's role in school eye health programs, Basics of Tele Optometry and its application in Public Health, Information, Education and Communication for Eye Care program

Project - Blindness
NPCB
Role of an optometrist in Public Health
Basics of Tele Optometry and its application in Public Health

CUTM1803-OPTOMETRIC INSTRUMENTS

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

Objective

- This course covers optometric instruments, its basic principle, description and usage in clinical practice.

Learning outcome

- Upon completion of the course, the student should be able to gain theoretical knowledge and basic practical skill in handling the advancedinstruments

Module -1 : Basic instrumentation

Slit Lamp -types, mechanical design, illumination techniques, Accessories, color coding. Color vision - theories, Common color vision defects, Pseudoisochromatic test plates, Color arrangement tests, Interpretation & clinical significance of findings. Autokeratore fractometers. Abberometer

Module -2: Retina diagnostics I

Ophthalmoscope - Direct & Indirect, Optical principle & Types, Instrumentation, Characteristics & Uses Slit lamp Ophthalmoscopy (+90, 78 D), Fundus photography Fundus biomicroscopy - Direct, Indirect, Principle & Instrumentation OCT

Module 3: Retina diagnostics II

B scan, Electrodiagnostic instrument (ERG, VEP, EOG), FFA, Amsler grid test

Module 4: Glaucoma diagnostics

Gonioscopy, Tonometry - Types, principle & standardization (Schiotz, Applanation & NCT) - Measurement, documentation & interpretation of results, Perimeter - Static, Kinetic - Results, Interpretation & Analysis of visual field examination. Emphasis on HVF, Octupus Pachemetry

Module 5: Cornea diagnostics

Keratometer - Keratometric principle, Types – Bausch & Lomb, Javal-Schiotz models, Measurement, Documentation & Interpretation of data, Placido's disc, Corneal topography - principle, types. ORBSCAN - interpretation and results, AS- OCT, Specular microscope. Introduction to refractive laser procedures

Module -6: Cataract diagnostics

A –Scan, Potential Acuity Meter, Brightness acuity test

Module 7: Neuro imaging

Basics of CT scan, Basic of MRI scan

Practice: Same as module contents

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

Ocular Microbiology & Pathology:-

1. Investigation of the epidemiology and 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 antibiotic resistance.

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.
4. Retinal anatomy, physiology and pathology.

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

Internship: -

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