STATE BOARD OF ALLIED MEDICAL SCIENCES ODISHA

Syllabus for Bachelor of Optometry(BO)

Learning Objectives: At the completion of this course, the student should -

1. Be able to develop skills to provide comprehensive eye examination
    a. To acquire knowledge on ocular structures, its functions and pathological changes
    b. To carryout ophthalmic investigations
    c. To impart knowledge with regard to common eye diseases
    d. To impart knowledge on treatment modalities from the perspective of counseling
    e. To acquire knowledge about the referral guidelines for ocular and systemic conditions
2. Be able to correct refractive error and provide spectacle prescription
3. Be able to fit, evaluate, prescribe and dispense contact lenses for refractive correction and other ocular conditions
4. Be able to assess the low vision and provide comprehensive low vision care
5. Be able to have adequate knowledge to develop skill in manufacturing of spectacle lenses, contact lenses and low vision devices.
6. Be able to do complete binocular vision assessment, manage non-strabismic binocular vision anomalies and refer condition which warrants surgery
7. Be able to assess the visual demands for various occupations and match it to the visual capabilities. Also be able to advice on eye safety wear for various occupations.
8. Have knowledge and skill for early detection of various ocular conditions and pathologies – Refractive error, Strabismus, Cataract, Diabetic retinopathy, Glaucoma etc.
9. Have knowledge regarding organizations of eye banks and preservation of ocular tissues.
10. Have knowledge on sensory substitution and other rehabilitation measures for totally visually challenged.
11. Have knowledge of counseling on visual/ocular hygiene, nutritional and environmental modifications

Expectation from the future graduates in the providing patient care.

1. Optometrist will work independently or in conjunction with other eye/health care professionals.
2. The optometrist will be knowledgeable, skilful and analytical in diagnosis, treatment planning, management of visual defects & impairments and in co-managements of ocular conditions.
3. The optometrist can work in hospitals (both private and public sectors), optical outlets and/or work as independent practitioner
4. The course will lead to a basic degree in optometry, which is considered as the minimum essential for statutory registration of optometrists in countries where optometry has been brought under legislation.
5. Undertake public health optometry projects and vision screening eye camps in schools, colleges, urban slums, rural areas and also practice occupational optometry in industries.
6. Public education on ocular hygiene and related nutritional and environmental counseling.
7. Offer a helping hand and or efficiently manage and successfully run any ophthalmic clinic, optometry department in hospitals, optical shops, and offer product expertise in ophthalmic industry & trade.

Plan of Classes & Examination Pattern for Degree course

- Total duration of each course is 4years (6 Semesters+ Research Project+Internship).
- Each semester is of 6months duration.
- In each semester the classes will be of 5months duration & internal assessment will be conducted in the last month of each semester except 3rd & 6th semester .
- University examination will be conducted at the end of 3rd & 6th Semester.
- In each semester, the classes will be of 500 hours including theory and practical/clinical.
- **Distribution of classes**: There will be 5 hours of classes / day for 5 days in a week, 25 hours / week, 100 hours /month and 500 hours in each semester.
- Of the 500 hours of classes, 200 hours will be dedicated for the theory classes; rest 300 hours will be practical / clinical.
- **Attendance in Class:** A Student will be eligible to appear in the semester and university examination if he/she has attended minimum75% theory classes and 85% practical classes.

EXAMINATION PATTERN

- **Internal assessment:** Internal assessment will be conducted in the last month of each semester except 3rd & 6th semester(where there will be University examination.)
- **Mark Distribution:** 50 marks per each subject (30 Theory and 20 practical/clinical).Minimum qualifying mark: 50 % in each theory and practical/clinical.
- **Question Pattern for Theory (Semester Examination):**
  i. Short questions of 2 marks each X 5 = 10
  ii. Multiple choice question1 mark each X 5 = 5
  iii. Fill in the blanks 1mark each X 5 = 5
  iv. Match the following 1 mark each X 5 = 5
  v. Long Question (Choice) 1 X 5 = 5
- **University Examination:** Candidate has to pass two university examinations to be conducted at the end of 3rd Semester & 6th Semester, of 100 marks/ subject. A student will be eligible to appear in the university examination if he/she has secured 50% in internal assessment done at the end of 1st, 2nd, 4th & 5th semester.

Degree:

On successful completion of four years course including submission of Research Project & completion of Internship , the candidate will be awarded with **"Bachelor of Optometry(BO)"** .

Curriculum Outline Bachelor of Optometry(BO)

FIRST YEAR		
Sl. No.	**Subject**	**Subject type (The+Prac+Cinical)**
1.	Foundation Course	
2.	General Anatomy	
3.	GeneralPhysiology	
4.	General Biochemistry	
5.	Geometrical Optics I &II	
6.	Nutrition	
7.	Ocular Anatomy	
8.	Ocular Physiology	
9.	Ocular Biochemistry	
10	Physical Optics	
11	Basics of Computers	
SECOND YEAR		
1.	Ocular Microbiology	
2.	Visual optics	
3.	Optometric optics I &II and Dispensing Optics	
4.	Clinical Optometry I&II	
5.	Ocular Diseases and Glaucoma	
6.	Clinical examination of visual system	
7.	Pathology	
8.	Basic and Ocular Pharmacology	
9.	Optometric Instruments	
THIRD YEAR		
1	Contact lens –I &II	
2	Geriatric Optometry &Pediatric Optometry	
3	Low Vision care	
4	Binocular Vision- I&II	
5	Systemic Disease	
6	Clinical Optometry III,IV& V	
7	Public Health & Community Optometry	
8	Occupational optometry	
FINAL YEAR		
RESEARCH PROJECT		**3 MONTHS**
INTERNSHIP		**9 MONTHS**

FOUNDATION COURSE

Introduction to Health care Delivery System in India	Basic computers and information Science	Communication and soft skills	Introduction to Quality and Patient safety (including Basic emergency care and life support skills, Infection prevention and control,	Medical Terminology and Record keeping (including anatomical terms)
Biomedical waste management	Disaster management and Antibiotic resistance)	Professionalism and values	Biostatistics & introduction to Research methodology	Medical Law and Ethics

GENERAL ANATOMY

COURSE 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.

OBJECTIVES: 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 humanbody.
2. Identify the microscopic structures of various tissues, and organs in the human body and correlate the structure with thefunctions.
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.

Sl No	List of Topics
1	**Introduction to Human Anatomy:** Anatomy: Definition and its relevance in medicine and optometry Planes of the body, relationship of structures, organ system
2	**Skeleton System**
3	**Tissues of the Body**: Epithelium,connectivetissue,boneandcartilage,Embryology,histology,different types of each of them, types of cells, cellular differentiation and arrangementsin different tissues
4	**Muscles:** Different types of muscles, their functional differentiation, their relationship with different structures, their neural supply
5	**Blood vessels**: Differentiation between arteries and veins, embryology, histology of both arteries and veins, Functional differences between the two,anatomical differences atdifferent locations
6	**Skin and appendages**: Embryology, anatomical differences in different areas, functional and protective variations, innervations, relationship with muscles and nerves
7	**Lymphatic system:** Embryology, functions, relationship with blood vessels and organs
8	**Glands:** Embryology, different types of glands (exocrine and endocrine), functional differences, neural control of glands
9	**Nervous system:** Parts of Nervous system, cell types of nervous system, Blood-brain barrier, Reflex arc, Peripheral Nerves, Spinal nerves, Nerve fibers, Autonomic Nervous system
10	**Brain and Cranial nerves:** Major parts of Brain, Protective coverings of the Brain, Cerebrospinal Fluid, Brain stem, Cerebellum, Diencephalon, Cerebrum, Cranial nerves

GENERAL PHYSIOLOGY

COURSE 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.

OBJECTIVES: 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.

Syllabus for physiology

Sl.No	Topic
1.	**SCOPE OF PHYSIOLOGY**. Definition of various terms used in physiology. Structure of cell, function of its components with special reference to mitochondria and microsomes. Elementary tissues: Elementary tissues of the body, i.e. epithelial tissue, muscular tissue, connective tissue and nervous tissue.
2.	**CARDIOVASCULAR SYSTEM**: Composition of the blood, functions of blood elements. Blood group and coagulation of blood. Brief information regarding disorders of the blood. Heart: myocardium–innervations– transmission of cardiac impulse- Events during the cardiac cycle–cardiac output. Structure and functions of various parts of the heart.
3.	**CIRCULATION**: General principles, Peripheral circulation: peripheral resistances–arterial blood pressure–measurements–factors, Regulation variations–capillary circulation–venous circulation. Special circulation: coronary cerebral–miscellaneous, Arterial and venous system with special reference to the names and positions of main arteries and veins. Brief information about cardiovascular disorders.
4.	**DIGESTION**: General arrangement, Salivary digestion–functions & regulations Gastric digestion –functions & regulations Pancreatic digestion –functions & regulations Intestinal digestion –functions & regulations Liver & bile, Absorption Motility Deglutition Vomiting Defecation Functions of large intestine Neuro humoral regulations of alimentary functions,
5.	**EXCRETION**: Body fluids –distribution, measurement & exchange, Kidney –structure of nephron–mechanism of urine formation –composition of the urine and abnormal constituents –urinary bladder & micturition
6.	**ENDOCRINES**: Hormone mechanism –negative feed backs –tropic action permissive action – cellular action, hypothalamic regulation, Thyroid hormones, actions, regulations Adrenal cortex - hormones, actions, regulations. Adrenal medulla –hormones, actions, regulations Parathyroid hormones, action, regulations Islets of pancreas –hormones, actions, regulations, Miscellaneous hormones, actions, regulations Common clinical disorders
7.	**REPRODUCTION**: Male reproductive system –control & regulation Female reproductive system –uterus –ovaries –menstrual cycle –regulation – pregnancy & delivery –breast –family planning
8.	**RESPIRATION:** Mechanics of respiration –pulmonary function tests –transport of respiratory gases- neural and chemical regulation of respiration –hypoxia, cyanosis, dyspnoea– asphyxia.
9.	**ENVIRONMENTAL PHYSIOLOGY** Body temperature regulation (including skin Physiology). Exposure to low and high atmospheric pressure

PRACTICALS

1. **Blood test:** Microscope, Haemocytometer, Blood, RBC count, Hb, WBC count, Differential Count, Haematocrit demonstration, ESR, Blood group & Rh. type, Bleeding time and clotting time
2. **Digestion**: Test salivary digestions
3. **Excretion**: Examination of Urine, Specific gravity, Albumin, Sugar, Microscopic examination for cells and cysts
4. **Endocrinology and Reproduction**: Dry experiments in the form of cases showing different endocrine disorders.
5. **Respiratory System**: Clinical examination of respiratory system, Spirometry, Breath holding test
6. **Cardio Vascular System**: Clinical examination of circulatory system, Measurement of blood pressure and pulse rate, Effect of exercise on blood pressure and pulse rate
7. **Central Nervous System**: Sensory system, Motor system, Cranial system, Superficial and deep reflexes

GENERAL BIOCHEMISTRY

COURSE DESCRIPTION: This course will be taught in two consecutive semesters. 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.

OBJECTIVES: 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.

Sl. No	Topics to be covered
1	**Carbohydrates:** Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function)
2	**Proteins:** Amino acids, peptides, and proteins (general properties & tests with a few examples like glycine, trytophan, glutathione, albumin, hemoglobin, collagen)
3	**Lipids:** Fatty acids, saturated and unsaturated, cholesterol and Triacyglycerol, phospholipids and plasma membrane
4	**Vitamins:** General with emphasis on A,B2, C, E and inositol (requirements, assimilation and properties)
5	**Minerals:** Na, K, Ca, P, Fe, Cu and Se.(requirements, availability and properties)

PRACTICAL

1. **Reactions of monosaccharides, disaccharides and starch:**
   Glucose,Fructose,Galactose, Maltose, lactose,Sucrose,Starch
2. **Analysis of Unknown Sugars Estimation :**

Photometry	Biofluid of choice – blood, plasma, serum	
Standard graphs	Glucose	
Proteins	Urea	Creatinine Bilirubin

GEOMETRICAL OPTICS-I

COURSE 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

OBJECTIVES: 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.

Sl. No	**Topics to be covered**
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.
2.	Wave fronts–spherical, elliptical and plane; Curvature and vergence; rays; convergence and divergence in terms of rays and vergence; vergence at a distance
3.	Refractive index; its dependence on wavelength
4.	Fermat's and Huygen's Principle –Derivation of laws of reflection and refraction (Snell's law) from these principles
5.	Plane mirrors –height of the mirror; rotation of the mirror
6.	Reflection by a spherical mirror –paraxial approximation; sign convention; derivation of vergence equation
7.	Imaging by concave mirror, convex mirror
8.	Reflectivity; transmissivity; Snell's Law, Refraction at a plane surface
9.	Glass slab; displacement without deviation; displacement without dispersion
10.	Thick prisms; angle of prism; deviation produced by a prism; refractive index of the prism
11.	Prisms; angular dispersion; dispersive power; Abbe's number.
12.	Definition of crown and flint glasses; materials of high refractive index
13.	Thin prism –definition; definition of Prism diopter; deviation produced by a thin prism; it dependence on refractive index
14.	Refraction by a spherical surface; sign convention; introduction to spherical aberration using image formed by a spherical surface of a distance object; sag formula
15.	Paraxial approximation; derivation of vergence equation
16.	Imaging by a positive powered surface and negative powered surface
17.	Vergence at a distance formula; effectivity of a refracting surface

18.	Definition of a lens as a combination of two surfaces; different types of lens shapes.
19.	Image formation by a lens by application of vergence at a distance formula; definitions of front and back vertex powers; equivalent power; first and second principal planes/points; primary and secondary focal planes/points; primary and secondary focal lengths
20.	Newton's formula; linear magnification; angular magnification
21.	Nodal Planes
22.	Thin lens as a special case of thick lens; review of sign convention
23.	Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions
24.	Imaging by a thin concave lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions
25.	Prentice's Rule
26.	System of two thin lenses; review of front and back vertex powers and equivalent power, review of six cardinal points.
27.	System of more than two thin lenses; calculation of equivalent power using magnification formula

PRACTICAL

1. **Thick Prism** – determination of prism angle and dispersive power; calculation of the refractive index
2. **Thin Prism** – measurement of deviation; calculation of the prism diopter
3. Image formation by spherical mirrors
4. **Convex lens** - power determination using lens gauge, power determination using distant object method; power determination using the vergence formula
5. **Concave lens** – in combination with a convex lens – power determination.

OCULAR ANATOMY

COURSE DESCRIPTION: This course deals with detailed anatomy of the orbit, eyeball and cranial nerves associated with ocular functions.

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

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa.
2. Identify the microscopic structures of various tissues in the eye and correlate the structure with the functions.
3. Comprehend 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.
4. To understand the basic principles of ocular embryology.

COURSE PLAN

1. **Central nervous system:**
   Spinal cord and brainstem, Cerebellum,Cerebrum.
2. **Orbit**
   Eye, Sclera, Cornea, Choroid, Ciliary body, Iris, Retina,
3. **Refractory media-**
   Aqueous humor, Anterior chamber, Posterior chamber, Lens,Vitreous body.
4. **Eyelids**

5. **Conjunctiva**
6. **Embryology**

PRACTICAL

1. **Eye:** Practical dissection of bull's eye
2. **Orbit:** Practical demonstration of orbital structures.

OCULAR PHYSIOLOGY

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

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

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

COURSE PLAN:

1. Protective mechanisms in the eye: Eye lids and lacrimation, description of the globe
2. Extrinsic eye muscles, their actions and control of their movements
3. Coats of the eyeball
4. Cornea
5. Aqueous humor and vitreous: Intra ocular pressure
6. Iris and pupil
7. Crystalline lens and accommodation –Presbyopia
8. Retina – structure and functions
9. Vision – general aspects of sensation
10. Pigments of the eye and photochemistry
11. The visual stimulus, refractive errors
12. Visual acuity, Vernier acuity and principle of measurement
13. Visual perception – Binocular vision, stereoscopic vision, optical illusions
14. Visual pathway, central and cerebral connections
15. Color vision and color defects. Theories and diagnostic tests
16. Introduction to electrophysiology
17. Scotopic and Photopic vision
18. Color vision, Color mixing
19. Mechanism of accommodation
20. Retinal sensitivity and Visibility
21. Receptive stimulation and flicker
22. Ocular, movements and saccades
23. Visual perception and adaptation
24. Introduction to visual psychology(Psychophysics)

PRACTICAL:

1. Lid movements
2. Tests for lacrimation tests
3. Extra ocular movements
4. Break uptime

5. Pupillary reflexes
6. Applanation Tonometry
7. Schiotz Tonometry.
8. Measurement of accommodation and convergence
9. Visual acuity measurement.
10. Direct ophthalmoscopy
11. Indirect ophthalmoscopy
12. Retinoscopy
13. Light and dark adaptation.
14. Binocular vision(Stereopsis)

OCULAR BIOCHEMISTRY

COURSE DESCRIPTION: This course is being taught in two consecutive semesters. Ocular Biochemistry deals with the metabolism that takes place in the human body. It also deals with ocular biochemistry in detail. Clinical estimation as well as the clinical significance of biochemical values is also taught.

OBJECTIVES: 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 the normal
2. Integration of 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
4. Understand metabolic processes taking place in different ocular structures.

COURSE PLAN:

1. Hormones basic concepts in metabolic regulation with examples say insulin.
2. Metabolism: General whole body metabolism(carbohydrates, proteins, lipids)
3. Ocular Biochemistry: Various aspects of the eye, viz., cornea, lens aqueous, vitreous, retina and pigment rhodopsin. (The important chemicals in each and their roles.) Immunology of anterior segment
4. Technique: Colloidal state, sol. Gel. Emulsion, dialysis, electrophoresis. pH buffers mode of action, molar and percentage solutions, photometer, colorimeter and spectrometry. Radio isotopes: application in medicine and basic research.

5. Clinical Biochemistry: Blood sugar, urea, Creatinine and Bilirubin significance of their estimation.

PRACTICAL

1. Quantitative analysis
2. Abnormal constituents in urine, sugar proteins, ketones, blood and bile salts.
3. Techniques of detection of abnormal constituents of urine:
4. Electrophoresis
   - 4.1 Chromatography
   - 4.2 Preparation of normal, molar and percentage solutions.
   - 4.3 Preparation of buffers, pH determination

5. Demonstration
   5.1 Estimation of blood cholesterol
   5.2 Estimation of alkaline phosphatase.
   5.3 Salivary amylase (effect of pH, etc)
   5.4 Milk analysis.

PHYSICAL OPTICS

OBJECTIVES: 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.

COURSE PLAN

Sl. No	Topics to be covered
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.
2.	Sources of light; Electromagnetic Spectrum.
3.	Polarized light; linearly polarized light; and circularly polarized light.
4.	Intensity of polarized light; Malus'Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle.
5.	Birefringence; ordinary and extraordinary rays.
6.	Relationship between amplitude and intensity.
7.	Coherence; interference; constructive interference, destructive interference; fringes ;fringe width
8.	Double slits, multiple slits, gratings.
9.	Diffraction; diffraction by a circular aperture; Airy's disc
10.	Resolution of an instrument (telescope, for example); Raleigh's criterion
11.	Scattering; Raleigh's scattering; Tyndall effect.
12.	Fluorescence and Phosphorescence
13.	Basics of Lasers –coherence; population inversion; spontaneous emission; Einstein's theory of lasers.
14.	Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units
15.	Inverse square law of photometry; Lambert's law.
16.	Other units of light measurement; retinal illumination; Trolands

PRACTICAL:

1. Gratings – determination of grating constant using Sodium vapour lamp; determination of wavelengths of light from Mercury vapour 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

GEOMETRICAL OPTICS II:

COURSE DESCRIPTION: This course will be taught in two consecutive semesters.

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

OBJECTIVES: 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.

COURSE PLAN:

1. Vergence and vergence techniques revised.
2. Gullstrand's schematic eyes, visual acuity, Stile Crawford
3. Emmetropia and ametropia
4. Blur retinal Imaginary
5. Correction of spherical ammetropia, vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptoric power, angular magnification of spectacles in aphakic
6. Thin lens model of the eye –angular magnification –spectacle and relative spectacle magnification.
7. Aperture stops- entrance and exit pupils.
8. Astigmatism. - To calculate the position of the line image in a sphero-cylindricallens.
9. Accommodation –Accommodation formulae and calculations.
10. Presbyopia- Spectacle magnification, angular magnification of spectacle lens, near point, calculation of adds, depth of field.
11. Spatial distribution of optical information- modulation transfer functions- Spatial filtering- applications.
12. Visual optics of aphakia and pseudophakia.

PRACTICAL:

1. Construction of a tabletop telescope – all three types of telescopes.
2. Construction of a table top microscope
3. Imaging by a cylindrical lens – relationship between cylinder axis and image orientation
4. 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
5. 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

OCULAR MICROBIOLOGY

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

OBJECTIVES The objectives of the course are:

1. To prepare the students to gain essential knowledge about the characteristics of bacteria, viruses, fungi and parasites;
2. To acquire knowledge of the principles of sterilization and disinfection in hospital and ophthalmic practice;
3. To understand the pathogenesis of the diseases caused by the organisms in the human body with particular reference to the eye infections and
4. To understand basic principles of diagnostic ocular Microbiology.

COURSE PLAN:

1. Morphology and principles of cultivating bacteria
2. Sterilization and disinfections used in laboratory and hospital practice
3. Common bacterial infections of the eye.
4. Common fungal infections of theeye
5. Common viral infections of theeye.
6. Common parasitic infections of theeye.

VISUAL OPTICS I

OPTOMETRIC OPTICS I

COURSE DESCRIPTION: 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.

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

1. Measurement of lens power , lens centration using conventional techniques
2. Transposition of various types of lenses •Knowledge to identify different forms of lenses (equi- convex, planoconvex, periscopic, etc.)
3. Knowledge to select the tool power for grinding process.
4. Measurement of surface powers using lens measure.
5. Method of laying off the lens for glazing process.
6. Ophthalmic prism knowledge –effects, units, base-apex notation, compounding and resolving prisms.
7. Knowledge of prism and decentration in ophthalmic lenses
8. Knowledge of different types of materials used to make lenses and its characteristics
9. Knowledge lens designs –single vision, bifocals, progressive lens
10. Knowledge on tinted and protective lenses
11. Knowledge on special lenses like iseikonic, spectacle magnifiers.
12. Knowledge on spectacle frames –manufacture, materials

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

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

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

subjective clinical refraction.

A)Review of Geometrical Optics: Vergence and power Conjugacy, object space and image space, Sign convention, kSpherical refracting surface, Spherical mirror; catoptrics power, Cardinal points, Magnification Light and visual, function, Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Bi- refringence, Dichroism,Aberration and application Spherical and, Chromatic, Optics of Ocular Structure ,Cornea and aqueous, Crystalline lens &Vitreous Schematic and reduced eye

1. **Measurements of Optical Constants of the Eye**
   a) Corneal curvature and thickness
   b) Keratometry
   c) Curvature of the lens and ophthalmophakometry
   d) Axial and axis of the eye
   e) Basic Aspects of Vision.
      e1)Visual Acuity
      e2)Light and Dark Adaptation
      e3)Color Vision
      e4)Spatial and Temporal Resolution
      e5)Science of Measuring visual performance and application to Clinical Optometry
2. **Refractive anomalies and their causes**
   2.1 Etiology of refractive anomalies
   2.2 Contributing variability and their ranges
   2.3 Populating distributions of anomalies.
   2.4 Optical component measurements
   2.5 Growth of the eye in relation to refractive errors

OPTOMETRIC INSTRUMENTS

OBJECTIVES: Upon completion of the course, the student should be able to gain theoretical knowledge and basic practical skill in handling the following instruments

1. Visual Acuity chart/drum
2. Retinoscope
3. Trail Box
4. Jackson Cross cylinder
5. Direct ophthalmoscope
6. Slit lamp Biomicroscope
7. Slit lamp Ophthalmoscopy (+90, 78 D)
8. Gonioscope
9. Tonometer: Applanation Tonometer
10. Keratometer
11. Perimeter
12. Electro diagnostic instrument (ERG, VEP,EOG)
13. A –Scan Ultrasound
14. Lensometer

COURSE PLAN

1. **Refractive instruments**

1. Optotypes and MTF, Spatial Frequency Test charts standards. Choice of test charts ,Trial case, lenses Refractor (phoropter), head units, Optical considerations of refractor units
2. Trial frame design
3. Near vision difficulties with units and trial frames
4. Retinoscope – types available
5. Adjustment of Retinoscopes- special features
6. Objective optometers.
7. Infrared optometer devices.
8. Projection charts
9. Illumination of the consulting room.
10. Brightness acuity test
11. Vision analyzer
12. Pupilometer
13. Potential Acuity Meter
14. Abberometer

2. Ophthalmoscopes and related devices
    1. Design of ophthalmoscopes –illumination
    2 .Design of ophthalmoscopes-viewing
    3. Ophthalmoscope disc
    4. Filters for ophthalmoscopy
    5. Indirect ophthalmoscope

3. Lensometer, Lens gauges or clock
4. Slit lamp
5. Tonometer
6. Keratometer and corneal topography
7. Refractometer
8. Orthoptic Instruments (Synaptophore Only)
9. Color Vision Testing Devices
10. Fields of Vision And Screening Devices
11. Scans
12. ERG
13. New Instruments

OCULAR DISEASES I

COURSE DESCRIPTION: 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.

OBJECTIVES: 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.

COURSE PLAN

1. Orbit
    1. Applied Anatomy
    2. Proptosis (Classification, Causes, Investigations)
    3. Enophthalmos
    4. Developmental Anomalies (craniosynostosis, Craniofacial Dysostosis, Hypertelorism, Median facial cleft syndrome)
    5. Orbital Inflammations (Preseptal cellulites, Orbital cellulitis Orbital Periostitis, cavernous sinus Thrombosis)
    6. Grave's Ophthalmopathy
    7. Orbital tumors(Dermoids, capillary haemangioma, Optic nerveglioma)
    8. Orbital blowout fractures
    9. Orbital surgery (Orbitotomy)
    10. Orbital tumors
    11. Orbital trauma
    12. Approach to a patient with proptosis
2. Lids
    a. Applied Anatomy
    b. Congenital anomalies (Ptosis, Coloboma, Epicanthus, Distichiasis, Cryptophthalmos)
    c. Oedema of the eyelids(Inflammatory, Solid, Passive edema)
    d. Inflammatory disorders (Blepharitis, External Hordeolum,Chalazion
        i. ,Internal hordeolum, Molluscum Contagiosum)
    e. Anomalies in the position of the lashes and Lid Margin (Trichiasis, Ectropion, Entropion, Symblepharon, Blepharophimosis, Lagopthalmos, Blepharospasm, Ptosis).
    f. Tumors (Papillomas, Xanthelasma, Haemangioma, Basal carcinoma, Squamous cell carcinoma, sebaceous gland melanoma)
3. Lacrimal System
    1. Applied Anatomy
    2. Tear Film
    3. The Dry Eye (Sjogren's Syndrome)
    4. The watering eye (Etiology, clinical evaluation)
    5. Dacryocystitis
    6. Swelling of the Lacrimal gland(Dacryoadenitis)
4. Conjunctiva
    1. Applied Anatomy
    2. Inflammations of conjunctiva (Infective conjunctivitis – bacterial, chlamydial, viral , Allergic conjunctivitis, Granulomatous conjunctivitis)
    3. Degenerative conditions(Pinguecula, Pterygium,Concretions)
    4. Symptomatic conditions(Hyperemia, Chemosis, Ecchymosis, Xerosis,Discoloration)
    5. Cysts and Tumors
5. Cornea
    a. Applied Anatomy and Physiology

b. Congenital Anomalies (Megalocornea, Microcornea, Cornea plana, Congenital cloudy cornea)
c. Inflammations of the cornea (Topographical classifications: Ulcerative Keratitis and Non ulcerative)
d. Etiological classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic))
e. 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)
f. 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)
g. Keratoconous, Keratoglobus
h. Corneal edema, Corneal opacity, Corneal vascularisation
i. Penetrating Keratoplasty

6. Uveal Tract and Sclera
   a. Applied Anatomy,
   b. Classification of uveitis
   c. Etiology
   d. Pathology
   e. Anterior Uveitis
   f. Posterior Uveitis
   g. Purulent Uveitis
   h. Endopthalmitis
   i. Panophthalmitis
   j. ParsPlanitis
   k. Tumors of Uveal tract(Melanoma)
   l. Episcleritis and scleritis
   m. Clinical examination of Uveitis and Scleritis

CLINICAL EXAMINATION OF THE VISUAL SYSTEM

COURSE DESCRIPTION:

This course covers various clinical optometry procedures involving external examination, anterior segment and posterior segment examination, neuroophthalmic examination, paediatric optometry examination, and Glaucoma evaluation.

OBJECTIVES: At the end of the course the students will be skilled in knowing the purpose, set- up and devices required for the test, indications and contraindications of the test, step-by-step procedures, documentation of the findings, and interpretation of the findings of the various clinical optometry procedures

COURSE PLAN

1. History taking
2. Visual acuity estimation
3. Extra ocular motility, Cover teat, Alternating cover test
4. Hirschberg test, Modified Krimsky
5. Pupils Examination
6. Maddox Rod

7. Van Herrick
8. External examination of the eye, Lid Eversion
9. Schirmer's, TBUT, tear meniscus level, NITBUT(Keratometry),
10. Color Vision
11. Stereopsis
12. Confrontation test
13. Photo stress test
14. Slit lamp Biomicroscope
15. Ophthalmoscopy
16. Tonometry
17. ROPLAS
18. Amsler test
19. Contrast sensitivity function test
20. Saccades and pursuit test

CLINICAL OPTOMETRY (I,II,III,IV)

Students will observe the basic operations of the optometry clinic while interacting with the multidisciplinary team members involved in providing optimal care to patients. The student will be introduced to optical terminology, equipment, and techniques used for treatment.

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a registered optometrist. Students are tested on intermediate clinical optometry skills. The practical aspects of the dispensing optics(hand-on in optical), optometric instruments, clinical examination of visual system(Hands-on under supervision) and ocular diseases (Slides and case discussion) will be given to the students during their clinical training.

Students will improve their skills in clinical procedures, and then progressive interactions with patients and professional personal are monitored as students practice optometry in supervised setting. Additional area includes problem solving and complications of various managements will be inculcated. Students should have exposure to eye bank facilities and must be made aware of eye donation, collection of eyes, preservation, pre and post-operative instructions and latest techniques for preservation of donor cornea. The students will get clinical training on the practical aspects of the following courses namely optometric optic –II & dispensing optics, visual optics – II and ocular disease -II.

The course provides students the opportunity to continue to develop confidence and increased skill in diagnosis and treatment delivery. Students will demonstrate competence in basic, intermediate and advance procedure in those areas. Students will participate in advance and specialized diagnostic and management procedure. Students will get practical experience of the knowledge acquired from geriatric and paediatric optometry courses. Hands-on experience under supervision will be provided in various outreach programmes namely, school vision screening, glaucoma and diabetic retinopathy screening etc., Students also get hand-on practical sessions on the following courses namely, contact lens, low vision care, geriatric optometry and paediatric optometry.

OCULAR MICROBIOLOGY

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

OBJECTIVES The objectives of the course are:

1. To prepare the students to gain essential knowledge about the characteristics of bacteria, viruses, fungi and parasites;
2. To acquire knowledge of the principles of sterilization and disinfection in hospital and ophthalmic practice;
3. To understand the pathogenesis of the diseases caused by the organisms in the human body with particular reference to the eye infections
4. To understand basic principles of diagnostic ocular Microbiology.

COURSE PLAN:

1. Morphology and principles of cultivating bacteria
2. Sterilization and disinfections used in laboratory and hospital practice
3. Common bacterial infections of the eye.
4. Common fungal infections of the eye
5. Common viral infections of the eye.
6. Common parasitic infections of the eye.

VISUAL OPTICS I

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

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

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

COURSE PLAN

1. Review of Geometrical Optics: Vergence and power
   - 1.1 Conjugacy, object space and image space
   - 1.2 Sign convention
   - 1.3 Spherical refracting surface
   - 1.4 Spherical mirror; catoptrics power
   - 1.5 Cardinal points
   - 1.6 Magnification
   - 1.7 Light and visual function
   - 1.8 Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Bi-refringence, Dichroism
   - 1.9 Aberration and application Spherical and Chromatic

   Optics of Ocular Structure

   - 1.10 Cornea and aqueous
   - 1.11 Crystalline lens
   - 1.12 Vitreous

1.13 Schematic and reduced eye

2. **Measurements of Optical Constants of the Eye**
   - 2.1 Corneal curvature and thickness
   - 2.2 Keratometry
   - 2.3 Curvature of the lens and ophthalmophakometry
   - 2.4 Axial and axis of the eye
   - **2.5 Basic Aspects of Vision.**
     - 2.5.1 Visual Acuity
     - 2.5.2 Light and Dark Adaptation
     - 2.5.3 Color Vision
     - 2.5.4 Spatial and Temporal Resolution
     - 2.5.5 Science of Measuring visual performance and application to Clinical Optometry
3. **Refractive anomalies and their causes**
   - 3.1 Etiology of refractive anomalies
   - 3.2 Contributing variability and their ranges
   - 3.3 Populating distributions of anomalies.
   - 3.4 Optical component measurements
   - 3.5 Growth of the eye in relation to refractive errors

OPTOMETRIC OPTICS I

COURSE DESCRIPTION: 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.

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

1. Measurement of lens power , lens centration using conventional techniques
2. Transposition of various types of lenses •Knowledge to identify different forms of lenses (equi-convex, planoconvex, periscopic, etc.)
3. Knowledge to select the tool power for grinding process.
4. Measurement of surface powers using lens measure.
5. Method of laying off the lens for glazing process.
6. Ophthalmic prism knowledge –effects, units, base-apex notation, compounding and resolving prisms.
7. Knowledge of prism and decentration in ophthalmic lenses
8. Knowledge of different types of materials used to make lenses and its characteristics
9. Knowledge lens designs –single vision, bifocals, progressive lens
10. Knowledge on tinted and protective lenses
11. Knowledge on special lenses like iseikonic, spectacle magnifiers.
12. Knowledge on spectacle frames –manufacture, materials

COURSE PLAN

1. **Introduction** –Light, Mirror, Reflection, Refraction and Absorption
2. **Prisms** –Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel's prisms, rotary prisms
3. **Lenses** –Definition, units, terminology used to describe, form of lenses

4. Vertex distance and vertex power, Effectivity calculations
5. Lens shape, size and types i.e. Spherical, cylindrical and Sphero-cylindrical
6. **Transpositions** –Simple, Toric and Spherical equivalent
7. Prismatic effect, centration, decentration and Prentice rule, Prismatic effect of Plano-cylinder and Sphero cylinder lenses
8. Spherometer & Sag formula, Edge thickness calculations
9. Magnification in high plus lenses, Minification in high minus lenses
10. Tilt induced power in spectacles
11. Aberration in Ophthalmic Lenses

OPTOMETRIC INSTRUMENTS

COURSE DESCRIPTION:

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

OBJECTIVES: Upon completion of the course, the student should be able to gain theoretical knowledge and basic practical skill in handling the following instruments

1. Visual Acuity chart/drum
2. Retinoscope
3. Trail Box
4. Jackson Cross cylinder
5. Direct ophthalmoscope
6. Slit lamp Biomicroscope
7. Slit lamp Ophthalmoscopy (+90, 78 D)
8. Gonioscope
9. Tonometer: Applanation Tonometer
10. Keratometer
11. Perimeter
12. Electro diagnostic instrument (ERG, VEP,EOG)
13. A –Scan Ultrasound
14. Lensometer

COURSE PLAN

1. **Refractive instruments**
   - 1.1 Optotypes and MTF, Spatial Frequency
   - 1.2 Test charts standards.
   - 1.3 Choice of test charts
   - 1.4 Trial case lenses
   - 1.5 Refractor (phoropter) head units
   - 1.6 Optical considerations of refractor units
   - 1.7 Trial frame design
   - 1.8 Near vision difficulties with units and trial frames
   - 1.9 Retinoscope – types available
   - 1.10 Adjustment of Retinoscopes- special features

1.11 Objective optometers.
1.12 Infrared optometers devices.
1.13 Projection charts
1.14 Illumination of the consulting room.
1.15 Brightness acuity test
1.16 Vision analyzer
1.17 Pupilometer
1.18 Potential Acuity Meter
1.19 Abberometer

2. **Ophthalmoscopes and related devices**
   2.1 Design of ophthalmoscopes –illumination
   2.2 Design of ophthalmoscopes-viewing
   2.3 Ophthalmoscope disc
   2.4 Filters for ophthalmoscopy
   2.5 Indirect ophthalmoscope
3. **Lensometer, Lens gauges or clock**
4. Slit lamp
5. Tonometer
6. Keratometer and corneal topography
7. Refractometer
8. Orthoptic Instruments (Synaptophore Only)
9. Color Vision Testing Devices
10. Fields of Vision And Screening Devices
11. Scans
12. ERG
13. New Instruments

OPTOMETRIC OPTICS II & Dispensing Optics

OPTOMETRIC OPTICS II

COURSE DESCRIPTION:

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

OBJECTIVES: 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. Counseling 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

COURSE PLAN

1.	**Spectacle Lenses - II:** • Manufacture ofglass • Lensmaterials • Lenssurfacing • Principle of surface generation and glasscements • Terminology used in Lensworkshop • Lens properties • Lens quality • Faults in lens material • Faults on lens surface • Methods of Inspecting the quality oflenses • Safety standards for ophthalmic lenses (FDA, ANSI, ISI,Others)
2.	**Spectacle Frames:** • Types and parts • Classification of spectacle frames-material, weight, temple position, Coloration • Frame construction • Frame selection • Size, shape, mounting and field of view of ophthalmic lenses
3.	**Tinted & Protective Lenses** • Characteristics of tinted lenses Absorptive Glasses • Polarizing Filters, Photochromic & Reflecting filters • Safety lenses-Toughened lenses, Laminated Lenses, CR 39, Polycarbonate lenses
4.	**Multifocal Lenses:** • Introduction, history and development, types • Bifocal lenses, Trifocal & Progressive addition lenses
5.	**Reflection from spectacle lens surface & lens coatings:** • Reflection from spectacle lenses - ghost images -Reflections in bifocals at the dividing line • Antireflection coating, Mirror coating, Hard Multi Coating [HMC], Hydrophobic coating
6.	**Miscellaneous Spectacle:** • Iseikonic lenses • Spectacle magnifiers • Recumbent prisms • Fresnel prism and lenses • Lenticular &Aspherical lenses • High Refractive index glasses

DISPENSING OPTICS:

Sl. No	Topic
1	Components of spectacle prescription & interpretation, transposition, Add and near power relation
2	Frame selection –based on spectacle prescription, professional requirements, age group, face shape
3	Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height
4	Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments –facial wrap, pantoscopic tilt
5	Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements)
6	Neutralization –Hand &lensometer, axis marking, prism marking
7	Faults in spectacles (lens fitting, frame fitting, patients complaints, description, detection and correction)
8	Final checking & dispensing of spectacles to customers, counseling on wearing & maintaining of spectacles, Accessories –Bands, chains, boxes, slevets, cleaners, screwdriver kit
9	Spectacle repairs –tools, methods, soldering, riveting, frame adjustments

10	Special types of spectacle frames ➢ Monocles ➢ Ptosis crutches ➢ Industrial safety glasses ➢ Welding glasses
12	Frame availability in Indian market
13	FAQ's by customers and their ideal answers

VISUAL OPTICS II

COURSE DESCRIPTION: 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.

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

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

PREREQUISITES: Geometrical Optics, Physical Optics & Ocular Physiology, Visual optics - I

COURSE PLAN

Sl. No	Topic
1.	**Accommodation & Presbyopia** • Far and near point ofaccommodation • Range and amplitude ofaccommodation • Mechanism ofaccommodation • Variation of accommodation withage Anomalies of accommodation • Presbyopia • Hypermetropia andaccommodation
2.	**Convergence:** • Type, Measurement andAnomalies • Relationship between accommodation and convergence-AC/Aratio
3.	**Objective Refraction (Static & Dynamic)** • Streakretinoscopy • Principle, Procedure, Difficulties and interpretation offindings • Transposition and sphericalequivalent • Dynamic retinoscopy variousmethods • Radical retinoscopy and nearretinoscopy • Cycloplegicrefraction
4.	**Subjective Refraction:** • Principle andfogging • Fixed astigmatic dial(Clock dial),Combination of fixed and rotator dial(Fan and blocktest),J.C.C • Duochrometest o Binocular balancing- alternate occlusion, prism dissociation, dissociate Duochrome balance, Borish dissociatedfogging o Binocular refraction-Varioustechniques

5.	**Effective Power &Magnification :** • Ocular refraction vs. Spectaclerefraction • Spectacle magnification vs. Relative spectaclemagnification • Axial vs. Refractive ammetropia, Knapp'slaw • Ocular accommodation vs. Spectacleaccommodation • Retinal image blur-Depth of focus and depth offield

OCULAR DISEASE II

COURSE DESCRIPTION: 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.

OBJECTIVES: 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 oculardisease
6. Diagnostic approach,and
7. Management of the oculardiseases.

COURSE PLAN

1	**Retina and Vitreous**: Applied Anatomy • Congenital and Developmental Disorders (Optic Disc: Coloboma, Drusen, Hypoplasia, Medullated nerve fibers; Persistent Hyaloid Artery) • Inflammatory disorders (Retinitis : Acute purulent , Bacterial, Virus, mycotic) • Retinal Vasculitis (Eales's) • Retinal Artery Occlusion (Central retinal Artery occlusion) • Retinal Vein occlusion (Ischaemic, Non Ischaemic , Branch retinal vein occlusion) • Retinal degenerations : Retinitis Pigmentosa, Lattice degenerations • Macular disorders: Solar retinopathy, central serous retinopathy, cystoid macular edema, Age related macular degeneration. • Retinal Detachement: Rhegmatogenous, Tractional, Exudative) • Retinablastoma • Diabetic retinopathy
2	**Ocular Injuries:** Terminology : **Closed globe injury** (contusion, lamellar laceration) **Open globe injury** (rupture, laceration, penetrating injury, perforating injury) • **Mechanical injuries** (Extraocular foreign body, blunt trauma, perforating injury, sympathetic ophthalmitis) • **Non Mechanical Injuries** (Chemical injuries, Thermal, Electrical, Radiational) • Clinical approach towards ocular injury patients

3	**Lens** • Applied Anatomy andPhysiology • Clinicalexamination • Classification ofcataract • Congenital and Developmentalcataract • Acquired (Senile, Traumatic, Complicated, Metabolic, Electric, Radiational, Toxic) • Morphological: Capsular, Subcapsular, Cortical, Supranuclear, Nuclear,Polar. • Management of cataract (Non-surgical and surgical measures; preoperative evaluation, Types ofsurgeries,) • Complications of cataractsurgery • Displacement of lens: Subluxation, Displacement • Lens coloboma, Lenticonus, Microsperophakia.
4	**Clinical Neuroophthalmology** • 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, Papilloedema, optic atrophy • Cortical blindness • Malingering • Nystagmus • Clinical examination
5.	**Glaucoma** • Applied anatomy and physiology of anterior segment • Clinical Examination • Definitions and classification of glaucoma • Pathogenesis of glaucomatous ocular damage • Congenital glaucoma's • 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's • Management : common medications, laser intervention and surgical techniques

PATHOLOGY

COURSE DESCRIPTION: This course describes basic aspects of disease processes with reference to specific entities relevant in optometry/ophthalmology.

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

1. Inflammation and repair aspects.
2. Pathology of various eye parts and adnexa.

COURSE PLAN

1. Inflammation and repair
2. Infection in general
3. Specific infections
   - 3.1 Tuberculosis
   - 3.2 Leprosy
   - 3.3 Syphilis
   - 3.4 Fungal infection
   - 3.5 Viral, chlamydial infection
4. Neoplasia
5. Hematology
   - 5.1 Anemia
   - 5.2 Leukemia
   - 5.3 Bleeding disorders
6. Circulatory disturbances
   - 6.1 Thrombosis
   - 6.2 Infarction
   - 6.3 Embolism
7. Clinical pathology
   - 7.1 Interpretation of urine report
   - 7.2 Interpretation of blood smears.
8. Immune system
9. Shock, Anaphylaxis.
10. Allergy

BASIC AND OCULAR PHARMACOLOGY

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

OBJECTIVES: 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.

1.	General Pharmacology: Introduction & sources of drugs, Routes of drug administration, Pharmacokinetics (emphasis on ocular pharmacokinetics), Pharmacodynamics & factors modifying drug actions

2.	Systemic Pharmacology: Autonomic nervous system: Drugs affecting papillary size and light reflex, Intraocular tension, Accommodation; Cardiovascular system: Anti- hypertensive sand drugs useful in Angina; Diuretics: Drugs used in ocular disorders; Central Nervous System: Alcohol, sedative hypnotics, General & local anaesthetics, Opioids & non-Opioids; Chemotherapy : Introduction on general chemotherapy, Specific chemotherapy –Antiviral, antifungal, antibiotics; Hormones : Corticosteroids, Antidiabetics; Blood Coagulants
3.	Ocular Pharmacology: Ocular preparations, formulations and requirements of an ideal agent; Ocular Pharmacokinetics, methods of drug administration & Special drug delivery system; Ocular Toxicology
4.	Diagnostic & Therapeutic applications of drugs used in Ophthalmology: Diagnostic Drugs & biological agents used in ocular surgery, Anaesthetics used in ophthalmic procedures, Anti-glaucoma drugs; Pharmacotherapy of ocular infections –Bacterial, viral, fungal & chlamydial; Drugs used in allergic, inflammatory& degenerative conditions of the eye; Immune modulators in Ophthalmic practice, Wetting agents & tear substitutes ,Antioxidants

INTRODUCTION TO QUALITY AND PATIENT SAFETY

COURSE DESCRIPTION: This course deals with various aspects of quality and safety issues in health care services.

OBJECTIVES: At the end of the course, students have gained introductory knowledge about quality and patient safety aspects from Indian perspectives.

COURSE PLAN:

1. Quality assurance and management
2. Basics of emergency care and life support skills
3. Biomedical waste management and environment safety
4. Infection and prevention control
5. Antibiotic resistance
6. Disaster preparedness and management

CONTACT LENSES I

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

COURSE OBJECTIVES: 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. Finalize the CL design for various kinds of patients
4. Recognize various types of fitting Explain all the procedures to patient
5. Identify and manage the adverse effects of contact lens

COURSE PLAN

1. **Introduction to Contact lenses**
   - 1.1 Definition
   - 1.2 Classification /Types
2. **History of Contact Lenses**
3. **Optics of Contact Lenses**
   - 3.1 Magnification & Visual field
   - 3.2 Accommodation & Convergence
   - 3.3 Back & Front Vertex Power / Vertex distance calculation
4. **Review of Anatomy & Physiology of**
   - 4.1 Tear film
   - 4.2 Cornea
   - 4.3 Lids &Conjunctiva
5. **Introduction to CL materials**
   - 5.1 Monomers , Polymers, Properties of CL materials
   - 5.2 Physiological (Dk, Ionicity, Water content)
   - 5.3Physical (Elasticity, Tensile strength, Rigidity)
   - 5.4Optical (Transmission, Refractive index)
6. **Indications and contraindications**
7. **Parameters / Designs** of Contact Lenses &Terminology
8. **RGP Contact Lens materials**
9. **Manufacturing** Rigid and Soft Contact Lenses – various methods
10. **Pre-Fitting examination** – steps, significance, recording of results
11. Correction of Astigmatism with RGP lens
12. **Types of fit** – Steep, Flat, Optimum – on spherical cornea with spherical lenses
13. **Types of fit** – Steep, Flat, Optimum – on Toric cornea with spherical lenses
14. **Calculation and finalizing Contact lens parameters**
15. **Ordering Rigid Contact Lenses** – writing a prescription to the Laboratory
16. **Checking and verifying Contact lenses from Laboratory**
17. **Modifications possible with Rigid lenses**
18. **Common Handling Instructions**
    - 18.1 Insertion & Removal Techniques
    - 18.2 Do's and Don'ts
19. **Care and Maintenance of Rigid lenses**
    - 19.1 Cleaning agents &Importance
    - 19.2 Rinsing agents &Importance
    - 19.3 Disinfecting agents &importance
    - 19.4 Lubricating & Enzymatic cleaners
20. Follow up visit examination
21. Complications of RGP lenses

PRACTICAL

1. Measurement of Ocular dimensions
2. Pupillary diameter and lid characteristics
3. Blink rate and TBUT

4. Schrimers test, Slit lamp examination of tear layer
5. Keratometry
6. Placido'sdisc
7. Soft Contact Lens fitting –Aspherical
8. Soft Contact Lens fitting – Lathecut lenses
9. Soft Contact Lens over refraction
10. Lens insertion and removal
11. Lens handling and cleaning
12. Examination of old soft Lens
13. RGP Lens fitting
14. RGP Lens Fit Assessment and fluorescein pattern
15. Special RGP fitting (Aphakia, pseudo phakia &Keratoconus)
16. RGP over refraction and Lens flexure
17. Examination of old RGP Lens
18. RGP Lens parameters
19. Slit lamp examination of Contact Lens wearers

LOW VISION CARE

COURSE DESCRIPTION:

This course deal with the definition of low vision, 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.

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

1. Definition and epidemiology of LowVision
2. Clinical examination of Low visionsubjects
3. Optical, Non-Optical, Electronic, and Assistivedevices.
4. Training for Low Vision subjects with Low visiondevices
5. Referrals andfollow-up

COURSE PLAN:

1. Definitions & classification of Low vision
2. Epidemiology of low vision
3. Model of low vision service
4. Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psycho- social impact of low vision
5. Types of low vision aids – optical aids, non-optical aids & electronic devices
6. Optics of low vision aids
7. Clinical evaluation – assessment of visual acuity, visual field, selection of low vision aids, instruction &training
8. Pediatric Low Vision care
9. Low vision aids – dispensing & prescribing aspects
10. Visual rehabilitation &counseling

11. Legal aspects of Low vision in India
12. Case Analysis

PRACTICALS

1. **Practical 1**: Attending in low vision care clinic and history taking.
2. **Practical2:**
   - 2.1 Determining the type of telescope and its magnification (Direct comparison method & calculated method)
   - 2.2 Determining the change in field of view with different magnification and different eye +to lens distances with telescopes and magnifiers.
3. **Practical3**:
   - 3.1 Inducing visual impairment and prescribing magnification.
   - 3.2 Determining reading speed with different types of low vision aids with same magnification.
   - 3.3 Determining reading speed with a low vision aid of different magnifications.

GERIATRIC OPTOMETRY & PAEDIATRIC OPTOMETRY
COURSE DESCRIPTION:

This course deals with 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.

COURSE OBJECTIVES: The student on taking this course should

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

COURSE PLAN

1. Structural , and morphological changes of eye in elderly
2. Physiological changes in eye in the course of aging.
3. Introduction to geriatric medicine – epidemiology , need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebrovascular disease, Diabetes,COPD)
4. Optometric Examination of the Older Adult
5. Ocular diseases common in old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye
6. Contact lenses in elderly
7. Pharmacological aspects of aging
8. Low vision causes, management and rehabilitation in geriatrics.
9. Spectacle dispensing in elderly – Considerations of spectacle lenses and frames

PEDIATRIC OPTOMETRY:
COURSE DESCRIPTION: This course is designed to provide the students adequate knowledge in theoretical and practical aspects of diagnosis, and management of eye

conditions related to paediatric population. Also it will inculcate the skill of transferring / communicating the medical information to the attender / patient by the students. The scope of this subject is to train the optometrists to develop a systematic way of dealing with children below 12, so as to implement primary eye care and have better, specialized management of anomalies.

COURSE OBJECTIVES: At the end of the course the student is expected to:

1. Have a knowledge of the principal theories of childhood development, and visual development
2. Have the ability to take a thorough paediatric history which encompasses the relevant developmental, visual, medical and educational issues
3. Be familiar with the accommodative-vergence system, the genesis of ametropia, the disorders of refraction, accommodation and vergence, and the assessment and management of these disorders
4. Be familiar with the aetiology, clinical presentation and treatment of amblyopia, comitant strabismus and commonly presenting incomitant strabismus
5. Have a knowledge of the epidemiology of eye disease in children, the assessment techniques available for examining visual function of children of all ages and an understanding varied management concepts of paediatric vision disorders
6. Have knowledge of the art of dispensing contact lens, low vision aids and referral to the surgeon or other specialists at the appropriate timing.
7. Have a capacity for highly evolved communication and co-management with other professionals involved in paediatric assessment and care.

COURSE PLAN

1. The Development of Eye and Vision
2. History taking Paediatric subjects
3. Assessment of visual acuity
4. Normal appearance, pathology and structural anomalies of
   - 4.1 Orbit, Eye lids, Lacrimal system,
   - 4.2 Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract ,Pupil
   - 4.3 Lens, vitreous, Fundus Oculomotor system
5. Refractive Examination
6. Determining binocular status
7. Determining sensory motor adaptability
8. Compensatory treatment and remedial therapy for : Myopia, Pseudo myopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia
9. Remedial and Compensatory treatment of Strabismus and Nystagmus
10. Paediatric eye disorders : Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics
11. Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma,Albinism
12. Spectacle dispensing for children
13. Paediatric contact lenses
14. Low vision assessment in children

BINOCULAR VISION I

COURSE DESCRIPTION: This course provides theoretical aspects of Binocular Vision and its clinical application. It deals with basis of normal binocular vision and space perception, Gross anatomy and physiology of extra ocular muscles, various binocular vision anomalies, its diagnostic approaches and management.

COURSE OBJECTIVES: On successful completion of this module, a student will be expected to be able to:-

1. Demonstrate an in-depth knowledge of the gross anatomy and physiology relating to the extra ocular muscles.
2. Provide a detailed explanation of, and differentiate between the etiology, investigation and management of binocular vision anomalies.
3. Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely.

COURSE PLAN

1. **Binocular Vision and Space perception**.
   - 1.1 Relative subjective visual direction.
   - 1.2 Retino motor value
   - 1.3 Grades of BSV
   - 1.4 SMP and Cyclopean Eye
   - 1.5 Correspondence,
   - 1.6 Fusion, Diplopia, Retinal rivalry
   - 1.7 Horopter
   - 1.8 Physiological Diplopia and Suppression
   - 1.9 Stereopsis, Panum's area, BSV.
   - 1.10 Stereopsis and monocular clues -significance.
   - 1.11 Egocentric location, clinical applications.
   - 1.12 Theories of Binocular vision.
2. **Anatomy of Extra Ocular Muscles**.
   - 2.1 Rectii and Obliques, LPS.
   - 2.2 Innervations & Blood Supply.
3. **Physiology of Ocular movements.**
   - 3.1 Center of rotation, Axes of Fick.
   - 3.2 Action of individual muscle.
4. **Laws of ocular motility**
   - 4.1 Donder's and Listing's law
   - 4.2 Sherrington's law
   - 4.3 Hering's law
5. **Uniocular& Binocular movements - fixation, saccadic &pursuits**.
   - 5.1 Version &Vergence.
   - 5.2 Fixation & field of fixation
6. **Near Vision Complex Accommodation**
   - 6.1 Definition and mechanism(process).
   - 6.2 Methods of measurement.

6.3 Stimulus and innervation.
6.4 Types of accommodation.
6.5 Anomalies of accommodation – aetiology and management.

7. **Convergence**
   7.1 Definition and mechanism.
   7.2 Methods of measurement.
   7.3 Types and components of convergence - Tonic, accommodative, fusional, proximal.
   7.4 Anomalies of Convergence – aetiology and management.
8. **Sensory adaptations**
   8.1 Confusion
9. **Suppression**
   9.1 Investigations
   9.2 Management
   9.3 Blind spot syndrome
10. **Abnormal Retinal Correspondence**
    10.1 Investigation and management
    10.2 Blind spot syndrome
11. **Eccentric Fixation**
    11.1 Investigation and management
12. **Amblyopia**
    12.1 Classification
    12.2 Aetiology
    12.3 Investigation

SYSTEMIC DISEASES

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

COURSE OBJECTIVES:

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 PLAN

1. **Hypertension**
   a) Definition, classification, Epidemiology, clinical examination, complications, and management.
   b) Hypertensive Retinopathy
2. **Diabetes Mellitus**
   a) Classification, pathophysiology, clinical presentations, diagnosis, and management, Complications

b) Diabetic Retinopathy

3. **Thyroid Disease**
   a) Physiology, testing for thyroid disease, Hyperthyroidism, Hypothyroidism, Thyroiditis, Thyroid tumors
   b) Grave's Ophthalmopathy
4. **Acquired Heart Disease**
   a) Ischemic Heart Disease, Congestive heart failure, Disorders of cardiac rhythm
   b) Ophthalmic considerations
5. **Cancer:**
   a) Incidence
   b) Etiology
   c) Therapy
   d) Ophthalmologic considerations
6. **Connective Tissue Disease**
   a) Rheumatic arthritis
   b) Systemic lupus erythematous
   c) Scleroderma
   d) Polymyositis and dermatomyositis
   e) Sjogren syndrome
   f) Behcet's syndrome
   g) Eye and connective tissue disease
7. **Tuberculosis**
   a) Aetiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complications, treatment tuberculosis and the eye.
8. **Herpes virus (Herpes simplex, Varicella Zoster, Cytomegalovirus, Epstein Barr Virus)**
   a) Herpes and the eye
9. **Hepatitis (** Hepatitis A, B,C)
10. **Acquired Immuno deficiency Syndrome**
11. **Anemia** (Diagnosis, clinical evaluation, consequences, Sickle cell disease, treatment, Ophthalmologic considerations)
12. **Common Tropical Medical Ailments**
    a) Malaria
    b) Typhoid
    c) Dengue
    d) Filariasis
    e) Onchocerciasis
    f) Cysticercosis
    g) Leprosy
13. **Nutritional and Metabolic disorders**:
    a) Obesity
    b) Hyper lipidaemias
    c) Marasmus,Kwashiorkor

d) Vitamin A Deficiency
e) Vitamin D Deficiency
f) Vitamin E Deficiency
g) Vitamin K Deficiency
h) Vitamin B1,B2,Deficiency
i) Vitamin C Deficiency

14. **Myasthenia Gravis**
15. **First Aid**
    a) General Medical Emergencies
    b) Preoperative precautions in ocular surgeries
16. **Psychiatry**
    a) Basic knowledge of psychiatric condition and Patient Management
17. **Genetics**
    a. Introduction to genetics
    b. Organization of the cell
    c. Chromosome structure and cell division
    d. Gene structure and basic principles of Genetics.
    e. Genetic disorders and their diagnosis.
    f. Genes and the eye
    g. Genetic counseling and genetic engineering.

RESEARCH METHODOLOGY AND BIOSTATISTICS

COURSE OBJECTIVES: The objective of this module is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings.

COURSE PLAN

Research Methodology:

1. Introduction to research methods
2. Identifying research problem
3. Ethical issues in research
4. Research design
5. Types of Data
6. Research tools and Data collection methods
7. Sampling methods
8. Developing a research proposal

Biostatistics

1. Basics of Biostatistics
   1.1 Introduction of Biostatistics
   1.2 Measures of Morality
   1.3 Sampling
   1.4 Statistical significance

1.5 Correlation
1.6 Sample size determination.
1.7 Statistics –Collection of Data - presentation including classification and diagrammatic representation –frequency distribution. Measures of central tendency; measures of dispersion.
1.8 Theoretical distributions.
a) Binomial
b) Normal
c) Sampling –necessity of methods and techniques.
d) Chi. Square test (2 x2)

2. Hospital Statistics
3. Use of computerized software for statistics

SYSTEMIC DISEASES

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

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

4. Common Systemic conditions: Definition, diagnostic approach, complications and management options
5. Ocular findings of the systemic conditions
6. First Aid knowledge

CONTACT LENSES II

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

COURSE OBJECTIVES:

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

1. Understand the basics of contactlenses
2. List the important properties of contactlenses
3. Finalise the CL design for various kindspatients
4. Recognize various types offitting
5. Explain all the procedures topatient
6. Identify and manage the adverse effects of contactlens

PREREQUISITES: Geometrical optics, Visual optics, Ocular Anatomy, Ocular Physiology, Biochemistry, Ocular Microbiology, Ocular Disease, Optometric Instruments

COURSE PLAN:

1. SCL Materials & Review of manufacturingtechniques
2. Comparison of RGP vs.SCL
3. Pre-fitting considerations forSCL
4. Fitting philosophies forSCL
5. Fit assessment in Soft Contact Lenses: Types of fit – Steep, Flat,Optimum
6. Calculation and finalising SCLparameters
   - 6.1 Disposablelenses
   - 6.2 Advantages andavailability

BINOCULAR VISION II

COURSE DESCRIPTION: This course deals with understanding of strabismus, its classification, necessary orthoptic investigations, diagnosis and non-surgical management.Along with theoretical knowledge it teaches the clinical aspects and application.

C**OURSE OBJECTIVES:**

The objective of this course is to inculcate the student with the knowledge of different types of strabismus its etiology signs and symptoms, necessary investigations and also management. The student on completion of the course should be able to independently investigate and diagnose case of strabismus with comments in respect to retinal correspondence and binocular single vision. The student should be able to perform all the investigations to check retinal correspondence, state of Binocular Single Vision, angle of deviation and special investigations for paralytic strabismus.

COURSE PLAN:

Neuro-muscularanomalies

- 1.1 Classification and etiologicalfactors

2. History – recording andsignificance.
3. Convergentstrabismus
   - 3.1 Accommodative convergentsquint
     - 3.1.1 Classification
     - 3.1.2 Investigation andManagement
   - 3.2 Non accommodative Convergentsquint
     - 3.1.3 Classification
     - 3.1.4 Investigation andManagement
4. DivergentStrabismus
   - 4.1 Classification
   - 4.2 A& Vphenomenon
   - 4.3 Investigation andManagement
5. Verticalstrabismus
   - 5.1 Classification
   - 5.2 Investigation andManagement
6. Paralytic Strabismus
   - 6.1 Acquired and Congenital
   - 6.2 Clinical Characteristics
7. Distinction from comitant and restrictiveSquint

8. Investigations
    8.1 History and symptoms
    8.2 Head Posture
    8.3 Diplopia Charting
    8.4 Hess chart
    8.5 PBCT
    8.6 Nine directions
    8.7 Binocular field of vision
9. Amblyopia and Treatment of Amblyopia
10. Nystagmus
11. Non-surgical Management of Squint
12. Restrictive Strabismus
    12.1 Features
    12.2 Musculo-fascical anomalies
    12.3 Duane's Retraction syndrome
    12.4 Clinical features and management
    12.5 Brown's Superior oblique sheath syndrome
    12.6 Strabismusfixus
    12.7 Congenital muscle fibrosis
13. Surgical management
14.
    14.1 Acquired and Congenital
    14.2 Clinical Characteristics
15. Distinction from commitant and restrictive Squint
16. Investigations
    16.1 History and symptoms
    16.2 Head Posture
    16.3 Diplopia Charting

PRACTICAL: Deals with hand-on session the basic binocular vision evaluation techniques.

PUBLIC HEALTH AND COMMUNITY OPTOMETRY
INSTRUCTOR INCHARGE: Public Health professional or optometrist with public health and community optometry experience
COURSE DESCRIPTION: 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.
COURSE OBJECTIVES: 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 agegroups.

COURSE PLAN

1. Public Health Optometry: Concepts and implementation, Stages of diseases
2. Dimensions, determinants and indicators of health
3. Levels of disease prevention and levels of health care patterns
4. Epidemiology of blindness – Defining blindness and visual impairment
5. Eye in primary healthcare
6. Contrasting between Clinical and community health programs
7. Community Eye Care Programs
8. Community based rehabilitation programs
9. Nutritional Blindness with reference to Vitamin A deficiency
10. Vision 2020: The Right to Sight
11. Screening for eye diseases
12. National and International health agencies ,NPCB
13. Role of an optometrist in Public Health
14. Organization and Management of Eye Care Programs – Service Delivery models
15. Health manpower and planning & Health Economics
16. Evaluation and assessment of health programmes
17. Optometrists role in school eye health programmes
18. Basics of Tele Optometry and its application in Public Health
19. Information, Education and Communication for Eye Care programs

PRACTICE MANAGEMENT

COURSE DESCRIPTION: This course deal with all aspects of optometry practice management
– business, accounting, taxation, professional values, and quality & safety aspects.
COURSE OBJECTIVES: At the end of the course, student would have gained knowledge on various aspects of private optometric practice from Indian perspective.
COURSE PLAN

1. Business Management:
   a. Practice establishment and development
   b. Stock control and costing
   c. Staffing and staff relations
   d. Business computerization
2. Accounting Principles
   a) Sources of finance
   b) Bookkeeping and cash flow
3. Taxation and taxation planning
4. Professionalism and Values
   a) Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality

b) Personal values- ethical or moral values
c) Attitude and behavior- professional behavior, treating people equally
d) Code of conduct , professional accountability and responsibility, misconduct
e) Differences between professions and importance of team efforts
f) Cultural issues in the health care environment

OCCUPATIONAL OPTOMETRY

INSTRUCTOR INCHARGE: Occupational Health professional and /or Optometrist with experience in occupational eye health

COURSE DESCRIPTION: This course deals with general aspects of occupational health, Visual demand in various job, task analyzing method ,visual standards for various jobs , occupational hazards and remedial aspects through classroom sessions and field visit to the factories.

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

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

COURSE PLAN:

1. Introduction to Occupational health, hygiene and safety, international bodies like ILO, WHO, National bodies etc.
   1.1 Acts and Rules - Factories Act, WCA, ESI Act.
2. Electromagnetic Radiation and its effects on Eye
3. Light – Definitions and units, Sources, advantages and disadvantages, standards
4. Color – Definition, Color theory, Color coding, Color defects, Color Vision tests
5. Occupational hazards and preventive/protective methods
6. Task Analysis
7. Industrial Vision Screening – Modified clinical method and Industrial Vision test
8. Vision Standards – Railways, Roadways, Airlines
9. Visual Display Units
10. Contact lens and work

RESEARCH PROJECT/DISSERTATION

Team of students will be doing a research project under the guidance of a supervisor (optometrists/vision scientists/ ophthalmologist). Student will get the experience of doing a research in systematic approach – identifying the primary question, literature search, identifying the gaps in the literature, identifying the research question, writing up the research proposal, data collection, data analysis, thesis writing and presentation.

Internship:

1. Primary Eye Care	25 %
2. Dispensing Optics	25 %
3. Contact Lens	10%
4. Low Vision Aids	10%
5. Orthoptics	10%
6. Diagnostics	10 %
7. Anterior Segment clinic	5%
8. Posterior Segment Clinic	5%

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