



CENTURION UNIVERSITY OF TECHNOLOGY AND MANAGEMENT

School of Paramedics and Allied Health Sciences

Date: 30-09-2023

MINUTES OF BOARD OF STUDIES MEETING held on 30-09-2023

Venue: Department of Optometry

Time: 10:30 am

The Board of Studies (BoS) meeting of School of **Paramedics and Allied Health Sciences** was held on **30-09-2023** at **Department of Optometry** in **Offline** mode. The following are the members:

1. Dr M L N Acharyulu - Dean SoPAHS
2. Ms Sravani Mereddy - HOD
3. Mr Sourajith Kumar Banerjee
4. Mr Dinesh Kumar Nagula
5. Ms Syama Alana Teja

The Chairperson welcomed all members of the Board and briefly outlined the purpose of the meeting. Thereafter, the Head of the Department presented the achievements and improvements of the department in the areas of academics, research, consultancy and infrastructure. The Head of the Department also gave a presentation on the feedback received on curriculum outlining the suggestions made by the various stakeholders.

The following agenda items were taken up subsequently:

Agenda 1: The minutes of the last meeting of the BoS held on 25-10-2022 were confirmed.

Agenda 2: Discussion and approval on any revision required in the Curriculum of 2023-24

SUBJECT	CODE & CREDIT (T+P+Pj)	MODIFICATIONS/REMARKS
OCULAR ANATOMY	CUTM 1782 (3+1+0)	Module VI Anterior and Vitreous Humour changed to Aqueous and Vitreous humour. Module VII Anatomy of the optic nerve is repeated twice so it is removed and Optic radiation is added in place of that.

		(MODIFICATIONS IN MODULE CONTENTS)
OPTOMETRIC OPTICS I	CUTM 1787 (3+2+0)	<p>Module I Lens equation and Mirror equation are added.</p> <p>Module VII Effect of the aberrations with respect to the vision is added.</p> <p>(MODIFICATIONS IN MODULE CONTENTS)</p>
OCULAR MICROBIO LOGY & PATHOLOG Y	CUTM 1789 (3+1+0)	<p>Module II Pathology of sclera is added.</p> <p>Module IV Morphology and Pathology caused with respect to Gram negative bacteria</p> <p>(MODIFICATIONS IN MODULE CONTENTS)</p>

VISUAL OPTICS II	CUTM 1791 (3+1+0)	<p>Module I Accommodation related to hyperopia and presbyopia is removed here as it already exists in Module II.</p> <p>Module II Hyperopia and Accommodation is removed as that is covered in accommodation.</p> <p>Module IV History of Retinoscopes is added.</p> <p>(MODIFICATIONS IN</p>
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		MODULE CONTENTS)
OPTOMETRIC OPTICS II & DISPENSING OPTICS	CUTM 1792 (3+2+0)	<p>Module VII Recent advances in the optical dispensing</p> <p>(MODIFICATIONS IN MODULE CONTENTS)</p>
CONTACT LENS I	CUTM 1793 (3+2+0)	<p>Module VI Follow up visit examine is removed</p> <p>Module VII Recent advances in the soft contact lens are added.</p> <p>(MODIFICATIONS IN MODULE CONTENTS)</p>

CONTACT LENS II	CUTM 1795 (3+2+0)	<p>Module I Comparison of RGP vs SCL added in place of Gas Transmission through contact lenses (Dk, Dk / t , EOP, critical study of measuring techniques and their application to various types of contact lenses.</p> <p>Module III Fitting Bifocal lenses, Post fitting care is removed and Disposable lenses, their availability and advantages are added.</p> <p>Module IV Fitting assessment is added.</p> <p>Module VI Scleral contact lens is removed here as it is repeating in Module VII</p> <p>Module VII Recent advances in the RGP</p>
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		Contact Lens is added (MODIFICATIONS IN MODULE CONTENTS)
LOW VISION AND REHABILITATION	CUTM 1797 (3+1+0)	Module VII Recent advances in Low Vision Management are added. (MODIFICATIONS IN MODULE CONTENTS)
BASIC & OCULAR PHARMACOLOGY	CUTM 1798 (3+0+1)	Module IV Recent advances in route of drug administration is added Assignment Adverse effects of ocular drugs on the human body are added. (MODIFICATIONS IN MODULE CONTENTS)
PEDIATRIC & GERIATRIC OPTOMETRY	CUTM 1800 (3+1+0)	Module IV Spectacle dispensing in the pediatric population is added. Module VI How to carry on one's visual task overcoming the problems of aging? is removed Module VII Recent advancements in the spectacle dispensing in geriatric Population is added. (MODIFICATIONS IN MODULE CONTENTS)
OPTOMETRIC INSTRUMENTS	CUTM 1803 (3+2+0)	Module II Fundus biomicroscopy - Direct, Indirect, Principle & is removed as the topic

		<p>is already covered in Module I</p> <p>Module V</p> <p>Interferometry and Tear film lipid mammography is added</p> <p>(MODIFICATIONS IN MODULE CONTENTS)</p>
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Based on the presentation on feedback on curriculum by the various stakeholders, the Board accepted and approved the above few suggestions for course revision to be implemented from the Academic Year 2023-24.

List of new courses approved by the Board is provided in Annexure A

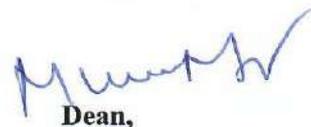
Agenda 3: Inclusion of courses on life skills and value addition

It was suggested that the students take up the various courses offered by the University in the areas of life skills and value addition for their overall improvement and wellbeing. The same was agreed upon and approved by the Board of members (Annexure B)

Agenda 4: Any other item with due permission of the chair

The Dean/Head of the Department extended sincere thanks to all members of the Board.

The meeting ended with a vote of thanks to the Chair.



Dean,

School of Paramedics and Allied Health

Sciences

CENTURION UNIVERSITY OF TECHNOLOGY AND MANAGEMENT, ANDHRA PRADESH

SCHOOL OF PARAMEDICS AND ALLIED HEALTH SCIENCES



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities!*

BACHELOR OF OPTOMETRY

2023-24

COURSE SYLLABUS

INTRODUCTION

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

As per the *World Council of Optometry (WCO'S CONCEPT OF OPTOMETRY)* "Optometry is a healthcare profession that is autonomous, educated, and regulated (licensed/registered), and optometrists are the primary healthcare practitioners of the eye and visual system who provide comprehensive eye and vision care, which includes refraction and dispensing, detection/diagnosis and management of disease in the eye, and the rehabilitation of conditions of the visual system."

PROGRAMME OBJECTIVES

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

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

Programmed: Bachelor of Optometry (B. Optom)

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

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

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

Degree:

The degree of Bachelor of Optometry course of the University shall be conferred on the candidates who have pursued the prescribed course of study for not less four academic years and have passed examinations as prescribed under the relevant scheme and completed 1 year of compulsory internship in the last year

On successful completion of four years programme, with a minimum course credit of **160 credits**, the candidate will be awarded with "**Bachelor of Optometry (B. Optom)**" from Centurion University

Internship

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

Project Work

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

Evaluation System

Theory + practice			
Internal Examination	Component	% of marks	Method of Assessment
	Internal Theory	40	Written examination
External Examination	External Theory	60	Written examination
Total		100	
Theory +Project			
Internal Examination	Component	% of marks	Method of Assessment
	Internal Theory	50	Written examination, record, viva, practical
External Examination	External Theory	50	Written examination, Viva, practical
Total		100	

Course structure

SEMESTER I					
S.no	Subject Code	Subject	Contact Hours per week (L+P+Pj)	Type	Credits
1	CUTM1760/ CUTM1761	BIOLOGY / MATHS	3+0+1	Theory + Project	4
2	CUTM1757	GENERAL ANATOMY	3+2+0	Theory + Practice	5
3	CUTM1758	GENERAL PHYSIOLOGY	3+2+0	Theory + Practice	5
4	CUTM1781	GEOMETRIC OPTICS	3+2+0	Theory + Practice	5
6	CUTM1742	BASIC COMPUTER AND INFORMATION SCIENCE	0+2+0	Practice	2
7	CUTM1759	BASIC BIOCHEMISTRY	3+2+0	Theory + Practice	5
				Total credits	26

SEMESTER II					
S .n o	Subject Code	Subject	Contact Hours per week (L+P+Pj)	Type	Credits
1	CUTM17 82	OCULAR ANATOMY	3+1+0	Theory + Practice	4
2	CUTM17 83	OCULAR PHYSIOLOGY	3+1+0	Theory + Practice	4
3	CUTM17 85	INTRODUCTION TO OPTOMETRY	1+1+0	Theory + Practice	2
4	CUTM17 84	PHYSICAL OPTICS	3+1+0	Theory	4
5	CUTM18 05	LAW & OPTOMETRY	2+0+1	Theory+ Project	3
6	CUTM1693	PROFICIENCY IN ENGLISH	1+1+0	Theory + Practice	2
7	CUTM1010	ENVIRONMENTAL SCIENCE	1+0+1	Theory+ Project	2
				Total credits	21

SKILL COURSE - 2 CREDITS

SEMESTER III

S .n o	Subject Code	Subject	Contact Hours per week (L+P+Pj)	Type	Credits
1	CUTM17 86	VISUAL OPTICS –I	3+2+0	Theory+Practi ce	5
2	CUTM17 87	OPTOMETRIC OPTICS –I	3+2+0	Theory+Practi ce	5
3	CUTM17 88	OCULAR DISEASES –I	3+1+0	Theory+Practi ce	4
4	CUTM17 89	OCULAR MICROBIOLOGY & PATHOLOGY	3+1+0	Theory+Practi ce	4
5	CUTM17 90	CLINICAL EXAMINATION OF VISUAL SYSTEM LAB	0+2+0	Practical	2
				Total credits	20

SEMESTER IV

S .n o	Subject Code	Subject	Contact Hours per week (L+T+P)	Type	Credits
1	CUTM17 91	VISUAL OPTICS –II	3+2+0	Theory+Practi ce	5
2	CUTM17 92	OPTOMETRIC OPTICS –II & DISPENSING OPTICS	3+2+0	Theory+Practi ce	5
3	CUTM17 94	OCULAR DISEASES –II	3+1+0	Theory+Practi ce	4
4	CUTM17 93	CONTACT LENSES-I	3+2+0	Theory+Practi ce	5
5	CUTM18 07	MEDICAL PSYCHOLOGY	2+0+1	Theory+Proje ct	3
				Total credits	22

SUMMER INTERNSHIP - 2 CREDITS

SEMESTER V

S.no	Subject Code	Subject	Contact Hours per week (L+P+Pj)	Type	Credits
1	CUTM17 95	CONTACT LENSES-II	3+2+0	Theory & Practice	5
2	CUTM17 96	BINOCULAR VISION –I	3+2+0	Theory & Practice	5
3	CUTM17 97	LOW VISION & REHABILITATION	3+1+0	Theory & Practice	4
4	CUTM17 98	BASIC & OCULAR PHARMACOLOGY	3+0+1	Theory + Project	4
				Total credits	18

SEMESTER VI

S. no	Subject Code	Subject	Contact Hours per week (L+P+Pj)	Type	Credits
1	CUTM179 9	BINOCULAR VISION –II	3+2+0	Theory+ Practice	5
2	CUTM180 0	PEDIATRIC & GERIATRIC OPTOMETRY	3+1+0	Theory+ Practice	4
3	CUTM180 1	SYSTEMIC DISEASES & EYE	3+0+1	Theory+ Project	4
4	CUTM180 4	PUBLIC HEALTH & COMMUNITY OPTOMETRY	2+0+1	Theory+Practi ce	3
5	CUTM180 3	OPTOMETRIC INSTRUMENTS	3+1+0	Theory+Practi ce	4
6	CUTM180 2	OCCUPATIONAL OPTOMETRY	2+0+1	Theory+ Project	3
				TOTAL CREDIT	23

**SEMESTER VII &
VIII**

S .n o	Subject Code	Subject	Contact Hours per week (L+P+Pj)	Type	Credits
1	CUTM18 09	PROJECT	0+0+16	PROJECT	16
2	CUTM18 10	INTERNSHIP	0+16+0	Practice	16
				Total credits	32

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.

Course Syllabus

SEMESTER I

Basket I: School Core Subjects

Subject Name	Code	Type of course	T+P+Pj	Credits
BIOLOGY	CUTM1760	Theory+Project	3+0+1	4

Description:

- 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, Golgi complex, lysosomes, microtubules, centriole, vacuole, cytoskeleton.

Project: cell organelles and their 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

Molecular Biology by Friefelder David, Publisher Narosa

Subject Name	Code	Type of course	LTP	Credits
MATHEMATICS	CUTM1761	Theory	3+0+1	4

Description

- The course describes about the concepts of matrices, progressions, trigonometry, two dimensional geometry and calculus. It also shows about 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 and Geometric 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

Subject Name	Code	Type of course	LTP	Credits
GENERAL ANATOMY	CUTM1757	Theory + Practice	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 CIRCULATORY 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 fascia, deep fascia, 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, oesophagus, 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, Models.

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 joints, 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).

Module -8 (Only for optometry)

OCULAR ANATOMY: orbit and its contents, ocular muscles- origin, insertion. Action and its nerve supply, movements.

Only for radiographers:

Surface anatomy of all systems

REFERENCE BOOKS

1. Text book Anatomy & Physiology for nurses by Evelyn Pearce, Publisher Faber& 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& 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.

Subject Name	Code	Type of course	LTP	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 and 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 Derrickson: Principles of anatomy & physiology, 11th edition,
2. John Wiley & Sons Inc, New Jersey, 2007

Reference Book:

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

AC Guyton: Textbook of Medical Physiology, 6th edition, Saunders Company, Japan, 1981

Subject Name	Code	Type of course	LTP	Credits
BASIC BIOCHEMISTRY	CUTM1759	Theory	3+2+0	5

Description

General Biochemistry deals with the biochemical nature of carbohydrates, proteins, minerals, vitamins, lipids etc. A detailed study of these, emphasizing on their chemical composition and their role in metabolism is the required aim of this course.

Learning outcome

At the end of the course, the student should be able to: demonstrate his knowledge and understanding on:

1. Structure, function and interrelationship of biomolecules and consequences of deviation from normal.
2. Integration of the various aspects of metabolism, and their regulatory pathways.
3. Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data.

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 plasma membrane.

MODULE-4:

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

MODULE-5:

Hormones: Hormones and their receptors basic concepts in metabolic regulation with examples, insulin, glucagon and thyroxine. 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

ii. 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: Essentialsof biochemistryandocularbiochemistry, Annamalai University Publications, Chidambaram, India, 1992

Reference Book:

1. S.Ramakrishnan, KGPrasannanandRRajan: Textbookof MedicalBiochemistry, Orient Longman, Madras, 1990.
2. D.R. Whitehart Biochemis
3. tryof the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003

Subject Name	Code	Type of course	LTP	Credits
GEOMETRICAL OPTICS		Theory	3+1+0	4

Description

This course will be taught in two consecutive semesters. Geometric Optics is the study of light and its behaviour 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. Wavefronts–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

Prentice's 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. Construction of a tabletop telescope – all three types of telescopes.
5. Construction of a tabletop microscope
6. Imaging by a cylindrical lens – relationship between cylinder axis and image orientation
7. 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
8. 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

Subject Name	Code	Type of course	LTP	Credits
FUNDAMENTALS OF COMPUTERS	CUTM1896	Theory	3+0+0	3

Description

- 1. Identify the function of computer hardware components.**
- 2. Identify the factors that go into an individual or organizational decision on how to purchase computer equipment.**
- 3. Identify how to maintain computer equipment and solve common problems relating to computer hardware.**
- 4. Identify how software and hardware work together to perform computing tasks and how software is developed and upgraded**
- 5. 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

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

1. Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
2. Input output devices: Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).
3. Processor and memory: The Central Processing Unit (CPU), main memory.
4. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.
5. 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.).
6. 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.
7. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.

8. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
9. Introduction of Operating System: introduction, operating system concepts, types of operating system.
10. Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.

Semester II

OCULAR ANATOMY - CUTM1782

Subject Name	Code	Type of course	L+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.

Course outcome

- CO1: To understand the basic principles of ocular embryology.
- CO2: To demonstrate microscopic structures of various tissues in the eye and correlate the structure with the functions.
- CO3: To analyse the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa.
- CO4: To appraise the basic structure and connections between the various parts of the central nervous system and the eye so as to understand the neural connections and distribution.

MODULE-1:(6hrs)

Embryology – Formation of optic vesicle & optic stal; 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, viterous; Development of accessory structures of eyeball – eyelids, lacrimal apparatus, extraocular muscles, orbit; Milestones in the development of the eye;

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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:(6hrs)

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 Zeis 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:(4hrs)

Cornea & Sclera -- (a) Layers & peculiarities; (b). Blood supply & nerve supply of cornea;(c) Corneal Transparency, Anterior, posterior & middle apertures; Episclera. Sclera proper. Lamina fusca. Blood supply of the scler; 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:(7hrs)

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;

MODULE-5:(6hrs)

Anterior & Vitreous humors (**Aqueous & Vitreous Humor**)- Composition, formation and drainage of aqueous humor , angle of the anterior chamber. Trabecular meshwork. Canal of Schlemm. Schwalbe's line.main masses of vitreous. Base of the vitreous. Hyaloidean vitreous. Vitreous cells.

MODULE-6:(7hrs)

Retina & its vascular supply → (a). Gross anatomy, (b). Microscopic structure of fovea centralize, (c). Blood retinal barrier. (d.) **Anatomy of optic nerve.** (e). Anatomy of optic nerve, (f). optic chaisma , **optic tracts** , (g) Lateral Geneculate body, (h). Optic **radicalism radiations** (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:(6hrs)

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, InduKhurana: 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’sPhysiology of the eye clinical application,10thedition, Mosby, 2002**

Subject Name	Code	Type of course	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.

Course outcome

CO1: To understand the normal functioning of all structures of the eye and their interactions.

CO2: To implement physiological aspects of normal growth and development of the eye.

CO3: To examine the phenomenon of vision.

CO4: evaluating the physiological principles underlying pathogenesis and treatment of diseases of the eye.

MODULE-1 **6 hours**

Cornea: Brief idea about ultra & histological structure of cornea. Corneal transparency & hydration, Regulation of corneal transparency & hydration. Corneal vascularization. Maurice theory & Goldman's theory

Practice: Pupil Examination

MODULE-2 **8 hours**

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.

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 Examination/ Torch Light Examination

MODULE-3 **6 hours**

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 **8 hours**

Protective Mechanism of the eye

Blinking – muscles of lid closer & lid opening (orbicularisocculi, 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 **12 hours**

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 moments

Subject Name	Code	Type of course	T P Pj	Credits
Proficiency in English	CUTM1693	Theory	1+1+0	2

Objective

- To develop vocabulary and grammar knowledge
- To develop reading comprehension skills

Learning outcome

- Development of academic and sub-technical vocabulary
- Enhancement of basic language skills, i.e., listening, speaking, reading and writing
- Development of grammatical competence
- Confidence level improvement

This course aims to build the vocabulary, comprehension, and writing skills for effective communication in English language. It will focus on reading, listening to, and writing passages, as a means of learning communications skills.

MODULE-I

READING SKILLS (7hrs.)

Read one of the following books:

- Animal Farm
- Alice in Wonderland
- Guide
- Malgudi Days
- Harry Potter
- Amar Chitra Katha

Comprehension Skills: Students will respond to comprehension lessons from the chosen book.

MODULE-II

WRITING SKILLS (7hr.)

Students learn grammar and usage by writing passages, and getting formal feedback on these.

MODULE-III

LISTENING SKILLS (6hrs.)

Students respond to questions based on listening to videos, audio, or speaking assignments of classmates.

MODULE-IV

SPEAKING SKILLS (7hrs.) Speaking assignments based on chosen book or contemporary topics.

Subject Name	Code	Type of course	LTP	Credits
PHYSICAL OPTICS	CUTM1784	Theory	2+1+0	3

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.

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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'S 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); Rayleigh's criterion.

Module 6

Scattering; Rayleigh'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: Subrahmanyam N, BrijLal, A textbook 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.

Subject Name	Code	Type of course	LTP	Credits
ENVIRONMENTAL SCIENCE	CUTM1010	Theory	1+0+1	2

Objective

To understand the concept of multi-disciplinary nature of Environmental Science where different aspects are dealt with a holistic approach.

- Students will develop a sense of community responsibility by becoming aware of environmental issues in the larger social context.
- One must be environmentally educated.

Learning outcome

- Understand the natural environment and its relationships with human activities.
 - Characterize and analyse human impacts on the environment.
 - Integrate facts, concepts and methods from multiple disciplines and apply to environmental problems.
 - Design and evaluate strategies, technologies and methods for sustainable management of environmental systems and for the remediation or restoration of degraded environments.

Module-I

Concepts of Ecology & Environment: Definition-Environment, Ecology & Ecosystem; Environmental concepts – Atmosphere, Hydrosphere, Lithosphere & Biosphere, Environmental factors – Abiotic factors (Climate & Edaphic) & Biotic factors, Environmental gradients & limiting factor.

Module-2

Concept of Ecosystem & Processes: Type & Structure, Ecosystem Processes – Energy flow, food chain, food web & ecological pyramids;

Module-3

Biogeochemical cycles – Hydrological cycle (water), gaseous cycle (carbon & oxygen), sedimentary cycle (nitrogen & sulphur).

Module-4

Population ecology & Ecological succession:

Population ecology: Population density, natality, mortality, population age structure, population growth curves & carrying capacity.

Ecological succession: Characteristics, types (Hydrosere & Xerosere) & Process.

Module-5

Environmental Pollution: Water pollution, Noise pollution, Air pollution(source, effect, control measure), Depletion of ozone layer – cause, effect & control measure, Green House Effects & Global warming, Acid rain, Biological concentration and bio magnifications, Sewage & sewage treatment.

Module-6

Conservation of natural resources: Natural resources – renewable, non-renewable, abstract resources,

Module-7

Biodiversity & its conservation, wild life conservation, pollution control board, Environmental awareness & mass education.

Text Books:

1. Text book of Environmental studies by A.K.Panigrahy&A.Sahu, SadagranthaMandir Publishing, and Berhampur.

Reference Books:

1. Fundamentals of Ecology by E.P.Odum
2. Environmental Engineering by G.Kiely

3. Fundamentals of Environmental studies by N.K.Tripathy
4. Environmental Biology by P.D.Sharma
5. Ecology & Environment by P.D.Sharma

Principles of Environmental Engineering & Science by Davis & Masten

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

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 Edition, Book by William Benjamin.

Subject Name	Code	Type of course	LTP	Credits
LAW & OPTOMETRY	CUTM1734	Theory	3+1+0	4

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

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

Compensation

2. Care of the terminally ill- Euthanasia

3. Organ transplantation

Malpractice litigation involving various specialties 2. Prevention of medical negligence 3. Supreme court of India guidelines on medical negligence 4. The therapeutic misadventure 5. Vicarious liability

Module 6

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

1. Telemedicine and electronic consultations

1. Products liability 2. medical indemnity insurance 3. Medical records 4. Consent in medical practice

Module 7

1. Role of government, community/ social organizations

2. New legal development in optometry

1. Euthanasia 2. Deaths due to medical care 3. Malingering

References:

1. Reflections on Medical law and Ethics in India by B. Sandeepabhat, published by Eastern law house.

2. The role of optometrists in India: An integral part of an eye health team

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

References:

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

SEMESTER III

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 in detail.

Reflections at plane and spherical surfaces and refractions at plane, spherical, cylindrical and toric surfaces will be studied in this course.

Attention will be given to the system of surfaces and/or lenses and their imaging properties. The effect of aperture stops on the quality of images, such as blur and aberrations, depth of field and depth of focus, will also be studied.

Course Outcomes

CO1: To understand the knowledge of mirrors and lenses.

CO2: To implement properties of the images formed on the retina by the optics of the eye.

CO3: To evaluate different types of lenses and frames.

CO4: To develop different types of lenses

Module-IV (4 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 (7 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 (6hrs)

Refractive anomalies and their causes;

Etiology of refractive anomalies;

Contributing variability and their ranges;

Populating distributions of anomalies;

Optical component measurement;

Growth of the eye in relation to refractive errors;

Module-VII (6 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

Optics and Refraction A User-friendly guide David Miller 1991 Gower Medical Publishing

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

Objective

This course deals with understanding the theory behind spectacles lenses and frame & their materials, types, advantages and disadvantages, calculations involved.

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

Learning outcome

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

Module-I (6 hrs)

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

Lens Equation & Mirror equation

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 prisms.

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, decentration 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 Lenses

Effect of aberrations with respect to vision.

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

Subject Name	Code	Type of course	LTP	Credits
OCULAR DISEASE I	CUTM1788	Theory +Practice	3+1+0	4

Objective

- Understands ocular diseases affecting various parts of the eyes.
- 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 disease
6. Diagnostic approach and
7. Management of the ocular diseases.

Module-I (9 Hours)

Orbit: Applied Anatomy, Proptosis (Classification, Causes, Investigations); Enophthalmos, Developmental Anomalies Craniosynostosis/craniofacial Dysostosis; Hypertelorism, Median facial cleft syndrome); Orbital Inflammations (Preseptal cellulites); Orbital cellulitis Orbital Periostitis, cavernous sinus, Thrombosis); Grave's Ophthalmopathy, Orbital tumors (Dermoids, capillary haemangioma, 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),Oedema of the eyelids;(Inflammatory, Solid, Passive edema), Inflammatory disorders(Blepharitis,ExternalHordeolum,Chalazion,Internalhordeolum, MolluscumContagiosum),Anomalies in theposition of the lashes and Lid Margin(Trichiasis, Ectropion; Entropion; Symblepharon; Blepharophimosis;Lagophthalmos; Blepharospasm; Ptosis). Tumors; (Papillomas ,Xanthelasma, Haemangioma, Basal carcinoma, Squamous cell carcinoma, sebaceous gland melanoma);

Practice :

- Slitlamp examination of adnexa

Module-III (8 hours)

Lacrimal System: Applied Anatomy; TearFilm; 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 condition;s(Pinguecula, Pterygium, Concretions);Symptomatic conditions(Hyperaemia, 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:

- Slitlamp examination of cornea.

Module-V (9 hours)

Etiological classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic, Degenerations (classifications, Arcussenilis, 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 guttata, Fuch's epithelial endothelial dystrophy, Congenital hereditary endothelial dystrophy) ,

Module-VI (8 hours)

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

Module-VII (9 hours)

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

Panophthalmitis, 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)
 JACK J. KANSKI: Clinical Ophthalmology, 2003, Butterworths.

Subject Name	Code	Type of course	T P Pj	Credits
OCULAR MICROBIOLOGY AND PATHOLOGY	CUTM178 9	Theory	3+1+0	4

Description

- This course covers the basic biological, biochemical and pathogenic characteristics of pathogenic organisms.

Course Outcomes

CO1: To understand the insights of general microbiology and pathology.

CO2: To apply the knowledge in identification of pathogenic diseases of eye

CO3: To examine conditions associated with ocular infections

CO4: To be able to evaluate systemic diseases of retina.

Module-1

8 hours

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.

Practice: Microscope and Handling techniques

Module-2

6 hours

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

Module-3 **8 hours**

Ocular Bacteriology-Gram positive,(Staphylococcus aureus, Staphylococcus epidermidis, Streptococcus, propionic bacterium, actinomyces,Nocardia) Bacteria including acid fast bacilli, Mycobacterium tuberculosis, Mycobacterium Leprae)

Practice: Gram staining procedures

Module-4 **6 hours**

Ocular Bacteriology - Gram negative Bacteria (pseudomonas, haemophilus, Brucella, Neisseria, Moraxella)

Morphology and ocular pathology caused.

Module-5 **6 hours**

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

Practice: Slit-lamp Examination

Module-6 **10 hours**

Spirochetes (Treponema, Leptospiraceae),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 **2 hours**

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.,3rdEdn.,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 InfectiousDiseases 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.

ROMINIC AND SOOD : CLINICAL PATHOLOGY, Medical Laboratory Technicalmanual

Subject Name	Code	Type of course	T+P+Pj	Credits
CLINICAL EXAMINATION OF VISUAL SYSTEM	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

MODULE-I: History taking

MODULE-II: External examination - HBT; Facial symmetry; and Head position;

MODULE -III: Pupil examination- Swinging flashlight test & RAPD grading ; Stereopsis testing -Titmus fly test;

MODULE IV: Ocular adnexa & anterior segment;- slit lamp examination;

MODULE V: Tear film tests- Schirmer's I & II; TBUT; NIBUT; ROPLAS; FDDT; TMH;

MODULE VI: Macular tests- Amsler grid; Photostress test;

MODULE VII: 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

SEMESTER IV

Subject Name	Code	Type of course	LTP	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.

Course outcome

CO1: To understand the advanced knowledge of mirrors and lenses.

CO2: To implement properties of the images formed on the retina by the optics of the eye.

CO3: To evaluate different types of lenses and frames.

CO4: To develop different types of lenses

Module-I(6 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 (6 hours)

Accommodation, Presbyopia;

Hypermetropia and accommodation; Accommodation related to hyperopia & Presbyopia;

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 (7 hrs)

Convergence types, measurement and anomalies;

Relationship between accommodation & convergence, AC/A ratio.

Module-4 (4hrs)

Objective Refraction: Static & Dynamic; **History of Retinoscopy**

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 (7 hrs) 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(6 hrs)

Anisometropia, Aniseikonia, Amblyopia, Aphakia and Pseudophakia;

Night myopia 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

Subject Name	Code	Type of course	LTP	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 construction, 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

Learning outcome

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
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 with contemporary eye frames, lens materials and its associated characteristics

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;

Cutting, Grinding, polishing

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, sleeves, 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

Absorbive lenses

Frame availability in Indian market, Visit to lens manufacturing workshops

Recent advancement in optical dispensing

Practice: Facial measurements

Text Books:

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

Reference Books:

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, 3rd edition, Butterworth - Heinemann, 2007
4. Michael P Keating: Geometric, Physical& Visual Optics, 2nd edition, Butterworth – Heinemann, 2002

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

Objective

- This course deals with various ocular diseases affecting various parts of the eyes.
- 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)

Practice :

- Understanding the normal fundus and the anatomical measurements of its constituents using various fundus images;
- Understanding the retinal pathology using fundus signs.

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.

Practice

- Understanding ocular foreign body

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-spherophakia.

Practice:

- Understanding the crystalline lens layers through slit lamp techniques
- Grading of lens

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;

Practice

- Pupillary defects

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;

Practice

- Irido Corneal Angle structures visualization/demonstration.

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. Barie Ophthalmology : RenuJogi (1999)

MILLER S J H : Parson's Diseases ofthe Eye, 18th Ed., Churchill Livingstone, 2003.

Subject Name	Code	Type of course	L+T+P	Credits
CONTACT LENS I	CUTM1793	Theory	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, Ionicity, 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 finalising 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

Recent advancements on the Soft contact lens

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
Anthony J. Phillips: Contact Lenses, 5th edition, Butterworth-Heinemann, 2006

Subject Name	Code	Type of course	L+T+P	Credits
MEDICAL PSYCHOLOGY	CUTM1807	Theory+Project	3+0+1	4

Module-1

1. Introduction to Psychology, Intelligence Learning, Memory, Personality, Motivation

Module-2

1. Emotions and feelings, Motivation-Human motivation

Module-3

1. Body Integrity-one's body image, Normality and Abnormality-Major and Minor Psychiatric entities

Module-4

1. The patient in his Milieu-Socio economic aspects, The self-concept of the therapist, Therapist-patient relationship some guidelines

Module-5

1. Illness, its impact on the patient

SEMESTER - V

Subject Name	Code	Type of course	LTP	Credits
CONTACT LENS II	CUTM1795	Theory	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)
- Comparison of RGP vs SCL
- 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
- Disposable lenses, their availability and advantages

Practice :

- Writing contact lens prescriptions.
- Bifocal contact lens fitting

Module 4

- Soft toric CL
- Stabilization techniques, parameter selection
- Fitting assessment

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
- Recent advancement in RGP contact Lenses

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, 5th edition, Butterworth-Heinemann, 2006

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.

Course outcome

CO1: To understand the concepts of grades of Binocular vision and Fundamental theories of binocular vision.

CO2: To apply knowledge in binocular muscle coordination and integration of motor and sensory system into binocular vision.

CO3: To identify non strabismic anomalies related to accommodation

CO4: To evaluate different types of strabismic anomalies - horizontal, vertical, torsional, paralytic & mechanical restrictive.

Contents of module

MODULE-I : (6 hours)

Space perception, Cyclopean 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:(6 hrs)

Horofter & 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:(4 hrs)

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:(7 hrs)

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:(6 hrs)

Influence of binocular optical defects- visual acuity, anisometropia, anisokenia, geometric optical effects of spectacles
Practice: Bruckner test

MODULE-VI:(7 hrs)

Binocular muscular co-ordination - orthophoria
Uniocular & Binocular movements – Fixation & its field, saccadic & pursuits, Version & Vergence
Practice: Saccades and pursuit test

MODULE-VII:(6 hrs)

Amblyopia :Classification ,Aetiology, Investigation, Management
Nystagmus: Classification ,Aetiology, 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

Subject Name	Code	Type of course	LTP	Credits
LOW VISION AND REHABILITATION	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)

5. Types of low vision aids – Optics & Characteristics of Low vision aids;
6. Magnification;
7. Galilean telescope Vs Keplarian Telescopes;
8. Spectacle magnifiers;
9. Hand Magnifiers;
10. Stand Magnifiers;
11. CCTV;
12. Biopic telescopes;
13. Accessory low vision aids;

Practice :

- Application, trial & selection of devices: Optical devices;
- Application, trial & selection of devices: Non - optical devices;

Module 4: (9 hours)

1. Selection of Low vision aids for distance, intermediate & near;
2. Guidelines & training to use various aids;

Module 5: (8 hours)

1. Choices of tests & Aids in various pathological conditions;
2. Conditions cause overall blurring of the visual field;
3. Conditions cause central field defects;
4. Conditions cause peripheral field defects;

Module 6: (8 hours)

1. Light, glare & Contrast in Low vision care & Rehabilitation;
2. Children with low vision;

Practice :

- Pediatric and Geriatric low vision

Module 7:

1. Genetics;
2. Rehabilitation of visually handicapped

Case discussions

3. Recent advances in low vision managements

Practice :

- Common conditions that lead to low vision and their special investigations
- Rehabilitation methods
- 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

A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinnemann, 2007

Subject Name	Code	Type of course	LTP	Credits
BASIC & OCULAR PHARMACOLOGY	CUTM17 98	Theory	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.

Course outcomes :

CO 1: To understand the basic principle of pharmacokinetics & Pharmacodynamics.

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

CO3: To relate pharmacology in treatment of many ocular diseases.

CO4: To create awareness about the usage of ocular drugs

Evaluation System

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;
Recent advanced methods of route of administration of drug in ophthalmology

Module-5 (6hrs)

Ocular Drugs and the Autonomic Nervous system; Parasympathetic(anti muscarinic); 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:

Pharmacokinetics of Drugs

Pharmacodynamics of Drugs

Drug receptor interactions

Different types of delivery methods of ocular medications

ocular drugs and its effects on parasympathetic nervous system

ocular drugs and its effects on sympathetic nervous system

Drugs used for IOP

Adverse effects of Ocular drugs on Human body

Novel drugs in recent times for higher impact on the recovery of the ocular pathology

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) BUTTERWORTH AND HEINMANN - Clinical Ocular Pharmacology 5th Edition.

Reference Book:

- 1) Zimmerman: Text Book of Ocular Pharmacology,1999
- 2) Bartlett and Jaanus: Clinical Ocular Pharmacology

S P RANG , M M DALE, RITTER – Pharmacology, Ed.3 Churchill 1995.

SEMESTER VI

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

Course Outcome

- CO 1: To identify non strabismic anomalies related to accommodation & convergence
- CO 2: To differentiate different types of strabismic anomalies - horizontal, vertical, torsional, paralytical & mechanical restrictive
- CO 3: To evaluate necessary investigations & its interpretation
- CO 4: To provide the appropriate management of the anomalies

Contents of module

Module I (6 hrs)

Neuro-muscular anomalies- Classification and etiological factors;

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 - Donders' and Listing's law, Sherrington's law, Hering's law;

Factors affecting Heterophoria & Heterotropia ;

Module II (6 hours)

Horizontal strabismus ;

Esotropia - classification, investigations, diagnosis, management & treatment ;

Exotropia - classification, investigations, diagnosis, management & treatment ;

A - V phenomenon, Microtropia ;

Practice: 4 prism base out test; Krinsky test; modified krinsky ;

Module III (4 hrs)

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

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

Practice: Maddox wing; Maddox rod; Double Maddox rod ;

Module IV (7 hrs)

Paralytic Strabismus - Acquired and Congenital ;

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

Practice: Bielschowsky park 3 step test ;

Module V (6 hrs)

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

Module VI (7 hrs)

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 (6 hrs)

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

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: Albinism, 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,congenital catarac;

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
Cyclo plegic refraction & Post mydriatic tests

MODULE-4

Measurement of the refractive system;

Spectacle Dispensing in Pediatric Population

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.
- Recent advancements in the spectacle dispensing in geriatric Population

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 Ophthalmology,
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

Subject Name	Code	Type of course	LTP	Credits
SYSTEMIC DISEASES AND EYE	CUTM1801	Theory	3+1+0	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

Course Outcome

- CO 1- To define common systemic conditions: diagnostic approach, complications and management options**
- CO 2- To identify ocular findings of the systemic conditions**
- CO 3- To demonstrate First Aid knowledge in different health conditions**
- CO 4- To examine different eye diseases related to systemic conditions.**

MODULE-1: (8 hrs)

Hypertension - Definition; 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 -

Hypertension & Hypertensive retinopathy
Diabetes & Diabetic retinopathy
Grave's Ophthalmopathy
Ocular Manifestations of viral infections
Ocular Manifestations of bacterial infections
Ocular Manifestations of parasitic infections
Ocular manifestations of nutritional deficiencies.

Text books:

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

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; Color – 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

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

Course Outcome :

CO1-To understand Community based eye care in India.

CO2- To solve various eye diseases

CO 3- To organize health education programmes in the community

CO 4- To design communication materials on eye and vision care for the benefit of

MODULE-1 (4 lectures)

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

Module II (4 lectures)

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

Module III (4 lectures)

Eye in primary health care;
Contrasting between Clinical and community health programs.

Module IV (4 lectures)

Community Eye Care Programs;
Community based rehabilitation programs.

Module V (6 lectures)

Nutritional Blindness with reference to Vitamin A deficiency;
Vision 2020: The Right to Sight;
Screening for eye diseases.

Module VI (8 lectures)

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 (8 lectures)

Evaluation and assessment of health programs;
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

Subject Name	Code	Type of course	LTP	Credits
OPTOMETRIC INSTRUMENTS	CUTM180 3	Theory+Practise	3+2+0	5

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 advanced instruments

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

Autokeratorefractometers;

Abberometer

Module -1: 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, Octopus;

Pachymetry

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;

Interferometry

Tear film lipid Mammography

Module -6: Cataract diagnostics

A –Scan;

Potential Acuity Meter;

Brightness acuity test.

Module 7: Neuro imaging

Basics of CT scan;

Basics of MRI scan.

7TH AND 8TH SEMESTER (4TH YEAR)

Subject Name	Code	Type of course	T+P+Pj	Credits
Project	CUTM1809	-	0+0+16	16

Subject Name	Code	Type of course	T+P+Pj	Credits
Internship	CUTM1810	-	0+16+0	16

Internship: -

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