

GURU KASHI UNIVERSITY



Bachelor of Optometry (BOP)

Session: 2026-27

Faculty of Allied & Healthcare

Graduate Attributes of the Program:

Bachelor of Optometry (BOP) program is designed to develop competent, ethical, and skilled eye care professionals capable of delivering comprehensive vision and primary eye care services. Graduates of the program acquire strong theoretical knowledge and clinical expertise in ocular anatomy, physiology, optics, refraction, binocular vision, contact lenses, low vision care, and ophthalmic instrumentation. The program prepares students to perform comprehensive eye examinations, diagnose common ocular disorders, provide refractive correction, and assist in the prevention and early detection of eye diseases. Graduates are trained to work independently as well as collaboratively with ophthalmologists and other healthcare professionals in hospitals, eye clinics, optical industries, rehabilitation centers, and community health programs. The program also emphasizes communication skills, professionalism, ethical practice, critical thinking, research aptitude, lifelong learning, and social responsibility to promote quality eye care and community visual health.

The objectives of the program are to:

1. Develop comprehensive knowledge of ocular anatomy, physiology, pathology, optics, and visual sciences.
2. Train students to perform comprehensive eye examinations and ophthalmic investigations.
3. Develop competency in the diagnosis and management of refractive errors and visual disorders.
4. Prepare students to prescribe and dispense spectacles, contact lenses, and low vision aids.
5. Enhance skills in binocular vision assessment and management of non-strabismic anomalies.
6. Provide knowledge regarding common ocular diseases, referral guidelines, and preventive eye care.
7. Develop clinical skills for early detection of ocular conditions such as cataract, glaucoma, diabetic retinopathy, and strabismus.
8. Train students in occupational optometry, visual ergonomics, and eye safety practices.
9. Promote community eye health through vision screening programs, public awareness, and preventive ophthalmology services.
10. Develop professional ethics, communication skills, patient counselling abilities, and teamwork in healthcare settings.
11. Encourage research aptitude, critical thinking, evidence-based practice, and lifelong learning.
12. Prepare graduates for employment, entrepreneurship, and independent optometric practice in diverse healthcare and optical sectors.

Element of the Descriptor	Program learning outcomes relating to Bachelor's Degree
The graduates should be able to demonstrate the acquisition of:	
Knowledge and understanding	Demonstrate comprehensive knowledge of ocular anatomy, physiology, pathology, optics, pharmacology, and visual sciences relevant to optometric practice.
	Understand the principles of refraction, binocular vision, contact lenses, low vision care, and ophthalmic instrumentation.
	Acquire knowledge of common ocular diseases, their clinical features, investigations, management, and referral guidelines.
	Understand the role of optometry in preventive, promotive, curative, and rehabilitative eye care services.
	Develop understanding of public health optometry, occupational eye safety, and community eye care programs.
General, technical and professional skills required to perform and accomplish tasks	Perform comprehensive eye examinations using standard ophthalmic instruments and diagnostic techniques.
	Accurately assess refractive errors and prescribe spectacles, contact lenses, and low vision aids.
	Conduct ophthalmic investigations and interpret clinical findings for patient management and referral.
	Develop competency in binocular vision assessment, vision therapy, and management of non-strabismic anomalies.
	Demonstrate effective communication, counselling, documentation, and patient management skills.
	Apply infection control, patient safety, and professional standards in clinical and community settings.
Application of knowledge and skills	Apply theoretical knowledge in clinical practice for diagnosis, treatment planning, and management of visual disorders.
	Provide primary eye care services independently and collaboratively with ophthalmologists and healthcare professionals.
	Utilize clinical reasoning and evidence-based practice for effective patient care and decision-making.
	Apply optometric skills in hospitals, eye clinics, optical industries, rehabilitation centers, and community health programs.

	Participate in vision screening camps, occupational vision assessment, and preventive eye care activities.
Generic learning outcomes	Develop critical thinking, analytical reasoning, and problem-solving abilities in optometric practice.
	Demonstrate lifelong learning and adaptability to advancements in eye care and healthcare technologies.
	Exhibit teamwork, leadership qualities, and interpersonal skills in multidisciplinary healthcare environments.
	Communicate effectively with patients, caregivers, peers, and healthcare professionals.
Constitutional, humanistic, ethical, and moral values	Practice optometry with honesty, integrity, compassion, and respect for human dignity.
	Uphold ethical principles, patient confidentiality, and professional accountability in healthcare services.
	Demonstrate sensitivity toward cultural, social, and economic diversity while delivering patient care.
	Promote equitable access to eye care services and contribute to community welfare.
Employability and job-ready skills, and entrepreneurship skills and capabilities/qualities and mindset	Develop clinical competence and professional confidence required for employment in hospitals, eye clinics, optical outlets, and vision care centers.
	Acquire entrepreneurial skills for establishing and managing independent optometry practice or optical businesses.
	Demonstrate proficiency in optical dispensing, ophthalmic product knowledge, and patient counselling.
	Build adaptability, professionalism, and workplace ethics for diverse healthcare and industry settings.
	Develop managerial, organizational, and communication skills essential for healthcare administration and teamwork.
Credit requirements	• The Bachelor of Optometry (BOP) program follows a credit-based academic system integrating theory, practical training, clinical exposure, and internship. • One credit is equivalent to: ➤ One hour of lecture per week, or ➤ Two hours of laboratory/practical/clinical training per week, or ➤ Two hours of research work per week.

	• Each semester consists of approximately 15 academic weeks. • The duration of the program is 5 years (4 academic years + 1 year compulsory internship). • The program comprises 10 semesters. • The total duration of learning is 6000 hours including theory, practicals, clinical training, and internship. • Students must successfully complete all prescribed theory, practical, clinical, and internship credits to qualify for the award of the degree. • Total duration of the program: 4 years (8 semesters)
Entry requirements	Candidates must have passed Higher Secondary Examination (10+2) or equivalent from a recognized board/university.
	Physics, Chemistry, and Biology/Mathematics must be studied as compulsory subjects.
	Candidates must obtain a minimum of 50% aggregate marks in the qualifying examination.
	Admission may be based on NEET or any equivalent entrance examination conducted by the Government of India followed by counselling.
	Candidates with a Diploma in Optometry after 10+2 with the required subjects and minimum marks are also eligible.
	The candidate must have completed 17 years of age on or before 31st December of the admission year.
	Candidates must submit a medical fitness certificate at the time of admission.
	Candidates must fulfill all institutional and regulatory requirements for admission

SEMESTER: 1st											
S.No.	Course Code	Course Title	L	T	P	No. of Credits	Internal Examination		External Examination		Total Marks
							Theory	Practical	Theory	Practical	
1.	BOPT101	General Anatomy	3	0	0.5	3.5	30	-	70	-	100
2.	BOPT102	General Physiology	3	0	0.5	3.5	30	-	70	-	100
3.	BOPT103	General Biochemistry	3	0	0.5	3.5	30	-	70	-	100
4.	BOPT104	Physical Optics	3	0	0.5	3.5	30	-	70	-	100
5.	BOPT105	Mathematics & Geometrical Optics I	3	0	0.5	3.5	30	-	70	-	100
6.	BOPT106	Introduction to Optometry [#]	2	0	0	2	100	-	-	-	100
7.	BOPT107	Nutrition [#]	1	0	0	1	100	-	-	-	100
8.	BOPT108	Communication [#]	1	0	2	3	100	-	-	-	100
9.	BOPT109	Clinical Optometry I [#]	0	0	1	1	-	100	-	-	100
	Grand Total		19	0	5.5	24.5	550	100	350	00	900

NOTE: Distribution of marks for Internal and External assessments will be based on the credit distribution of the theory and practical for the courses. For eg. If a course has 3 credits for Lecture and 0.5 credits for Practicals, 25 marks for theory and 5 marks for practical will be considered for internal assessments out of the 30 marks. Similar ratios will be followed for External assessments.

SEMESTER: 2nd											
S.No.	Course Code	Course Title	L	T	P	No. of Credits	Internal Examination		External Examination		Total Marks
							Theory	Practical	Theory	Practical	
1.	BOPT201	General Pharmacology	3	0	0	3	30	-	70	-	100
2.	BOPT202	General Pathology	2	0	0	2	30	-	70	-	100
3.	BOPT203	Ocular and related neuroanatomy	3	0	0.5	3.5	30	-	70	-	100
4.	BOPT204	Ocular and related neurophysiology	3	0	1	4	30	-	70	-	100
5.	BOPT205	Ocular Biochemistry	3	0	1	4	30	-	70	-	100
6.	BOPT206	Geometrical Optics II	3	0	1	4	30	-	70	-	100
7.	BOPT207	Basics of Computers#	0	0	1	1	100	-	-	-	100
8.	BOPT208	Clinical Optometry-II #	0	0	2	2	100	-	-	-	100
	Grand Total		17	0	6.5	23.5	280		410		800

NOTE: Distribution of marks for Internal and External assessments will be based on the credit distribution of the theory and practical for the courses. For eg. If a course has 3 credits for Lecture and 0.5 credits for Practicals, 25 marks for theory and 5 marks for practical will be considered for internal assessments out of the 30 marks. Similar ratios will be followed for External assessments.

SEMESTER: 3rd											
S.No.	Course Code	Course Title	L	T	P	No. of Credits	Internal Examination		External Examination		Total Marks
							Theory	Practical	Theory	Practical	
1.	BOPT301	General and Ocular Microbiology	3	0	0.5	3.5	30	-	70	-	100
2.	BOPT302	Ocular Pharmacology	3	0	0	3	30	-	70	-	100
3.	BOPT303	Visual optics I	3	0	1	4	30	-	70	-	100
4.	BOPT304	Optometric optics	3	0	1	4	30	-	70	-	100
5.	BOPT305	Ocular Disease I	3	0	0	3	30	-	70	-	100
6.	BOPT306	Indian Medicine and Telemedicine#	2	0	0	2	100	-		-	100
7.	BOPT307	Clinical Optometry-III	0	0	4	4	30	-	70	-	100
	Grand Total		17	0	6.5	23.5	280		420		700

NOTE: Distribution of marks for Internal and External assessments will be based on the credit distribution of the theory and practical for the courses. For eg. If a course has 3 credits for Lecture and 0.5 credits for Practicals, 25 marks for theory and 5 marks for practical will be considered for internal assessments out of the 30 marks. Similar ratios will be followed for External assessments.

SEMESTER: 4th											
S.No.	Course Code	Course Title	L	T	P	No. of Credits	Internal Examination		External Examination		Total Marks
							Theory	Practical	Theory	Practical	
1.	BOPT401	Optometric Instruments	3	0	0.5	3.5	30	-	70	-	100
2.	BOPT402	Clinical examination of visual system	1	0	2	3	30	-	70	-	100
3.	BOPT403	Visual perception and psychophysics	2	0	0.5	2.5	30	-	70	-	100
4.	BOPT404	Visual Optics II	3	0	1	4	30	-	70	-	100
5.	BOPT405	Ocular Disease II	3	0	0	3	30	-	70	-	100
6.	BOPT406	Behavioural Health Medical Psychology #	1	0	0	1	100	-	-	-	100
7.	BOPT407	Introduction to Quality & Patient safety #	1	0	0	1	100	-	-	-	100
8.	BOPT408	Clinical Optometry-IV	0	0	4	4	30	-	70	-	100
	Grand Total		14	0	8	22	380		420		800

NOTE: Distribution of marks for Internal and External assessments will be based on the credit distribution of the theory and practical for the courses. For eg. If a course has 3 credits for Lecture and 0.5 credits for Practicals, 25 marks for theory and 5 marks for practical will be considered for internal assessments out of the 30 marks. Similar ratios will be followed for External assessments.

SEMESTER: 5th											
S.No.	Course Code	Course Title	L	T	P	No. of Credits	Internal Examination		External Examination		Total Marks
							Theory	Practical	Theory	Practical	
1.	BOPT501	Systemic Disease	2	0	0	2	30	-	70	-	100
2.	BOPT502	Dispensing Optics	2	0	1	3	30	-	70	-	100
3.	BOPT503	Geriatric Optometry	3	0	0	3	30	-	70	-	100
4.	BOPT504	Paediatric Optometry	3	0	0.5	3.5	30	-	70	-	100
5.	BOPT505	Diagnostics and therapeutics of Anterior Segment diseases	4	0	0.5	4.5	30	-	70	-	100
6.	BOPT506	Innovation and technology #	1	0	0.5	1.5	100	-	-	-	100
7.	BOPT507	Clinical Optometry V	2	0	4	6	30	-	70	-	100
	Grand Total		17	0	6.5	23.5	280		420		700

NOTE: Distribution of marks for Internal and External assessments will be based on the credit distribution of the theory and practical for the courses. For eg. If a course has 3 credits for Lecture and 0.5 credits for Practicals, 25 marks for theory and 5 marks for practical will be considered for internal assessments out of the 30 marks. Similar ratios will be followed for External assessments.

SEMESTER: 6th											
S.No.	Course Code	Course Title	L	T	P	No. of Credits	Internal Examination		External Examination		Total Marks
							Theory	Practical	Theory	Practical	
1.	BOPT601	Contact lens I	2	0	1	3	30	-	70	-	100
2.	BOPT602	Low Vision care and Rehabilitation	2	0	1	3	30	-	70	-	100
3.	BOPT603	Binocular Vision I	2	0	1	3	30	-	70	-	100
4.	BOPT604	Diagnostics and therapeutics of Posterior segment diseases	4	0	0.5	4.5	30	-	70	-	100
5.	BOPT605	Optometry and Multidisciplinary aspects of Health #	1	0	0	1	100	-	-	-	100
6.	BOPT606	Research Methodology & Biostatistics #	2	0	0	2	100	-	-	-	100
7.	BOPT607	Clinical Optometry VI	2	0	4	6	30	-	70	-	100
	Grand Total		15	0	7.5	22.5	350		350		700

NOTE: Distribution of marks for Internal and External assessments will be based on the credit distribution of the theory and practical for the courses. For eg. If a course has 3 credits for Lecture and 0.5 credits for Practicals, 25 marks for theory and 5 marks for practical will be considered for internal assessments out of the 30 marks. Similar ratios will be followed for External assessments.

SEMESTER: 7th											
S.No.	Course Code	Course Title	L	T	P	No. of Credits	Internal Examination		External Examination		Total Marks
							Theory	Practical	Theory	Practical	
1.	BOPT701	Contact Lens II	2	0	1	3	30	-	70	-	100
2.	BOPT702	Binocular Vision II	2	0	1	3	30	-	70	-	100
3.	BOPT703	Public Health & Epidemiology	2	0	0	2	30	-	70	-	100
4.	BOPT704	Law and professional ethics Optometry. #	1	0	0	1	100	-	-	-	100
5.	BOPT705	Community eye health #	0	0	1.5	1.5	-	100	-	-	100
6.	BOPT706	Clinical Optometry VII	2	0	4	6	30	-	70	-	100
7.	BOPT707	Research Project – I #	0	0	3	3	-	100	-	-	100
		Grand Total	9	0	10.5	19.5	220	200	280		700

NOTE: Distribution of marks for Internal and External assessments will be based on the credit distribution of the theory and practical for the courses. For eg. If a course has 3 credits for Lecture and 0.5 credits for Practicals, 25 marks for theory and 5 marks for practical will be considered for internal assessments out of the 30 marks. Similar ratios will be followed for External assessments.

SEMESTER: 8th											
S.No.	Course Code	Course Title	L	T	P	No. of Credits	Internal Examination		External Examination		Total Marks
							Theory	Practical	Theory	Practical	
1.	BOPT801	Occupational Optometry	2	0	0.5	2.5	30	-	70	-	100
2.	BOPT802	Practice Management	2	0	0	2	30	-	70	-	100
3.	BOPT803	Community eye health and Tele-optometry #	1	0	2	3	100	-	-	-	100
4.	BOPT804	Data science for healthcare #	1	0	0.5	1.5	100	-	-	-	100
5.	BOPT805	Clinical Optometry VIII	2	0	4	6	30	-	70	-	100
6.	BOPT806	Research Project – II #	0	0	4	4	30	-	70	-	100
	Grand Total		8	0	11	19	320		280		600

NOTE: Distribution of marks for Internal and External assessments will be based on the credit distribution of the theory and practical for the courses. For eg. If a course has 3 credits for Lecture and 0.5 credits for Practicals, 25 marks for theory and 5 marks for practical will be considered for internal assessments out of the 30 marks. Similar ratios will be followed for External assessments.

SEMESTER: 9th											
S.No.	Course Code	Course Title	L	T	P	No. of Credits	Internal Examination		External Examination		Total Marks
							Theory	Practical	Theory	Practical	
1.	BOPT901	Internship	3	0	38	41	-	100	-	-	100
		Grand Total	3	0	38	41		100			100

SEMESTER: 10th											
S.No.	Course Code	Course Title	L	T	P	No. of Credits	Internal Examination		External Examination		Total Marks
							Theory	Practical	Theory	Practical	
1.	BOPT1001	Internship	3	0	38	41	-	100	-	-	100
		Grand Total	3	0	38	41		100			100

Note: ESE* will be conducted immediate after end of the 9th & 10th semester at the institutional level.

Every candidate after passing all semesters examination is required to undergo compulsory internship to the satisfaction of the college authorities and University for a period of 1 year as to be eligible for the award of the degree. The internship is partial fulfillment of the requirements for the graduation and no candidate shall be declared to have completed the program otherwise. The internship shall be completed within 18 months of the date of passing final examination.

1ST SEMESTER

Course Title: General Anatomy	L	T	P	Cr.
Course Code: BOPT101	3	0	0.5	3.5

Total Hours 45 hrs

Course Outcomes: At the end of the course students will 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.

COURSE CONTENTS

UNIT-I

09 Hours

Introduction to Human Anatomy:

Anatomy: Definition and its relevance in medicine and optometry

Planes of the body, relationship of structures, organ system

Skeletal System

UNIT-II

09 Hours

Tissues of the Body: Epithelium, connective tissue, bone and cartilage, Embryology, histology, different types of each of them, types of cells, cellular differentiation and arrangements in different tissues

Muscles: Different types of muscles, their functional differentiation, their relationship with different structures, their neural supply

UNIT-III

09 Hours

Blood vessels: Differentiation between arteries and veins, embryology, histology of both arteries and veins, Functional differences between the two, anatomical differences at different locations

Lymphatic system: Embryology, functions, relationship with blood vessels and organs

UNIT-IV

09 Hours

Skin and appendages: Embryology, anatomical differences in different areas, functional and protective variations, innervations, relationship with muscles and nerves

Glands: Embryology, different types of glands (exocrine and endocrine), functional differences, neural control of glands

UNIT-V

09 Hours

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

Brain and Cranial nerves: Major parts of Brain, Protective coverings of the Brain, Cerebrospinal Fluid, Brain stem, Cerebellum, Diencephalon, Cerebrum, Cranial nerves

SUGGESTED PRACTICALS/DEMONSTRATION (15 Hours)

Practical demonstration of each organ using specimen. If specimen for certain organs is not available, then videos can be shown to make the student understand the anatomic structures.

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *B.D. CHAURASIA: Handbook of General Anatomy, 2nd Ed., CBS Publishers and Distributors, New Delhi - 110 032.*
- *Inderbir Singh's text book of Anatomy -3 volumes 7th Edition*

- *PETER L. WILLIAMS AND ROGER WARWICK: - Gray's Anatomy - Descriptive and Applied, 36th Ed., 1980, Churchill Livingstone.*
- *T.S. RANGANATHAN: Text book of Human Anatomy, 1982, S. Chand & Co., New Delhi 110 055.*
- *INDERBIR SINGH: Human Embryology, 3rd Ed., Macmillan India, 1981.*
- *R. KANAGASUNTHARAM, P. SIVANANDA-SINGHAM & A. KRISHNAMURTI: Anatomy- Regional, Functional, & Clinical, P.G. Publisher, Singapore 1987.*

Course Title: General Physiology	L	T	P	Cr.
Course Code: BOPT102	3	0	0.5	3.5

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

1. Explain the normal functioning of various organ systems of the body and their interactions.
2. Elucidate the physiological aspects of normal growth and development.
3. Describe the physiological response and adaptations to environmental stresses.
4. Know the physiological principles underlying pathogenesis of disease.

COURSE CONTENTS

UNIT-I

07 Hours

Cell structure & organization

Tissue organization, Epithelium, Connective tissue –Collagen fibers –Elastic fibers –Areolar fibers, Cartilage –Bone, Contractile tissue –striated –skeletal –cardiac –non striated –plain –myoepithelial, General principles of cell physiology, Physiology of skeletal muscle

UNIT-II

09 Hours

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 system

UNIT-III

09 Hours

Digestion:

General arrangement, functions & regulations: Salivary digestion, Gastric digestion, Pancreatic digestion, Intestinal digestion, Liver & bile, Absorption, Motility, Deglutition, Vomiting-Defecation-Functions of large intestine-Neurohumoral regulations of alimentary functions

Excretion: Body fluids –distribution, measurement & exchange, Kidney – structure of nephron –mechanism of urine formation composition of the urine and abnormal constituents –urinary bladder & micturition

UNIT-IV

10 Hours

Endocrines: Hormone mechanism –negative feed backs –tropic action – permissive action –cellular action, hypothalamic regulation, hormones, actions, regulations: Thyroid, Adrenal cortex, Adrenal medulla, Parathyroid, Islets of pancreas, Miscellaneous, Common clinical disorders

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.

UNIT-V

10 Hours

Circulation: General principles

Heart: myocardium –innervation –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

Nervous system: Neuron –Conduction of impulse –synapse receptor, Sensory organization –pathways 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 co-ordination, Special senses –(Elementary) Olfaction –Taste –Hearing

SUGGESTED PRACTICALS/DEMONSTRATION (15 Hours)

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

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Human physiology - C C Chatterjee 14th edition 2 volumes*
- *Essentials of human physiology - K Sembulingam 8th edition*
- *A C Guyton: Text book of Medical Physiology, 8th edition, saunders company, Japan,*
- *G J Tortora, B Derrickson: Principles of anatomy & physiology, 11th edition, Harper & Row Publishers, New York*
- *John Wiley & Sons Inc, New Jersey, 2007*

Course Title: General Biochemistry	L	T	P	Cr.
Course Code: BOPT103	3	0	0.5	3.5

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

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.

COURSE CONTENTS

UNIT-I

09 Hours

Amino acids - classification, symbols, structures and properties - Proteins – primary structure, secondary structure, tertiary structure and quaternary structure - examples with biological functions

Carbohydrates - classification, structure and functions of mono-, di, oligo- and polysaccharides - Glycoconjugates - proteoglycans, glycoproteins and glycolipids

Lipids - structure and functions of fatty acids, triacylglycerols, phospholipids and glycolipids

UNIT-II

09 Hours

Enzyme nomenclature - derivation of Michaelis-Menten equation, significance and its limitations, Lineweaver-Burk equation and its plot - factors affecting the rate of enzymatic reactions - enzyme regulation - covalent modification, allosteric modification, positive and negative co-operativity - enzyme inhibition - reversible and irreversible inhibitions. Mechanism of enzyme catalysis - proximity effect, general acid-base reaction, electrostatic interaction, etc., that recurs in enzyme reactions; mechanism of action of chymotrypsin, lysozyme, ribonuclease-A and carboxypeptidase

UNIT-III**09 Hours**

Carbohydrate metabolism - glycolysis (aerobic and anaerobic), feeder pathways of glycolysis, gluconeogenesis, glycogenolysis, glycogenesis, pyruvate oxidation, TCA cycle, glyoxylate cycle and pentose phosphate pathway - pathway, control and energetics

Nucleic acids metabolism - Purines and Pyrimidines- synthesis, degradation and its control

UNIT-IV**09 Hours**

Amino acids metabolism - transamination, oxidative deamination, urea cycle, breakdown of amino acids leading to pyruvate, acetyl CoA, α -ketoglutarate and succinyl CoA – lipids metabolism - fatty acids, phospholipids and cholesterol - synthesis, degradation and its control

UNIT-V**09 Hours**

Electron transport chain and its complexes; oxidative phosphorylation: chemiosmotic theory; proton motive force, ATP synthesis - rotational catalysis; uncouplers of oxidative phosphorylation; control of ATP production

SUGGESTED PRACTICALS/DEMONSTRATION (15 Hours)

- Estimation of amino acid by Formol titration
- Estimation of starch by Anthrone method
- Estimation of protein by Lowry's method from germinating seeds
- Estimation of cholesterol by Zak's method
- Estimation of amino acid by Ninhydrin method from germinating seeds
- Estimation of ascorbic acid
- Estimation of Urea by DAM-TSC method
- Determination of enzyme activity – AST
- Determination of enzyme activity – ALT
- Identification of amino acids by descending paper chromatography
- Identification of sugars by TLC
- Demonstration Estimation of blood cholesterol
- Estimation of alkaline phosphatase.
- Salivary amylase (effect of PH, etc)

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Essentials of biochemistry - Shivananda Nayak 3rd edition*
- *Textbook of biochemistry for medical students - D M Vasudevan 8th edition*
- *S. Ramakrishnan, K G Prasannan and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990*
- *D.R. Whikehart: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003*

Course Title: Physical Optics	L	T	P	Cr.
Course Code: BOPT104	3	0	0.5	3.5

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

1. Explain the nature of light as an electromagnetic wave and describe its fundamental properties, including wavelength, frequency, amplitude, phase, and the electromagnetic spectrum.
2. Apply the principles of radiometry and photometry to understand the measurement of light, luminous efficiency, luminous efficacy, inverse square law, Lambert's law, and retinal illumination.
3. Explain the principles of interference and diffraction of light and describe their applications in optical instruments, wavelength determination, and resolution of images.
4. Describe the principles of polarization, double refraction, optical activity, fluorescence, and phosphorescence, including their applications in optical and ophthalmic instruments.
5. Explain the basic principles, characteristics, types, and medical applications of lasers, with particular emphasis on ophthalmic applications.

COURSE CONTENTS

UNIT-I

09 Hours

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, 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; Trolands

UNIT-II

09 Hours

INTERFERENCE: Interference of Light – Principle of Super Position - Coherence, Coherent, sources, Constructive interference, Destructive interference - Young's double slit Experiment– band width – Colors of Thin Films – Newton's Rings – Determination of Wavelength – Air wedge - Determination of diameter of a thin wire by air wedge Michelson's Interferometer and its Applications.

UNIT-III**09 Hours**

DIFFRACTION: Fresnel's Diffraction – Zone Plate and a Convex Lens – Diffraction at Circular aperture, Opaque circular disc, Straight edge and Narrow wire -. Fraunhofer's Diffraction – Diffraction at a Slit, Circular Aperture and Disc – Theory of Plane Transmission Grating. Resolution of Images – Rayleigh's Criterion – Resolving Power of Telescope, Microscopes, Prisms and Grating. Scattering; Rayleigh's scattering; Tyndall effect.

UNIT-IV**09 Hours**

POLARIZATION: Double Refraction – Brewster's Law – Nicol Prism – polarizer and analyzer - Huygens Explanation of double refraction – Elliptically & Circularly polarized light – Quarter Wave and Half Wave Plates - Polaroids and their uses -Optical Activity –Fresnel's Explanation – Bi quartz Polarimeter – Determination of Specific Rotatory Power using Half Shade Polarimeter. Fluorescence and Phosphorescence- Introduction to Fluorescence and Phosphorescence, Applications of Fluorescence

UNIT-V**09 Hours**

LASERS: Introduction –Basic Principle of LASER – spontaneous and stimulated emission, Coherence –Population Inversion – Different Types of Pumping –Systems – characteristics of LASER . Types of Laser: He-Ne Laser – Nd YAG laser – CO₂Laser – Semiconductor Laser - 3-D Profiling Using Lasers – Applications of Laser in Field of Medicine – ophthalmic applications.

SUGGESTED PRACTICALS/DEMONSTRATION (15 Hours)

- Determination of Refractive Index of the given Liquid – Newton's Ring
- Refractive Index of Hollow Prism
- Small Angle Prism
- Resolving Power of Prism
- Polarimeter - Specific Rotation
- Diffraction using Single Slit and Double Slit - determine its width.
- Determination of Wavelength of He-Ne - Laser Grating
- Michelson's Interferometer - determine the wavelength
- Circular Aperture - Airy disk, dependence of disk diameter on aperture size

- Verification of Malus' Law using a polarizer – analyzer combination
- Thickness of thin glass plate Michelson's Interferometer
- Photometry of Images: Verification of Inverse Square Law; Effect of aperture size on image illuminance

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- Keating NM. P, *Geometric, Physical and Visual Optics*, Butterworth-Heinemann, Massachusetts, USA, 2002.
- Pedrotti L. S, Pedrotti Sr. F. L, *Optics and Vision*, Prentice Hall, New Jersey, USA, 1998.
- Keating NM. P, *Geometric, Physical and Visual Optics*, Butterworth-Heinemann, Massachusetts, USA, 2002.

Course Title: Mathematics & Geometrical Optics I	L	T	P	Cr.
Course Code: BOPT105	3	0	0.5	3.5

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

1. Apply the principles of trigonometry, complex numbers, DeMoivre's theorem, and binomial theorem to solve mathematical problems related to optics.
2. Explain the concepts of scalars, vectors, matrices, determinants, vector spaces, and linear equations and apply matrix operations to solve mathematical problems.
3. Describe wavefronts, curvature, vergence, convergence, divergence, and refractive index, and explain the principles of Fermat and Huygens for deriving the laws of reflection and refraction.
4. Explain the principles of reflection and refraction using plane and spherical mirrors, apply sign conventions and vergence equations, and describe image formation and optical properties of glass slabs.
5. Explain the properties of prisms, including deviation, angular dispersion, dispersive power, Abbe's number, and refractive index, and apply the principles of thin prisms and prism diopters in ophthalmic optics.

COURSE CONTENTS

UNIT-I

09 Hours

Trigonometry: Complex numbers, DeMoivre's Theorem and important deductions, Trigonometric and exponential forms of complex numbers and applications. Expansion of $\sin q$, $\cos q$ and $\tan q$ in terms of q . Algebra: Combinations; Binomial theorem for any index

UNIT-II

09 Hours

Definition of scalars, vectors and matrices. Addition and subtraction of vectors and matrices; vector norm and matrix determinants. Dot and cross products; angle between vectors. Multiplication of two matrices. Inverse of matrices; solution of simultaneous linear equations using matrices. Concepts of groups, rings and vector spaces. Definition of linearity and applications

UNIT-III**09 Hours**

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. Fermat's and Huygen's Principle –Derivation of laws of reflection and refraction (Snell's law) from these principles

UNIT-IV**09 Hours**

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, Reflectivity; transmissivity; Snell's Law, Refraction at a plane surface, Glass slab; displacement without deviation; displacement without dispersion

UNIT-V**09 Hours**

Thick prisms; angle of prism; deviation produced by a prism; refractive index of the prism, angular dispersion; dispersive power; Abbe's number, Definition of crown and flint glasses; materials of high refractive index, Thin prism – definition; definition of Prism diopter; deviation produced by a thin prism; its dependence on refractive index

SUGGESTED PRACTICALS/DEMONSTRATION (15 Hours)

- Thick Prism – determination of prism angle and dispersive power; calculation of the refractive index
- Thin Prism – measurement of deviation; calculation of the prism dioptre
- Fresnel's Biprism - determine the wavelength of a monochromatic light source
- Refractive Index of Solid Prism
- Image formation by spherical mirrors.

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.*
- *B. S. Grewal, Higher Engineering Mathematics, 43/e, Khanna Publishers, 2014.*
- *Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.*
- *Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw-Hill, New York, USA, 2002.*

Course Title: Introduction to Optometry[#]	L	T	P	Cr.
Course Code: BOPT106	2	0	0	2

Total Hours 30 hrs**Course Outcomes:** At the end of the course students will be able to...

1. Define optometry and explain the rights, responsibilities, and professional roles of an optometrist in comprehensive eye care.
2. Explain the integration of basic sciences and support courses in optometry and describe their importance in clinical practice.
3. Describe the principles of primary eye care and identify common causes of blindness, vision impairment, refractive errors, and ocular diseases such as cataract, diabetic retinopathy, and glaucoma.
4. Identify the major disciplines of optometry, including binocular vision, contact lenses, low vision care, occupational optometry, and sports optometry, and explain their roles in eye care.
5. Describe the evolution of optometry in India, the structure of allied and healthcare professions, the position of optometry within the healthcare system, global practice trends, and the professional qualities required to become a healthcare professional.

COURSE CONTENTS**UNIT-I****10 Hours**

Introduction to optometry, Definition, Rights and Responsibilities

Integration of basic sciences and support courses to Optometry

Role of optometry in comprehensive eye care.

UNIT-II**10 Hours**

Introduction to Primary eye care, Blindness, Vision impairment, Refractive errors, common ocular diseases like cataract, diabetic retinopathy, glaucoma

Disciplines in Optometry: Binocular vision, Contact lens, Low vision care, Occupational optometry and Sports Optometry etc.

UNIT-III**10 Hours**

Background of the profession: Allied and Health care Profession, Systems and streams of different professions and the position of optometry

Evolution of optometry in India

Global practice trends of optometry

What does it take to become a healthcare professional?

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *J. Boyd Eskridge, John F. Amos, Jimmy D. Bartlett, Clinical Procedures in Optometry*

Course Title: Nutrition[#]	L	T	P	Cr.
Course Code: BOPT107	1	0	0	1

Total Hours 15 hrs

Course Outcomes: At the end of the course students will be able to...

1. Balanced diet.
2. Protein, carbohydrates, vitamins, Minerals, carotenoids and eye.
3. Nutrition and Ocular aging
4. Adverse effects of ocular nutritional supplements.

COURSE CONTENTS

UNIT-I

05 Hours

Introduction: Food groups, RDA, Balanced diet, diet planning. Assessment of nutritional status. Energy: Units of energy, Measurements of energy and value of food, Energy expenditure. Total energy/calorie requirement for different age groups and diseases. Satiety value, Energy imbalance- obesity, starvation. Limitations of the daily food guide. Nutrients and Nutrient derivatives relevant to ocular health: Proteins, Lipids, carbohydrates, vitamins, minerals and trace elements, carotenoids, oxidative stress and the eye.

UNIT-II

05 Hours

Nutrition deficiency and ocular disease: Vitamin A deficiency, Vitamin C deficiency and ocular disease, Vitamin E deficiency, retinitis pigmentosa.

UNIT-III

05 Hours

Nutrition and Ocular Senescence: Nutrition and malnutrition in older people, Dry eye disorders, Glaucoma, Cataract, and Age-related macular degeneration. Contraindications, adverse reactions and ocular nutritional supplements.

Recent Advance in research into nutrition related eye health: Age related eye disease study (AREDS), Carotenoids in Age related eye disease study (CAREDS),

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Textbook on nutrition and dietetics - Clement I 1st edition.*
- *M Swaminathan: Hand book of Food and Nutrition, fifth edition, Bangalore printing & publishing Co.Ltd, Bangalore, 2004*
- *C Gopalan, BV Rama Sastri, SC Balasubramanian: Nutritive Value of Indian Foods, National Institute of Nutrition, ICMR, Hyderabad, 2004*

Course Title: Communication[#]	L	T	P	Cr.
Course Code: BOPT108	1	0	2	3

Total Hours 15 hrs

Course Outcomes: At the end of the course students will be able to...

1. Demonstrate proficiency in vocabulary, grammar, and language skills, including synonyms, antonyms, prefixes, suffixes, active and passive voice, direct and indirect speech, prepositions, and conjunctions.
2. Develop effective written communication skills through letter writing, email writing, essays, articles, memos, note-making, comprehension, summary writing, and creative writing.
3. Demonstrate effective public speaking skills by applying voice modulation, speech preparation, good delivery techniques, and audience-handling strategies.
4. Explain the communication process, identify barriers to communication, and apply appropriate strategies for effective communication with patients and their attendants in hospital settings.
5. Apply effective listening, reading, comprehension, and non-verbal communication skills to improve interpersonal communication, concentration, rapport building, and professional interactions in healthcare settings.

COURSE CONTENTS

UNIT-I

05 Hours

Vocabulary, Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words, Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms. Letter Writing, Email, Essay, Articles, Memos, one word substitutes, note making and Comprehension, Summary writing, Creative writing, newspaper reading. Importance of speaking efficiently, Voice culture, Preparation of speech. Secrets of good delivery, Audience psychology, handling

UNIT-II

05 Hours

Communication process, Elements of communication, Barriers of communication and how to overcome them. Nuances for communicating with patients and their attenders in hospitals.

UNIT-III**05 Hours**

Listening Process, Barriers to Listening, Types of Listening, Importance of listening, Good and persuasive listening, Characteristics of a good listener. Efficient and fast reading, Awareness of existing reading habits, Tested techniques for improving speed, Improving concentration and comprehension through systematic study. Basics of non-verbal communication, Rapport building skills using neuro- linguistic programming (NLP)

SUGGESTED PRACTICALS/DEMONSTRATION (30 Hours)

- Listening comprehension
- Listening and Note-taking
- Training in Listening
- Professional speaking
- Audience Analysis
- Organizing a speech
- Delivering a speech: Presentation Strategies
- Interview Techniques
- Group Discussion
- Professional writing
- Trans-coding -- from verbal to visual & from visual to verbal
- Editing, Proof reading, Referencing
- Proposals
- User manual and Product description
- Reports – feasibility, market survey, project
- Conference paper/journal article writing in IMRAD Format
- Memos and E-mails
- Advertisement Writing
- Scenarios in Optometric Practice (Role play)
- As Clinician
- As Patient
- As Parent/ attendant
- Non-verbal communication

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Graham Lock, Functional English Grammar: Introduction to second Language Teachers. Cambridge University Press, New York, 1996.*
- *Gwen Van Servellen. Communication for Health care professionals: Concepts, practice and evidence, Jones & Bartlett Publications, USA, 2009*

Course Title: Clinical Optometry I #	L	T	P	Cr.
Course Code: BOPT109	0	0	1	1

Total Hours 30 hrs

Course Outcomes: At the end of the course students will be able to...

1. The objective is to introduce the student to the working of a clinic/ hospital
2. To introduce different departments in a hospital/ non-optometry service in a clinic

SUGGESTED PRACTICALS/DEMONSTRATION

- Observe the basic operations of the optometry clinic while interacting with the team members involved in providing optimal care to patients.
- Setting up of an optometric work up room
- Introduction to relevant terminologies, equipment and techniques used for treatment.
- Tour the hospital and get to know other departments in a tertiary eye care hospital and provide a report on the observation
- Coverage on the process of the clinic/ hospital, creating and maintaining medical records (electronic),
- Processes and guidelines in the Human resources department during the studentship along with the roles and responsibilities of the students,
- Observation in clinical and non-clinical processes of the Optometry/ Optical Department. Depending on the availability of the other departments like Disposals of the medical and non- medical waste in the system, Department of Bioengineering, Patient services, eye banks, multimedia/ Web development etc observations can be encouraged.
- Basic Life Support Skills Training
- Observation at the Hospital infection control and Safety and the Quality Control System
- Training on basic clinical protocol for community outreach

2ND SEMESTER

Course Title: General Pharmacology	L	T	P	Cr.
Course Code: BOPT201	3	0	0	3

Total Hours 45 hrs**Course Outcomes:** At the end of the course students will be able to...

1. Basic principle of pharmacokinetics & Pharmacodynamics
2. Commonly used ocular drugs, mechanism, indications, contraindications, drug dosage and adverse effects.

COURSE CONTENTS**UNIT-I****15 Hours**

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

UNIT-II**10 Hours**

Systemic Pharmacology: Autonomic nervous system, Cardiovascular system: Anti-hypertensive and drugs useful in Angina; Diuretics: Drugs used in ocular disorders; Central Nervous System: Alcohol, sedative hypnotics, Depressants. Histamines and Anti histamines, Serotonin, Prostaglandin

UNIT-III**10 Hours**

General & local anaesthetics, Opioids & non-opioids; Chemotherapy: Introduction on general chemotherapy, Specific chemotherapy –Antiviral, antifungal, antibiotics; Hormones: Corticosteroids, Antidiabetics; Blood Coagulants

UNIT-IV**10 Hours**

Principles and classification of autonomic drugs, Sympathomimetics – Sympatholytics, Parasympathomimetics – Parasympatholytics, Diagnostic use of autonomic drugs, Sulfonamides, Antibiotics, Anaesthetics-Proteolytic enzymes

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Essentials of medical pharmacology - K D Tripathi 8th edition*
- *Ocular Therapeutics Handbook by Dr. Bruce E. Onofrey*

Course Title: General Pathology	L	T	P	Cr.
Course Code: BOPT202	2	0	0	2

Total Hours 30 hrs

Course Outcomes: At the end of the course students will be able to...

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

COURSE CONTENTS

UNIT-I

15 Hours

Modes of cell injury, Necrosis & gangrene, Inflammation and repair (Chronic and Acute), Infection in general, Specific infections: Tuberculosis, Leprosy, Syphilis, Fungal infection, Viral, chlamydial infection

UNIT-II

10 Hours

Neoplasia, Haematology, Anemia, Leukemia, Bleeding disorders. Circulatory disturbances: Thrombosis, Infarction, Embolism, Hypersensitivity reactions

UNIT-III

05 Hours

Clinical pathology: Immune system, Shock, Anaphylaxis, Allergy

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Textbook of pathology - Harsh Mohan 8th edition*
- *CORTON KUMAR AND ROBINS: Pathological Basis of the Disease, 7th Edition, Elsevier, New Delhi, 2004.*
- *S R Lakhani Susan AD & Caroline JF: Basic Pathology: An introduction to the mechanism of disease, 1993.*

Course Title: Ocular and related neuroanatomy	L	T	P	Cr.
Course Code: BOPT203	3	0	0.5	3.5

Total Hours 45 hrs

Course Outcomes: At the end of the course students will 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 CONTENTS

UNIT-I

09 Hours

Ocular Embryology. Ocular Structures: Eyeball, Visual pathway, orbit, extraocular muscles and appendages. Ocular Embryology. Eyebrows: Gross anatomy, structure, vessels and nerves, functions. Orbit: Bony orbit, periorbita, orbital fascia, surgical spaces in the orbit, orbital fat and reticular tissue, apertures at the base of orbit, contents of the orbit; Paranasal sinuses. Anatomy of eyelids: Gross, structure, Glands of eyelids, vessels and nerves. Extraocular muscles: rectus, oblique, nerve supply, blood supply.

UNIT-II

09 Hours

Conjunctiva: Parts of conjunctiva, Structure of conjunctiva, the conjunctival glands, Plica semilunaris, the caruncle, Blood supply of the conjunctiva, venous drainage of conjunctiva, lymphatics of the conjunctiva, nerve supply of conjunctiva. Cornea: Dimensions, histology, blood supply, nerve supply, Limbus: Anatomical limbus, surgical limbus, cataract incision; Sclera: Thickness of sclera, special regions of the sclera, scleral apertures, microscopic structure, nerve supply, Uvea : iris, ciliary body choroid, blood supply; Aqueous Humour: Ciliary body, posterior chamber, anterior chamber, angle of the anterior chamber, Gonioscopic grading of the angle, Aqueous outflow system

UNIT-III**09 Hours**

The crystalline lens: structure of the lens, ciliary zonules. Vitreous Humour: general features, Structure (Hyaloid membrane, cortical vitreous, medullary vitreous), attachments, vitreous base. Retina and Visual Pathway: Gross anatomy of retina, microscopic structure, blood-supply of retina, blood retinal barrier; Anatomy of different components of visual pathway, arrangement of nerve fibres, blood supply, lesions of visual pathway.

UNIT-IV**09 Hours**

Lacrimal apparatus: Lacrimal glands (main and accessory; structure, blood supply, lymphatic drainage, nerve supply), Lacrimal passages (Puncta, canaliculi, lacrimal sac, nasolacrimal duct, blood supply, nerve supply). Tear film: Functions, structure (all layers), Physical properties, Chemical composition (water, proteins, metabolites, electrolytes, and lipids). Blood vessels and ocular circulations: Blood vessels – arteries and venous drainage; Ocular circulation – structural characteristics of ocular vessels. Orbital Nerves: Oculomotor, trochlear, abducent, trigeminal, facial, autonomic nerves

UNIT-V**09 Hours**

Central nervous system: Spinal cord and brain stem, Cerebellum, Cerebrum. Nervous system: Neuron –Conduction of impulse –synapse –receptor, Sensory organization –pathways 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 co-ordination

SUGGESTED PRACTICALS/DEMONSTRATION (15 Hours)

- Practical demonstration of bovine eye dissection.
- Retina Layers - Video Demonstration and OCT
- Cranial Nerve Examination
- Meibomian glands using meibography
- Syringing to understand lacrimal apparatus

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

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

Course Title: Ocular and related neurophysiology	L	T	P	Cr.
Course Code: BOPT204	3	0	1	4

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

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

COURSE CONTENTS

UNIT-I

09 Hours

Protective mechanisms in the eye: Eye lids and lacrimation, description of the globe, Extrinsic eye muscles, their actions and control of their movements, Coats of the eye ball, Ocular, movements and saccades

UNIT-II

09 Hours

Cornea, Aqueous humor and vitreous: Intra ocular pressure, Iris and pupil, Crystalline lens and accommodation – presbyopia, Mechanism of accommodation, Retina – structure and functions

UNIT-III

09 Hours

Vision – general aspects of sensation, Pigments of the eye and photochemistry, The visual stimulus, refractive errors, Visual acuity, Vernier acuity and principle of measurement, Visual perception – Binocular vision, stereoscopic vision, optical illusions

UNIT-IV

09 Hours

Visual pathway, central and cerebral connections, Introduction to electro physiology, Retinal sensitivity and Visibility, Receptive stimulation and flicker

UNIT-V**09 Hours**

Colour vision and colour defects. Theories and diagnostic tests, Scotopic and Photopic vision, Color vision, Color mixing, Visual perception and adaptation, Introduction to visual psychology (Psychophysics)

SUGGESTED PRACTICALS/DEMONSTRATION (15 Hours)

- Examination of Lid movements and Extra ocular movements
- Tests for lacrimation
- Experiments on Binocular vision (Accommodation, Vergence, Disparity, Single Vision, Fusion & Stereopsis)
- Examination of Pupillary reflexes
- Experiments on Light and dark adaptation
- Experiments on Colour Vision

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006*
- *L A Remington: Clinical Anatomy of the Visual System, Second edition, Elsevier Butterworth Heinemann, Missouri, USA, 2005*
- *PL Kaufman, A Alm: Adler's Physiology of the eye clinical application, 10th edition, Mosby, 2002*

Course Title: Ocular Biochemistry	L	T	P	Cr.
Course Code: BOPT205	3	0	1	4

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

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 CONTENTS

UNIT-I

09 Hours

Importance of ocular biochemistry in ophthalmic practice; Tear film – Functions of Tear film. Different layers of Tear film. Chemical composition of tears. Tear film abnormalities. Tests for film Adequacy, Cornea – Biochemical composition of cornea. Sources of Nutrients-Oxygen, Glucose, Amino acid. Metabolic pathway in cornea – Glycolysis, HMP shunt

UNIT-II

09 Hours

Lens – Biochemical composition of lens. Lens protein – their types & characteristics. Lens Metabolism - Carbohydrate metabolism, protein metabolism. Cataract – Due to biochemical defects of lens. Antioxidant mechanism in the lens

UNIT-III

09 Hours

Retina – structure – composition – photoreceptor cell – metabolism and functions – phagocytosis; Retinal neurochemistry – Monoamines – acetylcholine – GABA – amino acids – taurine – neuropeptides – Biochemical correlates of retinal diseases

UNIT-IV**09 Hours**

Biochemistry of the visual process; Photopigments – Rhodopsin & Iodopsin. Chemical nature of Rhodopsin. Visual cycle (Bleaching of Rhodopsin, Transducin cycle, Role of Phosphodiesterases)

UNIT-V**09 Hours**

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.

SUGGESTED PRACTICALS/DEMONSTRATION (30 Hours)

- Quantitative and qualitative analysis by spectrophotometry
- Electrophoresis o Chromatography – Lysozyme, Lactoferrin, IgA etc
- Preparation of normal, molar and percentage solutions – matching Tear Osmolarity.
- Measurement of tear osmolarity
 - Preparation of buffers, pH determination
- pH estimation of tears.
- Biochemistry Assay using following specimens
 - Tears of different age groups
 - Cataract lens
 - Different types of used contact lenses
 - Contact lens solutions on tears

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

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

- *S. Ramakrishnan, K G Prasannan and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990*
- *D R Whikehart: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003*

Course Title: Geometrical Optics II	L	T	P	Cr.
Course Code: BOPT206	3	0	1	4

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

1. Explain the concepts of vergence, vergence techniques, Gullstrand's schematic eye, visual acuity, the Stiles-Crawford effect, emmetropia, and ametropia.
2. Describe retinal blur and apply the principles of spherical ametropia correction, vertex distance, effective power, and dioptric power calculations of spectacle lenses.
3. Calculate angular magnification in aphakic spectacles and determine the position of line images formed by sphero-cylindrical lenses to understand the correction of astigmatism.
4. Explain the thin lens model of the eye, angular magnification, relative spectacle magnification, aperture stops, entrance and exit pupils, and various optical aberrations.
5. Describe the principles of telescopes and microscopes, explain accommodation and its related formulae, and perform calculations involving near point, spectacle lens magnification, addition power (add), and depth of field.

COURSE CONTENTS

UNIT-I

10 Hours

Vergence and vergence techniques revised. Gullstrand's schematic eyes, visual acuity, Stile Crawford. Emmetropia and ametropia

UNIT-II

15 Hours

Blur retinal Imaginary, Correction of spherical ammetropia, vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptric power, angular magnification of spectacles in aphakic. Astigmatism. - To calculate the position of the line image in a sphero-cylindrical lens.

UNIT-III

10 Hours

Thin lens model of the eye –angular magnification –spectacle and relative spectacle magnification. Aperture stops- entrance and exit pupils.

Aberrations Spherical – Coma - Oblique astigmatism - Curvature of the field – Distortion - Chromatic (longitudinal and lateral) - higher order aberrations.

UNIT-IV

10 Hours

Telescopes and Microscopes, Accommodation Accommodation formulae and calculations. angular magnification of spectacle lens, near point, calculation of add, depth of field.

SUGGESTED PRACTICALS/DEMONSTRATION (30 Hours)

- Image formation with Cylindrical Lenses, Imaging by two cylinders in contact
- Image formation with spherocylindrical lens – sphere and cylinder in contact
- Calculation of Spectacle and Relative Spectacle Magnification
- Construction of a tabletop telescope – all three types of telescopes.
- Construction of a tabletop microscope
- Demonstration of Aberrations

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Tunnacliffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990.*
- *Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.*
- *Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.*
- *Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw Hill, New York, USA, 2002.*

Course Title: Basics of Computers#	L	T	P	Cr.
Course Code: BOPT207	0	0	1	1

Total Hours 30 hrs

Course Outcomes: At the end of the course students will be able to...

1. Identify the basic components of a computer system, including input and output devices, the central processing unit, memory, storage devices, and operating systems.
2. Create, edit, format, save, and print documents using MS Word and perform tasks such as table creation, spell checking, and mail merge.
3. Use MS Excel to enter and format data, manage worksheets and workbooks, print worksheets, and create graphs for data presentation.
4. Develop and deliver presentations using MS PowerPoint by creating, formatting, and enhancing slides and incorporating graphs and other visual elements.
5. Explain computer networks, including LAN, MAN, WAN, the Internet, and intranet, and describe their applications in healthcare.
6. Describe the applications of computers in healthcare, including hospital data management systems and the organization, storage, retrieval, and management of patient information.

SUGGESTED PRACTICALS/DEMONSTRATION

- Introduction to computer: Input and output devices: Processor and memory: The Central Processing Unit (CPU), main memory. Storage Devices, Introduction of windows, Introduction of Operating System
- Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.
- Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
- Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
- Computer networks: introduction, types of networks (LAN, MAN, WAN, Internet, Intranet), Internet and its Applications.
- Introduction to computer applications in health and hospital data management system

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Sinha, P. K., and Sinha, P. Computer Fundamentals. BPB Publications.*
- *Rajaraman, V. Fundamentals of Computers. PHI Learning.*
- *Leon, A., and Leon, M. Fundamentals of Information Technology. Vikas Publishing House.*
- *Microsoft Support. Microsoft 365 Training and Help. Microsoft. Available at: <https://support.microsoft.com/>*
- *Goel, A. Computer Fundamentals. Pearson Education.*
- *World Health Organization. Global Strategy on Digital Health 2020–2025. World Health Organization. Available at: <https://www.who.int/health-topics/digital-health>*

Course Title: Clinical Optometry-II #	L	T	P	Cr.
Course Code: BOPT208	0	0	2	2

Total Hours 60 hrs

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 maintain a log of all the cases seen in the outpatient department. Students will be given hands on training on basic optometry procedures such as history taking, vision testing, basic binocular vision testing and other ancillary procedures that are part of a comprehensive eye examination.

COURSE PLAN:

- History Taking in systemic conditions and its relevant ocular implications
- General medications and its systemic conditions
- Interpretation of lab reports: Blood reports, urine reports, endocrinology reports
- Estimation of random blood sugar
- Estimation of Blood Pressure and pulse rate
- Demonstration of CPR
- Clinical Assessment of cranial nerve functions
- Visual Acuity tests for adult and children
- Basic Binocular Vision tests
- Tear film and lid assessment

3RD SEMESTER

Course Title: General and Ocular Microbiology	L	T	P	Cr.
Course Code: BOPT301	3	0	0.5	3.5

Total Hours 45 hrs**Course Outcomes:** At the end of the course students will be able to...

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 CONTENTS**UNIT-I****09 Hours**

Introduction to Microbiology: History and scope of Medical Microbiology; Prokaryotic Cell structure and functions; Eukaryotic Cell structure and functions; Overview of Bacteriology, Mycology, Virology and Protozoology; Ocular microbiology - Normal ocular flora; Control of Microbial Growth - Antimicrobial methods and Chemotherapy; Basic Laboratory techniques.

UNIT-II**09 Hours**

Sterilization in ophthalmic practice: Heat (dry & wet heat – steam under pressure autoclaving), radiation, filter, chemicals; control of efficacy of sterilization. Disinfection procedure – glutaraldehyde (2%), chlorhexidine, alcohol, iodine; preventive methods – hand washing, needle stick/slash policy; methods to disinfect tonometer and Slit lamp biomicroscope; Preventative method in operation theatre – attire, caps & masks, hand washing, cleaning procedure.

UNIT-III**09 Hours**

Ocular Immunology: Innate and adaptive immunity; Hypersensitivity responses – Anaphylactic hypersensitivity, cytotoxic hypersensitivity, Complex-mediated hypersensitivity, Delayed hypersensitivity; Autoimmunity; Host parasite relationship.

UNIT-IV**09 Hours**

Ocular Bacteriology: Ocular Bacterial diseases, Pathological mechanisms, Immunity, Laboratory diagnosis

Ocular Mycology: Ocular Mycotic diseases, Laboratory diagnosis

Ocular Virology: Ocular Viral infections, Immunity, Laboratory diagnosis;

Ocular Parasitology: Acanthameba, Toxoplasma, Onchocerciasis, Toxocariasis, Cysticercus cellulosae (larval form of Taenia solium), Phthiriasis

UNIT-V**09 Hours**

Hospital borne ocular infections: postoperative endophthalmitis, conjunctivitis, infections transmitted through corneal transplantations, hepatitis, HIV; high risk areas and staff; preventive methods, AIDS protocol, infective waste disposal

SUGGESTED PRACTICALS/DEMONSTRATION (15 Hours)

- Sterilization & Disinfection procedures and quality control
- Collection of specimens from conjunctiva, lid margin (using sterile cotton swabs), Specimen processing
- Isolation & Purification of microbes from collected specimens
- Characteristic growth on different culture media
- Characterization & Identification · Staining – Gram staining, Acid fast staining, Spore Staining, Flagella staining · Motility – Hanging drop method · Biochemical tests · Antibiotic sensitivity test
- Isolation and identification of various fungal strains in the laboratory
- Video demonstration of collection of specimen from cornea intraocular specimens (Aqueous humor and Vitreous aspirate) processing and reporting on bacterial and fungal cultures and reporting.
- Lab tour/ orientation to the PCR facility in diagnosis of ocular infections

- Impression Cytology of conjunctiva

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Textbook of microbiology - Ananthanarayan and Paniker 11th edition*
- *KJ Ryan, CG Ray: Sherris Medical Microbiology- An Introduction to infectious Diseases, fourth edition, McGRAW HILL Publisher, New Delhi, 1994*
- *MACKIE & McCartney Practical Medical Microbiology*
- *SYDNEY M. FINEGOLD & ELLEN JO BARON: Diagnostic Microbiology (DM)*

Course Title: Ocular Pharmacology	L	T	P	Cr.
Course Code: BOPT302	3	0	0	3

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

1. Basic principle of pharmacokinetics & Pharmacodynamics
2. Commonly used ocular drugs, mechanism, indications, contraindications, drug dosage and adverse effects.

COURSE CONTENTS

UNIT-I

09 Hours

Ocular Pharmacology: Ocular preparations, formulations and requirements of an ideal agent. Ocular Pharmacokinetics, methods of drug administration & Special drug delivery system; Ocular Toxicology

UNIT-II

09 Hours

Diagnostic & Therapeutic applications of drugs used in Ophthalmology: Diagnostic Drugs & biological agents used in ocular surgery, Anaesthetics used in ophthalmic procedures, Anti-glaucoma drugs

UNIT-III

09 Hours

Pharmacotherapy of ocular infections –Bacterial, viral, fungal & chlamydial infections

UNIT-IV

09 Hours

Pharmacotherapy of Drugs used in allergic, inflammatory & degenerative conditions of the eye

UNIT-V

09 Hours

Pharmacotherapy of Immune modulators in Ophthalmic practice, Wetting agents & tear substitutes, Antioxidants

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Ashok Garg: Manual of Ocular Therapeutics, Jaypee, New Delhi, 1996*
- *T J Zimmerman, K S Kooner: Text Book of Ocular Pharmacology, Lippincott Raven, 1997*

Course Title: Visual optics I	L	T	P	Cr.
Course Code: BOPT303	3	0	1	4

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

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 CONTENTS

UNIT-I

10 Hours

Review of Geometrical Optics: Vergence and power. Conjugacy, object space and image space, Sign convention, Spherical refracting surface, Spherical mirror; catoptric power, Cardinal points, Magnification, Light and visual function, Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Bi-refringence, Dichroism. Aberration and its application Spherical and Chromatic aberration

UNIT-II

10 Hours

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

UNIT-III

10 Hours

Measurements of Optical Constants of the Eye, Corneal curvature and thickness, Keratometry, Curvature of the lens and ophthalmophakometry

Axial and axis of the eye, Basic Aspects of Vision. Visual Acuity, Light and Dark Adaptation, Color Vision, Spatial and Temporal Resolution, Science of Measuring visual performance and application to Clinical Optometry

UNIT-IV

15 Hours

Refractive anomalies and their causes, Etiology of refractive anomalies

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

SUGGESTED PRACTICALS/DEMONSTRATION (30 Hours)

- Study of Purkinje images I to IV.
- Measurement of corneal curvature.
- Measurement of corneal thickness.
- Mathematical models of the eye - emmetropia, Hyperopia, Myopia
- Conjugate points - demonstration - worked examples.
- Axial and refractive ametropia - hyperopia, myopia - worked examples.
- Construction of Visual acuity charts
- Effect of lenses in front of the eye
- Effect of prisms in front of the eye
- Vision through pinhole, slit, filters, etc.

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *A H Tunnaclyffe: Visual optics, The Association of British Optician, 1987*
- *AG Bennett & RB Rabbets: Clinical Visual optics, 3rd edition, Butterworth Heinemann, 1998*
- *T Grosvenor: Primary Care Optometry, 4th edition, Butterworth heinneman, USA, 2002*
- *M P Keating: Geometric, Physical and Visual optics, 2nd edition, Butterworth Heinemann, USA, 2002*
- *HL Rubin: Optics for clinicians, 2nd edition, Triad publishing company. Florida, 1974.*
- *H Obstfeld: Optic in Vision- Foundations of visual optics & associated computations, 2nd edition, Butterworth, UK, 1982.*
- *WJ Benjamin: Borish"s clinical refraction, 2nd edition, Butterworth Heinemann, Missouri, USA, 2006*

Course Title: Optometric optics	L	T	P	Cr.
Course Code: BOPT304	3	0	1	4

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

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, plano convex, periscopic, etc.)
3. Ophthalmic prism knowledge –effects, units, base-apex notation, compounding and resolving prisms.
4. Knowledge lens designs –single vision, bifocals, progressive lens
5. Knowledge on tinted and protective lenses

COURSE CONTENTS

UNIT-I

09 Hours

Introduction –Light, Mirror, Reflection, Refraction and Absorption. Lenses – Definition, units, terminology used to describe, form of lenses Vertex distance and vertex power, Effectivity calculations

UNIT-II

09 Hours

Lens shape, size and types i.e. Spherical, cylindrical and Sphero-cylindrical

Transpositions –Simple, Toric and Spherical equivalent, Surfacing of spherical and cylindrical lenses

UNIT-III

09 Hours

Spherometer & Sag formula, Edge thickness calculations, Manufacturing of lenses, Inspection of Lenses

UNIT-IV

09 Hours

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

decentration and Prentice rule, Prismatic effect of Plano-cylinder and Spherocylinder lenses

UNIT-V

09 Hours

Lens Designs: Single Vision, Bifocals and Multifocal Lenses.

Tints and Protective Lenses, Special design lenses, Aberration in Ophthalmic Lenses

SUGGESTED PRACTICALS/DEMONSTRATION (30 Hours)

- Lens curvature and refractive index calculation with lens gauge, Lens material, design selection
- Lensometry (Single vision, Bifocal and Progressives, prism spectacles)
- Identification of lens defects
- Identification of tints, safety eyewear, and special lenses
- Demonstration of newer design lenses
- Visit to manufacturing lab set up to demonstrate surfacing of lenses.

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Jalie M: The principles of Ophthalmic Lenses, The Association of Dispensing Opticians, London, 1994.*
- *David Wilson: Practical Optical Dispensing, OTEN- DE, NSW TAFE Commission, 1999*
- *C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth-Heinemann, USA, 1996*

Course Title: Ocular Disease I	L	T	P	Cr.
Course Code: BOPT305	3	0	0	3

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

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

COURSE CONTENTS

UNIT-I

07 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 trauma, Approach to a patient with proptosis

UNIT-II

06 Hours

Lids

Applied Anatomy, Congenital anomalies (Ptosis, Coloboma, Epicanthus, Distichiasis, Cryptophthalmos) Oedema of the eyelids (Inflammatory, Solid, Passive edema) Inflammatory disorders (Blepharitis, External Hordeolum, Chalazion, Interalthordeolum, Molluscum Contagiosum) Anomalies in the position 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)

UNIT-III**06 Hours**

Lacrimal System: Applied Anatomy, Tear Film, The Dry Eye (Sjogren's Syndrome), The watering eye (Etiology, clinical evaluation), Dacryocystitis, Swelling of the Lacrimal gland (Dacryoadenitis)

UNIT-IV**08 Hours**

Conjunctiva

Applied Anatomy, Inflammations of conjunctiva (Infective conjunctivitis – bacterial, chlamydial, viral, Allergic conjunctivitis, Granulomatous conjunctivitis)

Degenerative conditions (Pinguecula, Pterygium, Concretions) Symptomatic conditions (Hyperaemia, Chemosis, Ecchymosis, Xerosis, Discoloration), Cysts and Tumors

UNIT-V**10 Hours**

Cornea

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

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

UNIT-VI**08 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

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007*
- *A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007*
- *Stephen J. Miller: Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990*

Course Title: Indian Medicine and Telemedicine#	L	T	P	Cr.
Course Code: BOPT306	2	0	0	2

Total Hours 30 hrs**Course Outcomes:** At the end of the course students will be able to...

1. Describe the healthcare delivery system in India, including primary, secondary and tertiary healthcare services, community participation, the private sector, the National Health Mission and the National Health Policy.
2. Explain the background, objectives, action plans, targets, operational strategies, achievements and constraints of various National Health Programmes in India.
3. Identify and explain the major systems of AYUSH, including Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy, and discuss the need for integration of different systems of medicine.
4. Analyze the past, present and future health scenario of India and explain the structure, components, dissemination and impact of telemedicine in healthcare delivery.

COURSE CONTENTS**UNIT-I****08 Hours**

Introduction to healthcare delivery system

Healthcare delivery system in India at primary, secondary and tertiary care

Community participation in healthcare delivery system

Health system in developed countries.

Private Sector

National Health Mission

National Health Policy

Issues in Health Care Delivery System in India

UNIT-II**08 Hours**

National Health Programme-Background objectives, action plan, targets, operations, achievements and constraints in various National Health Programme.

UNIT-III**08 Hours**

Introduction to AYUSH system of medicine

1. Introduction to Ayurveda.
2. Yoga and Naturopathy
3. Unani
4. Siddha
5. Homeopathy

Need for integration of various system of medicine

UNIT-IV**06 Hours**

Health scenario of India- past, present and future

Telemedicine: Structure, components, Dissemination and Impact

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Margie Lovett Scott, Faith Prather. Global health systems comparing strategies for delivering health services. Joney & Bartlett learning, 2014 (page 167 -178)*

Course Title: Clinical Optometry-III	L	T	P	Cr.
Course Code: BOPT307	0	0	4	4

Total Hours 120 hrs

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 optometric 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.

COURSE PLAN

1. Evaluation of EOM, Cover test, Hirschberg Test
2. Measurement of NPA, NPC, Stereopsis
3. Pupillary evaluation
4. Tests for Colour vision
5. Procedure of Confrontation
6. Measurement of IPD
7. Lensometry
8. Keratometry
9. Placido disc
10. Ptosis evaluation
11. Proptosis evaluation
12. Anterior segment evaluation – Torch light and slit lamp evaluation
13. Photostress recovery test
14. Red saturation test

4th SEMESTER

Course Title: Optometric Instruments	L	T	P	Cr.
Course Code: BOPT401	3	0	0.5	3.5

Total Hours 45 hrs**Course Outcomes:** At the end of the course students will be able to...

1. Explain the principles of optotypes, modulation transfer function (MTF), spatial frequency, test chart standards, trial case lenses and phoropter units, including their optical considerations.
2. Describe the design and application of trial frames, retinoscopes, objective optometers and infrared optometer devices in clinical vision assessment.
3. Explain the principles, features and clinical applications of projection charts, brightness acuity tests, vision analyzers, pupilometers, potential acuity meters and aberrometers.
4. Describe the construction, optical principles and clinical applications of direct and indirect ophthalmoscopes, including illumination systems, viewing systems, ophthalmoscope discs and filters.
5. Explain the working principles, components and clinical uses of lensometers, lens gauges, slit lamps and tonometers.
6. Demonstrate an understanding of the principles and clinical applications of keratometers, corneal topography systems, refractometers, synaptophores and colour vision testing devices.
7. Describe the principles and applications of visual field assessment, vision screening devices, scanning technologies, electrodiagnostic instruments and newer ophthalmic diagnostic instruments.

COURSE CONTENTS**UNIT-I****07 Hours**

Optotypes and MTF, Spatial Frequency

Test charts standards.

Choice of test charts

Trial case lenses

Refractor (phoropter) head units

Optical considerations of refractor units

UNIT-II**07 Hours**

Trial frame design

Near vision difficulties with units and trial frames

Retinoscope – types available

Adjustment of Retinoscopes- special features

Objective optometers.

Infrared optometer devices

UNIT-III**07 Hours**

Projection charts

Illumination of the consulting room.

Brightness acuity test

Vision analyzer

Pupilometer

Potential Acuity Meter

Abberometer

UNIT-IV**06 Hours**

Ophthalmoscopes and related devices, Design of ophthalmoscopes – illumination, Design of ophthalmoscopes- viewing, Ophthalmoscope disc

Filters for ophthalmoscopy, Indirect ophthalmoscope

UNIT-V**06 Hours**

Lensometer

Lens gauges or clock

Slit lamp

Tonometers

UNIT-VI

06 Hours

Keratometer and corneal topography

Refractometer

Orthoptic Instruments (Synaptophore Only)

Color Vision Testing Devices

UNIT-VII

06 Hours

Fields of Vision And Screening Devices

Scans Electrodiagnostics New Instruments

SUGGESTED PRACTICALS/DEMONSTRATION (15 Hours)

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. Electrodiagnostic instrument (ERG, VEP, EOG)
13. A –Scan Ultrasound
14. Lensometer

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *David Henson: Optometric Instrumentations, Butterworth- Heinemann, UK, 1991*
- *P R Yoder: Mounting Optics in Optical Instruments, SPIE Society of Photo-Optical Instrumentation, 2002*
- *G Smith, D A. Atchison: The Eye and Visual Optical Instruments, Cambridge University Press, 1997*

Course Title: Clinical examination of visual system	L	T	P	Cr.
Course Code: BOPT402	1	0	2	3

Total Hours 15 hrs

Course Outcomes: At the end of the course students will be able to...

1. Perform patient history taking and assess visual acuity, extraocular motility, ocular alignment and binocular eye movements using appropriate clinical tests, including cover tests, Hirschberg test, modified Krimsky test, Maddox rod, saccades and pursuit tests.
2. Evaluate pupillary reactions, colour vision, stereopsis, visual fields by confrontation, photostress recovery, macular function using the Amsler grid and contrast sensitivity using appropriate clinical testing methods.
3. Conduct external eye examination and slit-lamp biomicroscopy, assess anterior chamber depth using the Van Herick technique, measure intraocular pressure using tonometry, evaluate lacrimal drainage and tear film function using ROPLAS, Schirmer's test, tear break-up time (TBUT), tear meniscus assessment and non-invasive TBUT (NITBUT), and perform ophthalmoscopy for ocular health assessment.

COURSE CONTENTS

UNIT-I

05 Hours

History taking, Visual acuity estimation, Extraocular motility, Cover test, Alternating cover test, Hirschberg test, Modified Krimsky, Maddox Rod, Saccades and pursuit test

UNIT-II

05 Hours

Pupils Examination, Color Vision, Stereopsis, Confrontation test, Photostress test, Amsler test, Contrast sensitivity function test

UNIT-III

05 Hours

External examination of the eye, Slit lamp biomicroscopy, Van Herrick, Tonometry, ROPLAS, Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer), Ophthalmoscopy

SUGGESTED PRACTICALS/DEMONSTRATION (60 Hours)

1. History taking
2. Visual acuity estimation
3. Extraocular motility, Cover test, 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 (keratometer),
10. Color Vision
11. Stereopsis
12. Confrontation test
13. Photostress test
14. Slit lamp biomicroscopy
15. Ophthalmoscopy
16. Tonometry
17. ROPLAS
18. Amsler test
19. Contrast sensitivity function test
20. Saccades and pursuit test

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international(p) Ltd. Publishers, New Delhi, 2007*
- *D B. Elliott: Clinical Procedures in Primary Eye Care, 3rd edition, Butterworth Heinemann, 2007*
- *Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth-Heinemann, 2007*
- *J.B Eskridge, J F. Amos, J D. Bartlett: Clinical Procedures in Optometry, Lippincott Williams and Wilkins, 1991*
- *N B. Carlson, D Kurtz: Clinical Procedures for Ocular Examination, 3rd edition, McGraw-Hill Medical, 2003*

- *T Grosvenor: Primary Care Optometry, 5th edition, Butterworth Heinemann, USA, 2007.*

Course Title: Visual perception and psychophysics	L	T	P	Cr.
Course Code: BOPT403	2	0	0.5	2.5

Total Hours 30 hrs

Course Outcomes: At the end of the course students will be able to...

1. Explain the physiological mechanisms of visual processing at different retinal layers, the functions of bipolar and ganglion cells, receptive fields, post-retinal visual pathways, scotopic and photopic vision, parvocellular and magnocellular pathways, and postnatal development of human vision.
2. Describe the principles of psychophysics, including Weber's law, Fechner's law, classical and modern concepts of visual thresholds, internal and external noise, factors affecting thresholds, and psychophysical methods such as the method of limits, staircase and adaptive techniques, and forced-choice procedures.
3. Analyze the spatial and temporal aspects of vision, including radiometry, photometry, luminance, illuminance, modulation transfer function, contrast sensitivity function, spatial and temporal summation, visual acuity, Nyquist limit, critical flicker frequency, motion perception and monocular and binocular depth perception.
4. Explain the physiological and perceptual mechanisms of colour vision, including rod and cone spectral sensitivity, trichromatic and opponent-process theories, neural processing of colour perception, and the principles and clinical applications of colour vision testing.

COURSE CONTENTS

UNIT-I

07 Hours

Visual Physiology: Processing of light at each layer of retina, Types of Bipolar cells, ganglion cells, Receptive fields, Post retinal visual pathways in terms of visual processing, Duplex retina – Scotopic and photopic visual system, absolute sensitivity of vision, parallel pathways – parvo and magnoretinogeniculate pathway, postnatal human vision development

UNIT-II

08 Hours

Introduction to Psychophysics: Weber's Law and Fechner's Law, Classical concepts of thresholds, Modern concepts of thresholds – statistical nature of thresholds; internal and external noise; factors affecting thresholds, Psychophysical methods of threshold estimations – methods of limits,

staircase and adaptive techniques of threshold estimation, forced-choice procedures

UNIT-III

08 Hours

Spatial & temporal aspects of vision: Basic concepts of photometry and radiometry, v Lambda function/ Luminance/ Illuminance, Modulation transfer function (MTF), contrast sensitivity function (CSF), Effect of optical and neural disorders on the CSF, Spatial summation, Ricco's law, differences between acuity types, conversion of visual acuity to grating acuity, Nyquist limit, Temporal procession of vision, Critical flicker frequency (CFF), temporal summation, Bloch's law, Motion perception, Depth perception – monocular and binocular depth cues

UNIT-IV

07 Hours

Color vision: Rod and Cone Spectral Sensitivity Function, Theories of colour vision – trichromatic theory and colour opponent theory, visual processing involved in color perception, clinical testing of color vision and principles

SUGGESTED PRACTICALS/DEMONSTRATION (15 Hours)

- Determination of blur threshold
- Visual acuity testing
- Colour vision examination

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

S. H. Schwartz, Visual Perception – A Clinical Orientation, 5/e, McGraw-Hill Medical Publishing Division, New York, USA, 2017

Course Title: Visual Optics II	L	T	P	Cr.
Course Code: BOPT404	3	0	1	4

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

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 CONTENTS

UNIT-I

09 Hours

Accommodation & Presbyopia, Far and near point of accommodation, Range and amplitude of accommodation, Mechanism of accommodation, Variation of accommodation with age, Anomalies of accommodation, Presbyopia, Hypermetropia and accommodation

UNIT-II

09 Hours

Convergence: Type, Measurement and Anomalies

Relationship between accommodation and convergence-AC/A ratio

UNIT-III

09 Hours

Objective Refraction (Static & Dynamic), Streak retinoscopy, Principle, Procedure, Difficulties and interpretation of findings, Transposition and spherical equivalent, Dynamic retinoscopy various methods

Radical retinoscopy and near retinoscopy, Cycloplegic refraction

UNIT-IV

09 Hours

Subjective Refraction: Principle and fogging, Fixed astigmatic dial (Clock dial), Combination of fixed and rotator dial (Fan and block test), J.C.C

Duochrome test, Binocular balancing- alternate occlusion, prism dissociation, dissociate Duochrome balance, Borish dissociated fogging, Binocular refraction-Various techniques, Prescribing guidelines,

Understanding Myopia: Theories, definitions, myopia management, recent advancements

UNIT-V

09 Hours

Effective Power & Magnification: Ocular refraction vs. Spectacle refraction

Spectacle magnification vs. Relative spectacle magnification, Axial vs. Refractive Ametropia, Knapp's law, Ocular accommodation vs. Spectacle accommodation, Retinal image blur-Depth of focus and depth of field

SUGGESTED PRACTICALS/DEMONSTRATION (30 hours)

- Visual acuity, stereo acuity in emmetropia.
- Myopia and pseudomyopia, myopia and visual acuity
- Myopic correction - subjective verification - monocular and binocular
- Hypermetropia - determination of manifest error subjectively.
- Hypermetropic correction: subjective verification
- Demonstration of astigmatism.
- Use of slit and Keratometry to find the principle meridians.
- Astigmatism: Fan - subjective verification tests
- Astigmatism: Cross-Cyl. - subjective verification tests.
- Measurement of accommodation: near and far points and range.
- Presbyopic correction and methods: accommodative reserve, balancing the relative accommodation and cross grid test.
- Methods of differentiating axial and refractive ametropia
- Practice of Retinoscopy
- Interpretation of cycloplegic retinoscopic findings.
- Prescription writing.
- Binocular refraction.
- Photo refraction.

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Theodore Grosvenor: Primary Care Optometry, 5th edition, Butterworth Heinemann, 2007*
- *Duke –Elder"s practice of Refraction*
- *AI Lens: Optics, Retinoscopy, and Refractometry: 2nd edition, SLACK Incorporated (p) Ltd, 2006*
- *George K. Hans, Kenneth Cuiffreda: Models of the visual system, Kluwer Academic, NY, 2002*
- *Leonard Werner, Leonard J. Press: Clinical Pearls in Refractive Care, Butterworth Heinemann, 2002*
- *David B. Elliot: Clinical Procedures in Primary Eye care, 3rd edition, Butterworth Heinemann, 2007*
- *WJ Benjamin: Borish"s clinical refraction,2nd edition, Butterworth Heinemann, Missouri, USA,2006*

Course Title: Ocular Disease II	L	T	P	Cr.
Course Code: BOPT405	3	0	0	3

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

1. Diagnostic approach
2. Management of the ocular diseases.

COURSE CONTENTS

UNIT-I

09 Hours

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 Detachment: Rhegmatogenous, Tractional, Exudative)

Retinoblastoma

Diabetic retinopathy

UNIT-II

09 Hours

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

UNIT-III

09 Hours

Lens

Applied Anatomy and Physiology, Clinical examination, Classification of cataract

Congenital and Developmental cataract, 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 of surgeries,) Complications of cataract surgery

Displacement of lens: Subluxation, Displacement, Lens coloboma, Lenticonus, Microspherophakia.

UNIT-IV

09 Hours

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, Pappilloedema, optic atrophy

Cortical blindness

Malingering

Nystagmus, Clinical examination

UNIT-V

09 Hours

Glaucoma

Applied anatomy and physiology of anterior segment, Clinical Examination
Definitions 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
techniques

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning,
Continuous interactive learning, Case-based, Project based, Seminars,
Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007*
- *Stephen J. Miller: Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990*
- *Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth- Heinemann, 2007*

Course Title: Behavioural Health Medical Psychology #	L	T	P	Cr.
Course Code: BOPT406	1	0	0	1

Total Hours 15 hrs

Course Outcomes: At the end of the course students will be able to...

1. Explain the evolution, major perspectives, personality theories, and fundamental concepts of psychology.
2. Describe the major theories of personality and human development proposed by prominent psychologists.
3. Explain the principles of health psychology, models of health and illness, and factors influencing health-related behaviour.
4. Apply health behaviour models and health promotion approaches to understand health beliefs and promote healthy practices.
5. Describe client-professional partnerships, common psychological disorders, pain, loss, stress, and coping strategies in healthcare settings.
6. Demonstrate an understanding of effective client engagement, compassionate care, and psychological factors influencing healthcare delivery.

COURSE CONTENTS

UNIT-I

05 Hours

Evolution of Psychology, Personality theories, Developmental psychology; Introduction to Psychology,

History of Psychology - Structuralism, Functionalism, Psychoanalytic of Sigmund Freud, Behaviourism, Gestalt psychology, Humanistic Psychology, Cognitive Psychology, Feministic Psychology, Multicultural Psychology

Personality Theories: Biomedical Model, Psycholanalytic theory - Personality structure, stages, Defense mechanisms, Behavioural Psychology - Classical Conditioning, Operant Conditioning, Vicarious/Observational learning behaviour), Positive Psychology (Martin Seligman), Humanistic Psychology (Carl Roger), Maslow's Hierchy of Needs, Eclectic approach, Nature Versus Nurture of Personality

Developmental Psychology: Psychosexual stages of development, Psychosocial stages of development, Cognitive theory of development, Theory of moral development, social Cultural development - Sigmund Freud, Erickson, Piaget, Kohlberg, Lev Vygotsky, Bronfenbrenner's.

UNIT-II**05 Hours**

Introduction to Health Psychology - What is Health Psychology, Father of health Psychology, What constitutes well being? Models of Health Psychology - Biomedical Model and Biopsychosocial model Health Behaviour models - Health Belief Model, Transtheoretical Model, social Cognitive Theory, Theory of Planned behaviour. Health Promotion - Precede Proceed model Illness belief. Beliefs that influence practitioners.

UNIT-III**05 Hours**

Partnerships in health: Client-professional partnership. Issues in Client engagement with treatment, involving clients in care, chronic illness, disability, complex health issues, attitude and background of clients. Personality disorders. Depression Disorders. Anxiety disorders. Pain and types. Loss and models of Loss. Stress and Coping strategies. Compassionomics in healthcare.

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Patricia Barkway. Psychology for health professionals, 2nd edition, Elsevier, 2013*

Course Title: Introduction to Quality & Patient safety #	L	T	P	Cr.
Course Code: BOPT407	1	0	0	1

Total Hours 15 hrs

Course Outcomes: At the end of the course students will be able to...

1. Explain the principles of quality assurance and quality management in healthcare settings.
2. Demonstrate knowledge of basic emergency care, first aid, and life support skills.
3. Describe biomedical waste management practices and environmental safety measures in healthcare facilities.
4. Explain the principles of infection prevention and control to minimize healthcare-associated infections.
5. Understand antibiotic resistance, its causes, prevention, and the importance of rational antibiotic use.
6. Describe disaster preparedness, emergency response, and disaster management procedures in healthcare settings.

COURSE CONTENTS

UNIT-I

03 Hours

Quality assurance and management

UNIT-II

03 Hours

Basics of emergency care and life support skills

UNIT-III

03 Hours

Biomedical waste management and environment safety

UNIT-IV

02 Hours

Infection and prevention control

UNIT-V

02 Hours

Antibiotic resistance

UNIT-VI

02 Hours

Disaster preparedness and management

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *World Health Organization. WHO Guidelines on Hand Hygiene in Health Care. Geneva: World Health Organization.*
- *World Health Organization. Basic Emergency Care: Approach to the Acutely Ill and Injured. Geneva: World Health Organization.*
- *World Health Organization. Safe Management of Wastes from Health-Care Activities. Geneva: World Health Organization.*
- *World Health Organization. Global Action Plan on Antimicrobial Resistance. Geneva: World Health Organization.*
- *Government of India, Ministry of Environment, Forest and Climate Change. Bio-Medical Waste Management Rules, 2016, as amended.*
- *Government of India, Ministry of Health and Family Welfare. National Guidelines for Infection Prevention and Control in Healthcare Facilities. New Delhi: Government of India.*
- *National Accreditation Board for Hospitals and Healthcare Providers (NABH). Standards for Hospitals. Quality Council of India.*

Course Title: Clinical Optometry-IV	L	T	P	Cr.
Course Code: BOPT408	0	0	4	4

Total Hours 120 hrs

Course Outcomes: At the end of the course students will be able to...

Students will improve their skills in clinical procedures, and then progressive interactions with patients and professional personnel are monitored as students practice optometry in a supervised setting. Additional areas include 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, visual optics – II and ocular disease -II.

PRACTICALS

1. History taking- Ocular and Special clinical conditions
2. Refraction
 - a) Subjective
 - b) Objective
3. Keratometry in special conditions like Keratoconus, High Astigmatism, Pterygium, Post ocular surgery
4. Lensometry - Bifocals and PAL"s
5. Pupillometry
6. Tonometry
 - a) Applanation
 - b) Other Tonometers
7. AC Grading - Van Herick method
8. Gonioscopy

5TH SEMESTER

Course Title: Systemic Disease	L	T	P	Cr.
Course Code: BOPT501	2	0	0	2

Total Hours 30 hrs**Course Outcomes:** At the end of the course students will be able to...

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

COURSE CONTENTS**UNIT-I****10 Hours**

Hypertension, Diabetes Mellitus, Acquired Heart disease, Thyroid Disease: Definition, classification, Epidemiology, clinical examination, complications, and management. Ophthalmic considerations for the diseases

UNIT-II**10 Hours**

Cancer, Tropical infections, Tuberculosis, Herpes virus, Hepatitis, Acquired Immunodeficiency Syndrome: Definition, classification, Epidemiology, clinical examination, complications, and management. Ophthalmic considerations for the diseases

UNIT-III**10 Hours**

Anaemia, Nutritional and metabolic disorders, Myasthenia Gravis, Connective Tissue Disease: Definition, classification, Epidemiology, clinical examination, complications, and management. Ophthalmic considerations for the diseases

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *C Haslett, E R Chilvers, N A boon, N R Coledge, J A A Hunter: Davidson's Principles and Practice of Medicine, Ed. John Macleod, 19th Ed., ELBS/Churchill Livingstone. (PPM), 2002*
- *Basic and clinical Science course: Update on General Medicine, American Academy of Ophthalmology, Section 1, 1999*

Course Title: Dispensing Optics	L	T	P	Cr.
Course Code: BOPT502	2	0	1	3

Total Hours 30 hrs

Course Outcomes: At the end of the course students will be able to...

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 CONTENTS

UNIT-I

06 Hours

Lens designs - compatible to contemporary eye frames. Components of spectacle prescription & interpretation, transposition, Add and near power relation

UNIT-II

06 Hours

Frame selection –based on spectacle prescription, professional requirements, age group, face shape. Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height. Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments –facial wrap, pantoscopic tilt, Dispensing for Myopia management spectacles

UNIT-III**06 Hours**

Neutralization –Hand & lensometer, axis marking, prism marking. Faults in spectacles (lens fitting, frame fitting, patients complaints, description, detection and correction).

UNIT-IV**06 Hours**

Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements). Final checking & dispensing of spectacles to customers, counseling on wearing & maintaining of spectacles

UNIT-V**06 Hours**

Spectacle repairs –tools, methods, soldering, riveting, Frame adjustments
Special types of spectacle frames: Monocles, Ptosis crutches, Industrial safety glasses, Welding glasses, Frame availability in Indian market

SUGGESTED PRACTICALS/DEMONSTRATION (30 Hours)

- Inter pupillary distance measurements using PD ruler and Pupillometry
- Face and frame measurements and frame selection for dispensing spectacles.
- Criteria of Selection for patients, spectacle frames for dispensing special ophthalmic lenses – prisms, bifocal, progressive, aspheric, lenticular, high index lenses, etc.
- Bifocals - Measurements, Fitting, Verification and troubleshooting
- Progressive Lenses – Special measurements, fitting, verification and troubleshooting.
- Types of Progressive lenses available in India – Brand names, raw material properties, manufacturers suppliers details, ordering systems, etc.
- Myopia management spectacles dispensing- DIMS, HALT etc
- Glazing, cutting and fitting Ophthalmic Lenses in all types of spectacle frames.
- Frame manipulations and repairs
- Troubleshooting and problem solving of patients after Spectacle dispensing

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Jalie MO: Ophthalmic lens and Dispensing, 3rd edition, Butterworth – Heinemann, 2008*
- *Troy E. Fannin, Theodore Grosvenor: Clinical Optics, 2nd edition, Butterworth Heinemann, 1996*
- *C W Brooks, IM Borish: System for Ophthalmic Dispensing, 3rd edition, Butterworth - Heinemann, 2007*
- *Michael P Keating: Geometric, Physical & Visual Optics, 2nd edition, Butterworth Heinemann, 2002*
- *A handbook on practical approach to troubleshooting and solution in spectacle dispensing - Lavanya Kalikivayi, Venkataramana Kalikivayi*

Course Title: Geriatric Optometry	L	T	P	Cr.
Course Code: BOPT503	3	0	0	3

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

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 CONTENTS

UNIT-I

10 Hours

Aspects of ageing: Introduction to geriatrics and gerontology, epidemiology of geriatrics in India, GNFC-AOA statistics and Functional Perspective on Ageing, physiological and pathological changes in ageing

UNIT-II

12 Hours

Effects of ageing on Cardiovascular system, respiratory system, gastro intestinal, excretory and central nervous system.

UNIT-III

10 Hours

Preventive geriatrics – Periodical health assessment, lifestyle and dietary pattern. Healthy ageing- physical, mental and social health, Social aspects of Ageing and Psychological aspects of Ageing, Pharmacological aspects of aging

UNIT-IV

13 Hours

Optometric examination and management of the elderly: Ageing changes in the eye, Optometric Examination of the Elderly patient, Fitting and Dispensing spectacle for the elderly patient, Age related Eye Diseases, Ocular Implication of systemic diseases in the elderly, Management of geriatric patients

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *OP Sharma: Geriatric Care –A textbook of geriatrics and Gerontology, viva books, New Delhi, 2005*
- *VS Natarajan: An update on Geriatrics, Sakthi Pathipagam, Chennai, 1998*
- *DE Rosenblatt, VS Natarajan: Primer on geriatric Care A clinical approach to the older patient, Printers Castle, Cochin, 2002*

Course Title: Paediatric Optometry	L	T	P	Cr.
Course Code: BOPT504	3	0	0.5	3.5

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

1. Have a knowledge of the principle 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 CONTENTS

UNIT-I

05 Hours

Development of the eye and the paediatric milestones: Ocular Embryology, Developmental Milestones

UNIT-II

10 Hours

Normal appearance, pathology and structural anomalies: Orbit, Eye lids, Lacrimal system, Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil, Lens, vitreous, Fundus Oculomotor system

UNIT-III**10 Hours**

Paediatric eye disorders: Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics, Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism

UNIT-IV**10 Hours**

Paediatric eye examination: Overview – Paediatric eye examination, History taking Paediatric subjects, Visual Acuity Assessment in different age groups, Refractive Examination

UNIT-V**10 Hours**

Determining binocular status, determining sensory motor adaptability, Compensatory treatment and remedial therapy for: Myopia, Pseudomyopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia, Remedial and Compensatory treatment of Strabismus and Nystagmus Spectacle dispensing for children, Paediatric contact lenses, Low vision assessment in children

SUGGESTED PRACTICALS/DEMONSTRATION (15 hours)

- Demonstrate vision assessment using different vision testing charts/techniques for different paediatric age groups
- Handling and performing comprehensive eye examination for a pediatric patient

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Pediatric Optometry* - JEROME ROSNER, Butterworth, London 1982
- *Paediatric Optometry* –William Harvey/ Bernard Gilmartin, Butterworth Heinemann, 2004

- *Binocular Vision and Ocular Motility* - VON NOORDEN G K Burian Von Noorden"s, 2nd Ed., C.V. Mosby Co. St. Louis, 1980.
- *Assessing Children"s Vision*. By Susan J Leat, Rosalyn H Shute, Carol A Westall.45 Oxford: Butterworth-Heinemann, 1999.
- *Clinical pediatric optometry*. LJ Press, BD Moore, Butterworth-Heinemann, 1993

Course Title: Diagnostics and therapeutics of Anterior Segment diseases	L	T	P	Cr.
Course Code: BOPT505	4	0	0.5	4.5

Total Hours 60 hrs

Course Outcomes: At the end of the course students will be able to...

1. To Diagnose and sequential anterior segment ocular disease management
2. To list down management options in terms of optometric, pharmacological, LASER and surgical categories
3. To determine sequential management protocol and other referral needs

COURSE CONTENTS

UNIT-I

10 Hours

Pathophysiology and clinical management of systemic and anterior segment ocular disease

UNIT-II

10 Hours

Overview of drugs used in treatment of anterior segment disease

UNIT-III

10 Hours

LASER for anterior segment disease management, overview of surgical intervention for anterior segment disease

UNIT-IV

10 Hours

Vertical Integration of all treatment options of anterior segment disease with special emphasis on optometric management

UNIT-V

10 Hours

Interpretation and diagnose conditions using – Biometry (Contact and Non-Contact), Corneal Topography, Pentacam, Anterior Segment Optical Coherence Tomography, Specular Microscopy, Meibography

UNIT-VI**10 Hours**

Interpretation and diagnose conditions using – Perimetry, Posterior segment Optical Coherence Tomography, Ultrasound Biomicroscopy, Heidelberg Retinal Tomography (Cornea and Optic Nerve)

SUGGESTED PRACTICALS/DEMONSTRATION (15 Hours)

- Perform and Interpret Biometry (Contact and Non-Contact), Corneal Topography, Pentacam, Anterior Segment Optical Coherence Tomography, Specular Microscopy, Meibography
- Perform and Interpret Perimetry, Posterior segment Optical Coherence Tomography, Ultrasound Biomicroscopy, Heidelberg Retinal Tomography (Cornea and Optic Nerve)

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007*

Course Title: Innovation and technology #	L	T	P	Cr.
Course Code: BOPT506	1	0	0.5	1.5

Total Hours 15 hrs

Course Outcomes: At the end of the course students will be able to...

1. To cover comprehensively the process of converting an idea into a product
2. To understand the design, working principle and optics of ophthalmic instruments
3. To design and develop hardware and software for vision and eye testing
4. To understand the basics of health and optometry informatics
5. To develop software for management of eye health data

COURSE CONTENTS

UNIT-I

05 Hours

Research & Ideation: Concepts. Understanding design and optics behind ophthalmic instruments

UNIT-II

05 Hours

Prototype development

UNIT-III

05 Hours

Clinical validation

SUGGESTED PRACTICALS/DEMONSTRATION (15 Hours)

- Develop a prototype of a simple clinical instrument and validate for clinical use

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Kumar, A. Ophthalmic Instruments and Procedures. Relevant reference materials on the principles, design, and applications of ophthalmic instruments.*
- *Benjamin, W. J. Borish's Clinical Refraction. 2nd ed. Butterworth-Heinemann; 2006.*
- *Elliott, D. B. Clinical Procedures in Primary Eye Care. 4th ed. Elsevier; 2014.*
- *Carlson, N. B., and Kurtz, D. Clinical Procedures for Ocular Examination. 3rd ed. McGraw-Hill Education; 2004.*
- *World Health Organization. WHO Guidelines on Good Manufacturing Practices for Medical Products. Relevant guidance for prototype development and quality assurance.*
- *International Organization for Standardization. ISO 13485: Medical Devices: Quality Management Systems. Relevant sections on medical device development, design verification, and validation.*

Course Title: Clinical Optometry V	L	T	P	Cr.
Course Code: BOPT507	2	0	4	6

Total Hours 30 hrs

Course Outcomes: At the end of the course students will be able to...

1. Explain the principles of evidence-based practice in the diagnosis and management of common refractive errors, including myopia, hyperopia, astigmatism, and presbyopia.
2. Evaluate the clinical presentation, causes, and management of headache associated with ocular and visual conditions.
3. Describe the clinical features, diagnostic procedures, and evidence-based management of cataract, open-angle glaucoma, and angle-closure glaucoma.
4. Perform lens fitting, frame measurements, ocular biometry, and slit-lamp examination of the anterior segment.
5. Demonstrate the use of direct and indirect ophthalmoscopy and 78D/90D lenses for retinal evaluation.
6. Interpret findings from corneal topography, Pentacam, pachymetry, specular microscopy, aberrometry, meibography, OCT, and visual field testing to support clinical decision-making.

COURSE CONTENTS

UNIT-I

15 Hours

Evidence Based Practice on the following Common Clinical Conditions

Myopia/ Hyperopia

Astigmatism

Presbyopia

Headache

UNIT-II

15 Hours

Evidence Based Practice on the following Common Clinical Conditions

Cataract

Open Angle Glaucoma

Angle closure glaucoma

SUGGESTED PRACTICALS/DEMONSTRATION (60 hours)

- Lens fitting
- Frame measurements
- Ocular Measurements - Axial, ACD, LT
- Slit Lamp evaluation of anterior segment
- Retina Evaluation
 - a) 78D and 90 D
 - b) Direct Ophthalmoscopy
 - c) Indirect Ophthalmoscopy
- Topography, Pentacam, Pachymetry, Specular Microscopy and Aberrometry Interpretation
- Meibography Interpretation
- OCT Interpretation
- Visual Field Interpretation

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- Elliott DB. *Clinical Procedures in Primary Eye Care*. 5th ed. Elsevier; 2021.
- Benjamin WJ, editor. *Borish's Clinical Refraction*. 2nd ed. Butterworth-Heinemann; 2006.
- Grosvenor T. *Primary Care Optometry*. 5th ed. Butterworth-Heinemann; 2007.
- Kanski JJ, Bowling B. *Clinical Ophthalmology: A Systematic Approach*. 8th ed. Elsevier; 2016.
- Khurana AK. *Comprehensive Ophthalmology*. 7th ed. Jaypee Brothers Medical Publishers; 2019.

6th SEMESTER

Course Title: Contact lens I	L	T	P	Cr.
Course Code: BOPT601	2	0	1	3

Total Hours 30 hrs**Course Outcomes:** At the end of the course students will 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. Identify and manage the adverse effects of contact lens

COURSE CONTENTS**UNIT-I****06 Hours**

Introduction to Contact lenses: Definition, Classification / Types. History of Contact Lenses. Optics of Contact Lenses: Magnification & Visual field, Accommodation & Convergence, Back & Front Vertex Power / Vertex distance calculation. Review of Anatomy & Physiology of Tear film, Cornea, Lids & Conjunctiva

UNIT-II**06 Hours**

Introduction to CL materials: Monomers, Polymers, Properties of CL materials: Physiological (Dk, Ionicity, Water content), Physical (Elasticity, Tensile strength, Rigidity), Optical (Transmission, Refractive index), Indications and contraindications, Parameters / Designs of Contact Lenses & Terminology

UNIT-III**06 Hours**

RGP Contact Lens materials, Manufacturing Rigid and Soft Contact Lenses – various methods, Pre-Fitting examination – steps, significance, recording of results, 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.

UNIT-IV

06 Hours

Ordering Rigid Contact Lenses – writing a prescription to the Laboratory. Checking and verifying Contact lenses from Laboratory. Modifications possible with Rigid lenses. Common Handling Instructions: Insertion & Removal Techniques, Do's and Don'ts

UNIT-V

06 Hours

Care and Maintenance of Rigid lenses: Cleaning agents & Importance, Rinsing agents & Importance, disinfecting agents & importance, Lubricating & Enzymatic cleaners. Follow up visit examination. Complications of RGP lenses

SUGGESTED PRACTICALS/DEMONSTRATION (30 Hours)

- Measurement of Ocular dimensions
- Pupillary diameter and lid characteristics
- Blink rate and TBUT
- Schrimers test, Slit lamp examination of tear layer
- Keratometry
- Placido's disc
- Soft Contact Lens fitting – Aspherical
- Soft Contact Lens fitting – Lathecut lenses
- Soft Contact Lens over refraction
- Lens insertion and removal
- Lens handling and cleaning
- Examination of old soft Lens
- RGP Lens fitting
- RGP Lens Fit Assessment and fluorescein pattern
- Special RGP fitting (Aphakia, pseudo phakia & Keratoconus)
- RGP over refraction and Lens flexure
- Examination of old RGP Lens
- RGP Lens parameters
- Slit lamp examination of Contact Lens wearer

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *IACLE modules A-F*
- *CLAO Volumes 1, 2, 3*
- *IACLE case discussion series also for resources for teaching*
- *Anthony J. Phillips: Contact Lenses, 5th edition, Butterworth-Heinemann, 2006*
- *Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004.*
- *E S. Bennett, V A Henry: Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008*

Course Title: Low Vision care and Rehabilitation	L	T	P	Cr.
Course Code: BOPT602	2	0	1	3

Total Hours 30 hrs

Course Outcomes: At the end of the course students will be able to...

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

COURSE CONTENTS

UNIT-I

07 Hours

Definitions & classification of Low vision, Epidemiology of low vision, Model of low vision service

UNIT-II

07 Hours

Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psycho-social impact of low vision, Types of low vision aids – optical aids, non-optical aids & electronic devices, Optics of low vision aids

UNIT-III

08 Hours

Clinical evaluation – assessment of visual acuity, visual field, selection of low vision aids, instruction & training, Pediatric Low Vision care, Low vision aids – dispensing & prescribing aspects

UNIT-IV

08 Hours

Visual rehabilitation & counselling, Legal aspects of Low vision in India, Case Analysis

SUGGESTED PRACTICALS/DEMONSTRATION (30 Hours)

- Attending in low vision care clinic and history taking.

- Determining the type of telescope and its magnification (Direct comparison method & calculated method)
- Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers.
- Inducing visual impairment and prescribing magnification.
- Determining reading speed with different types of low vision aids with same magnification.
- Determining reading speed with a low vision aid of different magnifications

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Functional Assessment of Low Vision by Bruce P. Rosenthal*
- *Remediation and Management of Low Vision Mosby's optometric problem solving series; Editors, Roy Gordon Cole, Bruce P. Rosenthal*
- *Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth-Heinemann, 1998*
- *Sarika G, Sailaja MVSE Vaithilingam: practice of Low vision –A guide book, Medical Research Foundation, 2015.*
- *Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999*
- *Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991*
- *A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinemann, 2007*

Course Title: Binocular Vision I	L	T	P	Cr.
Course Code: BOPT603	2	0	1	3

Total Hours 30 hrs

Course Outcomes: At the end of the course students will be able to...

1. Demonstrate an in-depth knowledge of the gross anatomy and physiology relating to the extraocular 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 CONTENTS

UNIT-I

06 Hours

Binocular Vision and Space perception: Relative subjective visual direction, Retino motor value, Grades of BSV, SMP and Cyclopean Eye, Correspondence, Fusion, Diplopia, Retinal rivalry, Horopter, Physiological Diplopia and Suppression, Stereopsis, Panum's area, BSV, Stereopsis and monocular clues – significance, Egocentric location, clinical applications, Theories of Binocular vision.

UNIT-II

06 Hours

Anatomy of Extra Ocular Muscles: Rectii and Obliques, LPS, Innervation & Blood Supply. Physiology of Ocular movements: Center of rotation, Axes of Fick, Action of individual muscle. Laws of ocular motility: Donder's and Listing's law, Sherrington's law, Hering's law. Uniocular & Binocular movements - fixation, saccadic & pursuits: Version & Vergence, Fixation & field of fixation

UNIT-III

06 Hours

Near Vision Complex Accommodation: Definition and mechanism (process), Methods of measurement, Stimulus and innervation, Types of accommodation, Anomalies of accommodation – aetiology and management. Convergence: Definition and mechanism, Methods of measurement, Types and components of convergence - Tonic, accommodative, fusional, proximal. Anomalies of Convergence – aetiology and management.

UNIT-IV**06 Hours**

Sensory adaptations: Confusion, Suppression, Investigations, Management. Abnormal Retinal Correspondence: Investigation and management, Blind spot syndrome. Eccentric Fixation: Investigation and management.

UNIT-V**06 Hours**

Amblyopia: Classification, Aetiology, Investigation, Management

SUGGESTED PRACTICALS/DEMONSTRATION (30 Hours)

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

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

1. Pradeep Sharma: *Strabismus simplified*, New Delhi, First edition, 1999, Modern publishers.
2. Fiona J. Rowe: *Clinical Orthoptics*, second edition, 2004, Blackwell Science Ltd
3. Gunter K. V. Mosby Company
4. Mitchell Scheiman; Bruce Wick: *Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders*, 2008, Lippincot Williams & Wilkins publishers

Course Title: Diagnostics and therapeutics of Posterior segment diseases	L	T	P	Cr.
Course Code: BOPT604	4	0	0.5	4.5

Total Hours 60 hrs

Course Outcomes: At the end of the course students will be able to...

1. To Diagnose and sequential posterior segment ocular disease management
2. To list down management options in terms of optometric, pharmacological, LASER and surgical categories
3. To determine sequential management protocols and other referral needs
4. To propose schematic management options available for all posterior segment disease
5. To sequence management options in terms of optometric, pharmacology, LASER and surgery.

COURSE CONTENTS

UNIT-I

10 Hours

Pathophysiology and clinical management of systemic and posterior segment ocular disease

UNIT-II

10 Hours

Overview of drug used in treatment of posterior segment disease

UNIT-III

10 Hours

LASER for posterior segment disease management, overview of surgical intervention for posterior segment disease

UNIT-IV

10 Hours

Vertical Integration of all treatment options of posterior segment disease with special emphasis on optometric management

UNIT-V**10 Hours**

Perform, interpret and diagnose anterior and posterior segment diseases images, Fundus Fluorescein Angiography, Electrodiagnostics and Visual Evoked Potential

UNIT-VI**10 Hours**

Perform, interpret and diagnose conditions using – Contrast acuity, Potential acuity meter, Retinometer, Brightness acuity test, Photostress test, Amsler charting

SUGGESTED PRACTICALS/DEMONSTRATION (15 Hours)

- Direct ophthalmoscopy examination
- 90D examination of Optic disc
- Fundus photography
- Other procedure
- Contrast acuity
- Potential acuity meter
- Retinometer, Brightness acuity test
- Photostress test o Amsler charting

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007*

Course Title: Optometry and Multidisciplinary aspects of Health #	L	T	P	Cr.
Course Code: BOPT605	1	0	0	1

Total Hours 15 hrs

Course Outcomes: At the end of the course students will be able to...

1. To appreciate the connection between ocular and systemic diseases and rehabilitation
2. To integrate systemic diseases and be aware of the health care delivery systems
3. To understand the primary, secondary and tertiary eye care services
4. To understand the need for integrating eye care services into other health care delivery models

COURSE CONTENTS

UNIT-I

15 Hours

Health care models

1. International health care models
2. National health care models
3. Decentralized health care delivery systems
4. Pros and cons of different health care models
5. Universal health coverage

UNIT-II

15 Hours

General and systemic rehabilitation services

1. Models of health care for different systemic illness
2. Rehabilitation models
3. Referral to rehabilitation setups

UNIT-III

15 Hours

Primary, secondary and tertiary eye care models

1. Preventive, promotive and curative eyecare
2. Primary, secondary and tertiary eye care

UNIT-IV**15 Hours**

Integrating health care professions

1. Integration of primary health and primary eye care
2. Integration of eye care services to bigger model of health care
3. Problem oriented health care records
4. Co-management with other healthcare specialties
5. Development of comprehensive management plan
6. Benefits of multidisciplinary approach to eye care

SUGGESTED PRACTICALS/DEMONSTRATION (15 Hours)

- Visit to Public health centres

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Park K. Park's Textbook of Preventive and Social Medicine. 26th ed. Jabalpur: Banarsidas Bhanot; 2021.*
- *World Health Organization. World Report on Vision. Geneva: World Health Organization; 2019.*
- *World Health Organization. Primary Health Care: Now More Than Ever. Geneva: World Health Organization; 2008.*
- *World Health Organization, World Bank. Tracking Universal Health Coverage: 2023 Global Monitoring Report. Geneva: World Health Organization; 2023.*
- *World Health Organization. Rehabilitation in Health Systems: Guide for Action. Geneva: World Health Organization; 2019.*

Course Title: Research Methodology & Biostatistics #	L	T	P	Cr.
Course Code: BOPT606	2	0	0	2

Total Hours 30 hrs**Course Outcomes:** At the end of the course students will be able to...

1. Explain the fundamental concepts of research methodology, identify research problems, and formulate research questions and objectives.
2. Describe research designs, ethical considerations, types of data, sampling methods, research tools, and data collection techniques.
3. Develop a research proposal using appropriate research methods and demonstrate an understanding of sample size determination and statistical significance.
4. Apply biostatistical methods, including measures of central tendency, dispersion, mortality, frequency distribution, and graphical presentation of data.
5. Select and interpret appropriate statistical tests for comparing groups and assessing associations, including tests for normally and non-normally distributed data.
6. Use computerized statistical software to organize, analyze, present, and interpret research data for evidence-based decision-making.

COURSE CONTENTS**UNIT-I****10 Hours**

Research Methodology: Introduction to research methods, identifying research problem, Ethical issues in research, Research design, Types of Data, Research tools and Data collection methods, sampling methods, Developing a research proposal

UNIT-II**10 Hours**

Biostatistics: Introduction, Central Limit Theorem, Measures of Morality, Sampling, Statistical significance, Correlation, Sample size determination Statistics –Collection of Data - presentation including classification and diagrammatic representation –frequency distribution. Measures of central tendency; measures of dispersion

UNIT-III**10 Hours**

Statistical tests to compare means in normal and not normal distribution with one or more groups. Tests to check for association between groups. Use of computerized software for statistics

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Mausner & Bahn: Epidemiology-An Introductory text, 2nd Ed., W. B. Saunders Co.*
- *Richard F. Morton & J. Richard Hebd: A study guide to Epidemiology and Biostatistics, 2nd Ed., University Park Press, Baltimore.*
- *Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4th edition, Springs, 2015*

Course Title: Clinical Optometry VI	L	T	P	Cr.
Course Code: BOPT607	2	0	4	6

Total Hours 30 hrs

Course Outcomes: At the end of the course students will be able to...

COURSE CONTENTS

UNIT-I

15 Hours

Evidence Based Practice on the following Common Clinical Conditions

Blepharitis/ Chalazion /Stye

Pinguecula, Conjunctival Cyst, Concretions, Conjunctival Naevus

Pterygium

Pseudophakia/ Aphakia

UNIT-II

15 Hours

Evidence Based Practice on the following Common Clinical Conditions

Dry eye

Esotropia/ Exotropia/ Other types of Squint

Acute Red eye/ Subconjunctival Hemorrhage/ Conjunctivitis

SUGGESTED PRACTICALS/DEMONSTRATION (60 Hours)

- Comprehensive eye examination
- Community out-reach (Screening camps, Awareness camps and impact assessments for children, adult and geriatric population and occupation specific camps)
- Basic BV work up
- Low Vision assessment
- Contact Lens Fitting - Soft lens
- Contact Lens fitting - RGP lens
- Interpretation of OCT - Posterior Segment

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

7TH SEMESTER

Course Title: Contact lens II	L	T	P	Cr.
Course Code: BOPT701	2	0	1	3

Total Hours 30 hrs**Course Outcomes:** At the end of the course students will 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 patients
4. Recognize various types of fitting
5. Explain all the procedures to patient
6. Identify and manage the adverse effects of contact lens

COURSE CONTENTS**UNIT-I****05 Hours**

SCL Materials & Review of manufacturing techniques

Comparison of RGP vs. SCL

Pre-fitting considerations for SCL

Fitting philosophies for SCL

Fit assessment in Soft Contact Lenses: Types of fit – Steep, Flat, Optimum

Calculation and finalising SCL parameters

1. Disposable lenses
2. Advantages and availability

UNIT-II**04 Hours**

Soft Toric CL

1. Stabilization techniques
2. Parameter selection
3. Fitting assessment

UNIT-III**04 Hours**

Common Handling Instructions

1. Insertion & Removal Techniques
2. Do's and Dont's

Complications of Soft lenses

UNIT-IV**05 Hours**

Care and Maintenance of Soft lenses

1. Cleaning agents & Importance
2. Rinsing agents & Importance
3. Disinfecting agents & importance
4. Lubricating & Enzymatic cleaners

Follow up visit examination

UNIT-V**05 Hours**

Therapeutic contact lenses

1. Indications
2. Fitting consideration

UNIT-VI**05 Hours**

Specialty fitting

1. Aphakia
2. Pediatric
3. Corneal ectasia
4. Post refractive surgery
5. Ocular surface disease
6. Occupational fitting

UNIT-VII**02 Hours**

Management of Presbyopia with Contact lenses

SUGGESTED PRACTICALS/DEMONSTRATION (30 Hours)

- Examination of old soft Lens
- RGP Lens fitting
- RGP Lens Fit Assessment and fluroscein pattern
- Special RGP fitting (Aphakia, pseudo phakia & Keratoconus)
- RGP over refraction and Lens flexure
- Examination of old RGP Lens
- RGP Lens parameters
- Fitting Cosmetic Contact Lens
- Slit lamp examination of Contact Lens wearers
- Fitting Toric Contact Lens
- Bandage Contact Lens
- SPM & Pachymetry
- Specialty Contact Lens fitting.

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *IACLE modules A-F*
- *CLAO Volumes 1, 2, 3*
- *IACLE case discussion series also for resources for teaching*
- *Anthony J. Phillips: Contact Lenses, 5th edition, Butterworth-Heinemann, 2006*
- *Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004*
- *E S. Bennett, V A Henry: Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008*

Course Title: Binocular Vision II	L	T	P	Cr.
Course Code: BOPT702	2	0	1	3

Total Hours 30 hrs

Course Outcomes: At the end of the course students will be able to...

1. Classify neuromuscular anomalies and strabismus and explain their etiological factors, clinical history, and significance.
2. Describe the classification, clinical features, investigations, and management of convergent, divergent, vertical, and paralytic strabismus.
3. Perform and interpret appropriate investigations for strabismus, including diplopia charting, Hess chart, prism bar cover test (PBCT), assessment in nine directions of gaze, and binocular field of vision.
4. Explain the causes, clinical features, and management principles of amblyopia and nystagmus.
5. Describe non-surgical management options for squint and identify their clinical indications.

COURSE CONTENTS

UNIT-I

01 Hours

Neuro-muscular anomalies

1. Classification and etiological factors

History – recording and significance

UNIT-II

08 Hours

Convergent strabismus

Accommodative convergent squint

1. Classification
2. Investigation and Management

Non accommodative Convergent squint

1. Classification
2. Investigation and Management

Divergent Strabismus

1. Classification

2. A& V phenomenon
3. Investigation and Management

Vertical strabismus

1. Classification
2. Investigation and Management

Paralytic Strabismus

1. Acquired and Congenital
2. Clinical Characteristics

Distinction from comitant and restrictive Squint

UNIT-III

08 Hours

Investigations

1. History and symptoms
2. Head Posture
3. Diplopia Charting
4. Hess chart
5. PBCT
6. Nine directions
7. Binocular field of vision

UNIT-IV

04 Hours

Treatment of Amblyopia

Nystagmus

UNIT-V

02 Hours

Non-surgical Management of Squint

UNIT-VI**06 Hours**

Restrictive Strabismus

1. Features
2. Musculo-fascical anomalies
3. Duane's Retraction syndrome
4. Clinical features and management
5. Brown's Superior oblique sheath syndrome
6. Strabismus fixus
7. Congenital muscle fibrosis

UNIT-VII**01 Hours**

Surgical management of squint

SUGGESTED PRACTICALS/DEMONSTRATION (30 Hours)

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

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- Pradeep Sharma: *Strabismus simplified*, New Delhi, First edition, 1999, Modern publishers.
- Fiona J. Rowe: *Clinical Orthoptics*, second edition, 2004, Blackwell Science Ltd
- Gunter K. Von Noorden: *BURIAN- VON NOORDEN'S Binocular vision and ocular motility theory and management of strabismus*, Missouri, Second edition, 1980, C. V. Mosby Company
- Mitchell Scheiman; Bruce Wick: *Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders*, 2008, Lippincot Williams & Wilkins publishers

Course Title: Public Health & Epidemiology	L	T	P	Cr.
Course Code: BOPT703	2	0	0	2

Total Hours 30 hrs

Course Outcomes: At the end of the course students will be able to...

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 CONTENTS

UNIT-I

05 Hours

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

UNIT-II

05 Hours

Levels of disease prevention and levels of health care patterns

UNIT-III

05 Hours

Contrasting between Clinical and community health programs
Community based rehabilitation programs

UNIT-IV

05 Hours

National and International health agencies,
Organization and Management of Eye Care Programs – Service Delivery models

UNIT-V**05 Hours**

Health manpower and planning & Health Economics

Evaluation and assessment of health programmes

IEC Materials, KAP survey

UNIT-VI**05 Hours**

Principles of Epidemiology and Epidemiological Methods

Health Information and Basic Medical Statistics

Descriptive epidemiology: Person, place, time

Prevalence, Incidence and Magnitude of diseases

Screening in the detection of disease

Sampling & Sample size determination

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- GVS Murthy, S K Gupta, D Bachani: *The principles and practice of community Ophthalmology, National programme for control of blindness, New Delhi, 2002*
- Newcomb RD, Jolley JL : *Public Health and Community Optometry, Charles C Thomas Publisher, Illinois, 1980*
- K Park: *Park's Text Book of Preventive and Social Medicine, 19th edition, Banarsidas Bhanot publishers, Jabalpur, 2007*
- MC Gupta, Mahajan BK, Murthy GVS, 3rd edition. *Text Book of Community Medicine, Jaypee Brothers, New Delhi, 2002*

Course Title: Law and professional ethics Optometry. #	L	T	P	Cr.
Course Code: BOPT704	1	0	0	1

Total Hours 15 hrs**Course Outcomes:** At the end of the course students will be able to...

1. Define medical ethics and explain its goals, scope, code of conduct, fundamental ethical principles, and the importance of confidentiality in healthcare practice.
2. Explain medical malpractice, negligence, rational drug therapy, patient autonomy, informed consent, and patients' rights in clinical practice.
3. Describe the ethical and legal considerations involved in the care of terminally ill patients, euthanasia, and organ transplantation.
4. Explain the medico-legal aspects of medical records, including medico-legal cases, documentation, ownership, confidentiality, privileged communication, release of medical information, unauthorized disclosure, and record retention.
5. Describe professional indemnity insurance, develop standardized protocols to prevent near-miss incidents and sentinel events, and demonstrate the principles of obtaining valid informed consent.

COURSE CONTENTS**UNIT-I****02 Hours**

Medical ethics - Definition - Goal - Scope

- Introduction to Code of conduct
- Basic principles of medical ethics –Confidentiality

UNIT-II**03 Hours**

Malpractice and negligence - Rational and irrational drug therapy

- Autonomy and informed consent - Right of patients

UNIT-III**02 Hours**

Care of the terminally ill- Euthanasia

- Organ transplantation

UNIT-IV**05 Hours**

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.

UNIT-V**03 Hours**

Professional Indemnity insurance policy

Development of standardized protocol to avoid near miss or sentinel events

Obtaining an informed consent.

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Medico-Legal and Ethical Issues in Eye Care: Case Scenarios for Optometrists, Opticians, Ophthalmologists and Family Physicians* by Kah Guan Au Eong, Catherine Tay
- *Law and Ethics for the Eye Care Professional* Barbara K Pierscionek London: Butterworth Heinemann Elsevier 2008
- *Code of conduct and ethics document for optometrists* on OCI website
- *Law and Optometry: A guide for optometry professionals and optometry students in India*, Vijaya kumar

Course Title: Community eye health #	L	T	P	Cr.
Course Code: BOPT705	0	0	1.5	1.5

Total Hours 45 hrs

Course Outcomes: At the end of the course students will be able to...

1. Learn the principles and commandments of Screening
2. Learn Implementation and evaluation of a community outreach program
3. Participate in community outreach programs
4. To organize and conduct an Eye camp

COURSE CONTENTS

UNIT-I

45 Hours

Exclusive training of

- School screenings.
- Vision screening of different ages and occupations.
- Diabetic retinopathy screening,
- Glaucoma Screening,
- Geriatric doorstep care,
- Special children vision screening.

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Newcomb RD, Jolley JL: Public Health and Community Optometry, Charles C Thomas Publisher, Illinois, 1980*
- *K Park: Park's Text Book of Preventive and Social Medicine, 19th edition, Banarsidas Bhanot publishers, Jabalpur, 2007*

Course Title: Clinical Optometry VII	L	T	P	Cr.
Course Code: BOPT706	2	0	4	6

Total Hours 30 hrs

Course Outcomes: At the end of the course students will be able to...

1. Explain the clinical features, causes, and evidence-based management of common corneal conditions, including corneal abrasion, corneal ectasia, corneal ulcer, and corneal opacity.
2. Describe the etiology, clinical presentation, and management of ptosis and proptosis.
3. Identify the clinical features and evidence-based management approaches for ectropion and entropion.
4. Explain the causes, clinical manifestations, diagnosis, and evidence-based management of uveitis.
5. Describe the clinical presentation, diagnostic evaluation, and management of acute dacryocystitis.
6. Assess common types of ocular trauma and explain the principles of evidence-based emergency management and referral.

COURSE CONTENTS

UNIT-I

15 Hours

Evidence Based Practice on the following Common Clinical Conditions

Corneal abrasion/ Corneal Ectasia/ Corneal Ulcer/Corneal Opacity

Ptosis

Proptosis

Ectropion, Entropion

UNIT-II

15 Hours

Evidence Based Practice on the following Common Clinical Conditions

Uveitis

Acute Dacryocystitis

Ocular Trauma

SUGGESTED PRACTICALS/DEMONSTRATION (120 Hours)

- Comprehensive eye examination
- Community out-reach (Screening camps, Awareness camps and impact assessments for children, adult and geriatric population and occupation specific camps)
- Comprehensive BV work up and Vision Therapy
- Low Vision assessment and Management
- Special Children evaluation (Observation)
- Interpretation of specialty Contact Lens Fitting - Video Demonstration
- Retinal Diagnostics Interpretation (OCT, HRA, FFA, ICG, OCTA, ERG, EOG, mfERG)

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

Course Title: Research Project – I #	L	T	P	Cr.
Course Code: BOPT707	0	0	3	3

Total Hours 90 hrs

Course Outcomes: At the end of the course students will be able to...

1. To acquire the basic knowledge and experience of conducting research systematically
2. To demonstrate an understanding of the relevant roles and responsibilities involved
3. To conduct basic review of literature
4. To design a brief methodology

8TH SEMESTER

Course Title: Occupational Optometry	L	T	P	Cr.
Course Code: BOPT801	2	0	0.5	2.5

Total Hours 30 hrs

Course Outcomes: At the end of the course students will be able to...

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 based on occupation and sport
5. To set visual requirements, standards for different jobs.

COURSE CONTENTS

UNIT-I

10 Hours

Introduction to occupational health, National and international organisations/agencies of occupational health, Labour reforms, Occupational health centre in organised sector, Health care for workers in unorganised sector, Role of occupational health physician, Industrial hygienist, and Safety officer; Occupational diseases and occupational related diseases, Occupational Hazards.

UNIT-II

10 Hours

Occupational optometry, role of optometrist in industry, Steps involved in occupational optometry services, Visual task analysis, Ocular injuries, Electromagnetic radiations, visual functions for different occupations, Vision standards, Personal protective equipment, Lighting and occupation, Contact lens for various occupations.

UNIT-III

10 Hours

Case studies on visual health in various occupations.

SUGGESTED PRACTICALS/DEMONSTRATION (15 Hours)

- Perform visual task analysis
- Industrial Vision Screening – Modified clinical method and Industrial Vision test

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *PP Santanam, R Krishnakumar, Monica R. Dr. Santanam's text book of Occupational optometry. 1st edition, Published by Elite School of optometry , unit of Medical Research Foundation, Chennai, India , 2015*
- *R V North: Work and the eye, Second edition, Butterworth Heinemann, 2001*
- *G W Good: Occupational Vision Manual available in the following website: www.aoa.org*
- *N.A. Smith: Lighting for Occupational Optometry, HHSC Handbook Series, Safchem Services, 1999*
- *J Anshel: Visual Ergonomics Handbook, CRC Press, 2005*
- *G Carson, S Doshi, W Harvey: Eye Essentials: Environmental & Occupational Optometry, Butterworth-Heinemann, 2008*

Course Title: Practice Management	L	T	P	Cr.
Course Code: BOPT802	2	0	0	2

Total Hours 30 hrs

Course Outcomes: At the end of the course students will be able to...

1. Explain the principles of business management, practice establishment, and business development in healthcare settings.
2. Apply basic concepts of stock control, costing, staffing, staff relations, and business computerization.
3. Describe accounting principles, sources of finance, bookkeeping, and cash flow management.
4. Explain the fundamentals of taxation and taxation planning relevant to healthcare businesses and professional practices.
5. Demonstrate an understanding of professional values, ethical principles, confidentiality, integrity, and professional accountability.
6. Explain professional codes of conduct, appropriate workplace behaviour, teamwork, equality, and cultural issues in healthcare environments.

COURSE CONTENTS

UNIT-I

10 Hours

Business Management: Practice establishment and development, Stock control and costing, Staffing and staff relations, Business computerization

UNIT-II

10 Hours

Accounting Principles: Sources of finance, Bookkeeping and cash flow. Taxation and taxation planning

UNIT-III

10 Hours

Professionalism and Values: Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality. Personal values- ethical or moral values. Attitude and behaviour- professional behaviour, treating people equally. Code of conduct, professional accountability and responsibility, misconduct. Differences between professions and importance of team efforts Cultural issues in the healthcare environment

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *L. S. Thal, S. Quintero, Business aspects of Optometry, 3rd edition - Association of Practice Management Educators – Butterworth Heinemann Elsevier, USA, 2010*
- *I. Bennett, Optometric Practice Management, 2nd edition, Butterworth Heinemann, 2003*
- *A. Hanks, What Patients want? AJ Hanks & VJ Hanks, 2010*
- *N. Gailmard, Practice management in optometry, Walnut Ridge Publishing, 2017.*

Course Title: Community eye health and Tele-optometry #	L	T	P	Cr.
Course Code: BOPT803	1	0	2	3

Total Hours 15 hrs

Course Outcomes: At the end of the course students will be able to...

1. Learn the principles and commandments of Screening
2. Develop relevant IEC materials and deliver them at the campsites
3. Develop and conduct surveys to understand the practices and knowledge of stakeholders
4. Learn the cost analysis pertaining to community outreach
5. Learn Implementation and evaluation of a community outreach program

COURSE CONTENTS

UNIT-I

05 Hours

Epidemiology of blindness – Defining blindness and visual impairment. Prevalence, incidence and distribution of visual impairment. Eye in primary health care. Community Eye Care Programs

UNIT-II

05 Hours

Nutritional Blindness with reference to Vitamin A deficiency. Screening for eye diseases – Refractive errors, Low Vision, Cataract, Diabetic retinopathy, Glaucoma, Amblyopia, Squint. National and International Agencies - NPCB, IAPB, WHO.. Role of an optometrist in Public Health. Optometrists role in school eye health programmes

UNIT-III

05 Hours

Basics of Tele Optometry and its application in Public Health. Information, Education and Communication for Eye Care programs. Health Information and Basic Medical Statistics. Communication for Health Education. Health Planning and Management. Plan and implement 2030 INSIGHT

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- *Newcomb RD, Jolley JL: Public Health and Community Optometry, Charles C Thomas Publisher, Illinois, 1980*
- *K Park: Park's Text Book of Preventive and Social Medicine, 19th edition, Banarsidas Bhanot publishers, Jabalpur, 2007*

Course Title: Data science for healthcare #	L	T	P	Cr.
Course Code: BOPT804	1	0	0.5	1.5

Total Hours 15 hrs

Course Outcomes: At the end of the course students will be able to...

1. To understand the foundation and rules for handling big health data
2. To develop a practical knowledge and understanding of important statistical issues and relevant data analytics for health big data analysis
3. To learn and master basic software and programming skills for data cleaning and data processing

COURSE CONTENTS

UNIT-I

05 Hours

Foundations of data science: Probability and statistics, Linear algebra for data science, Optimisation for data science

UNIT-II

05 Hours

Health care systems, types of data in healthcare Healthcare data literacy
Health care data security, compliance and privacy

UNIT-III

05 Hours

Machine learning: foundations and algorithms, Machine learning and real world use: cases in biology and health care, disease modelling, Applications and benefits of data science

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- Provost F, Fawcett T. *Data Science for Business: What You Need to Know About Data Mining and Data-Analytic Thinking*. 1st ed. Sebastopol, CA: O'Reilly Media; 2013.
- James G, Witten D, Hastie T, Tibshirani R, Taylor J. *An Introduction to Statistical Learning: With Applications in Python*. New York: Springer; 2023.
- Géron A. *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow*. 3rd ed. Sebastopol, CA: O'Reilly Media; 2022.
- Shortliffe EH, Cimino JJ, editors. *Biomedical Informatics: Computer Applications in Health Care and Biomedicine*. 5th ed. Cham: Springer; 2021.
- World Health Organization. *Global Strategy on Digital Health 2020–2025*. Geneva: World Health Organization; 2021.
- World Health Organization. *Ethics and Governance of Artificial Intelligence for Health*. Geneva: World Health Organization; 2021.

Course Title: Clinical Optometry VIII	L	T	P	Cr.
Course Code: BOPT805	2	0	4	6

Total Hours 30 hrs

Course Outcomes: At the end of the course students will be able to...

1. Explain the principles of evidence-based practice and apply current scientific evidence to the assessment and management of common ocular and visual disorders.
2. Evaluate and manage binocular vision disorders, including convergence insufficiency and divergence excess, using evidence-based approaches.
3. Describe the visual consequences of refractive surgery, optic atrophy, and retinal detachment and identify appropriate assessment and referral strategies.
4. Explain the clinical features, diagnostic approaches, and evidence-based management of inherited retinal disorders, including retinitis pigmentosa, congenital stationary night blindness (CSNB), and Stargardt disease.
5. Apply evidence-based approaches to the assessment and management of age-related macular degeneration, diabetic retinopathy, and hypertensive retinopathy.
6. Perform comprehensive eye examinations, specialised ocular assessments, and community-based screening activities while recognising conditions requiring referral to an ophthalmologist.

COURSE CONTENTS

UNIT-I

15 Hours

Evidence Based Practice on the following Common Clinical Conditions

Convergence insufficiency/ Divergence excess

Post refractive surgery

Optic atrophy

Retinal Detachment

UNIT-II

15 Hours

Evidence Based Practice on the following Common Clinical Conditions

Retinitis pigmentosa, CSNB, Stargardt's Disease

Age related macular Degeneration

Diabetic retinopathy

Hypertensive Retinopathy

SUGGESTED PRACTICALS/DEMONSTRATION (60 Hours)

- Comprehensive eye examination
- Community out-reach (Screening camps, Awareness camps and impact assessments for children, adult and geriatric population and occupation specific camps)
- Neuro-optometric work up
- Ocular surface work up
- Cornea work up
- Glaucoma work up
- Uvea work up

TRANSACTIONAL MODES

Lecture, Tutorial, Problem based learning, small group teaching and learning, Continuous interactive learning, Case-based, Project based, Seminars, Clinical conferences, E-learning, Skills laboratory, Industrial visit

SUGGESTED READING

- Elliott DB, editor. *Clinical Procedures in Primary Eye Care*. 5th ed. Edinburgh: Elsevier; 2021.
- American Academy of Ophthalmology. *BCSC: Basic and Clinical Science Course*. San Francisco: American Academy of Ophthalmology. Relevant sections on retina, neuro-ophthalmology, and clinical optics.
- Kanski JJ, Bowling B. *Kanski's Clinical Ophthalmology: A Systematic Approach*. 9th ed. Edinburgh: Elsevier; 2019.
- Schardt C, Adams MB, Owens T, Keitz S, Fontelo P. Utilization of the PICO framework to improve searching PubMed for clinical questions. *BMC Med Inform Decis Mak*. 2007;7:16.
- Greenhalgh T. *How to Read a Paper: The Basics of Evidence-Based Medicine and Healthcare*. 6th ed. Hoboken, NJ: Wiley-Blackwell; 2019.
- American Academy of Ophthalmology. *Preferred Practice Pattern Guidelines*. San Francisco: American Academy of Ophthalmology.

Relevant guidelines on diabetic retinopathy, age-related macular degeneration, and retinal disorders.

Course Title: Research Project – II #	L	T	P	Cr.
Course Code: BOPT806	0	0	4	4

Total Hours 120 hrs

Course Outcomes: At the end of the course students will be able to...

1. To acquire the basic knowledge and experience of collecting necessary data for the research topic
2. To demonstrate an understanding of the relevant roles and responsibilities involved
3. To conduct basic statistical analysis on the collected data
4. To consolidate and report the results collected

9th SEMESTER

Course Title: Internship	L	T	P	Cr.
Course Code: BOPT901	3	0	38	41

Total Hours 600 hrs

The internship time period provides the students the opportunity to continue to develop confidence and increased skill in diagnosis and management. Students will demonstrate competence in beginning, intermediate, and advanced procedures in above areas. Students will participate in advanced and specialized treatment procedures. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction.

The students are expected to work for minimum 7 hours per day and this may be more depending on the need and the healthcare setting.

Internships postings can be in the following locations: Eye Hospitals, Eye clinics in general hospital, Independent eye clinics, Optometric clinics in eye hospitals, general hospitals or optical showrooms, wherein the learning objective can be achieved. Short period of observation to eye care (instruments, optical, contact lens) related manufacturing set-ups, corporates and nongovernmental organizations. It is mandatory to provide exposure to all the outlined types of clinical postings as below.

S No	TYPE OF CLINICAL POSTINGS	DETAILS	Weightage based on clinical hours	Minimum No. of cases
1	OPD	General OPD Specialty OPD	30% 15%	650
2	Specialty Clinics	CL LVC BVC Opticals Diagnostics: (Covering all specialty including	10% 10% 10% 10% 5%	20 10 10 100* 50

		Corneal, retinal, cataract etc)		
3	Community Rotations	School eye screening, Adult screening, Occupational Optometry etc.	10%	10 camps

Vertical integration in the context of medical curricula can be defined as the integration of basic knowledge such as basic science and clinical science including skills, in the clinical context. In the current discipline-based curriculum, the teaching and learning of the clinical component takes place in clinics in the traditional design of teaching. The basic knowledge such as anatomy, physiology or biochemistry are not related with the clinical condition during patient care. This lack of integrating knowledge could be bridged by introducing the concept of vertical integration wherein the facilitators take the role of introducing the cases and the students take the major role of gathering knowledge and understand the clinical scenario and apply the basic knowledge till the patient management based on evidence. Here the subject is introduced with a case and the study materials are provided to the students well in advance for them to prepare for the class (group discussions and not Regular one way lecture). Here the students have greater opportunity of structured learning.

10TH SEMESTER

Course Title: Internship	L	T	P	Cr.
Course Code: BOPT1001	3	0	38	41

Total Hours 600 hrs

The internship time period provides the students the opportunity to continue to develop confidence and increased skill in diagnosis and management. Students will demonstrate competence in beginning, intermediate, and advanced procedures in above areas. Students will participate in advanced and specialized treatment procedures. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction.

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