DRAFT REGULATIONS FOR BACHELOR OF OPTOMETRY (BOP) PROGRAMME

SRI GURU RAM DAS UNIVERSITY OF HEALTH SCIENCES,

SRI AMRITSAR

Applicable from Academic Session 2025-2026

AS PER THE NATIONAL COMMISSION FOR ALLIED AND HEALTHCARE PROFESSIONS (NCAHP) ACT, 2021

BACHELOR OF OPTOMETRY

Introduction:

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

1. Be able to develop skills to provide comprehensive eye examination.

a. To acquire knowledge on ocular structures, its functions and pathological changes
b. To carryout ophthalmic investigations
c. To impart knowledge with regard to common eye diseases
d. To impart knowledge on treatment modalities from the perspective of counselling
e. To acquire knowledge about the referral guidelines for ocular and systemic conditions

2. Be able to correct refractive error and provide spectacle prescription
3. Be able to fit, evaluate, prescribe and dispense contact lenses for refractive correction and other ocular conditions
4. Be able to assess the low vision and provide comprehensive low vision care
5. Be able to have adequate knowledge to develop skill in manufacturing of spectacle lenses, contact lenses and low vision devices.
6. Be able to do complete binocular vision assessment, manage non-strabismic binocular vision anomalies and refer condition which warrants surgery
7. Be able to assess the visual demands for various occupations and match it to the visual capabilities. Also be able to advice on eye safety wear for various occupations.
8. Have knowledge and skill for early detection of various ocular conditions and pathologies –Refractive error, Strabismus, Cataract, Diabetic retinopathy, Glaucoma etc.
9. Have knowledge regarding organizations of eye banks and preservation of ocular tissues.
10. Have knowledge on sensory substitution and other rehabilitation measures for totally visually challenged.
11. Have knowledge of counselling on visual/ocular hygiene, nutritional and environmental modifications

Expectation from the future graduates in the providing patient care.

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

Eligibility for admission:

Selection procedure:

1. He/she has passed the Higher Secondary (10+2) or equivalent examination recognized by any Indian University or a duly constituted Board with pass marks (50% marks) in physics, chemistry, biology/mathematics. Admission is done based on the NEET exam / equivalent exam conducted by the Government of India (for both UG and PG programs) followed by a counselling session.

OR

Diploma in Optometry after completing 12th class/ 10 +2 of CBSE or equivalent with minimum aggregate of 50% marks in physics, chemistry and biology/mathematics provided the candidate has passed in each subject separately.

2. Candidates who have studied abroad and have passed the equivalent qualification as determined by the Association of Indian Universities will form the guideline to determine the eligibility and must have passed in the subjects: Physics, Chemistry, Biology/Mathematics and English up to 12th Standard level with pass marks (equivalence to) 50% in physics, chemistry, biology/mathematics
3. Candidates who have passed the Senior Secondary school Examination of National Open School with a minimum of 5 subjects with any of the following group subjects with pass marks of 50% in physics, chemistry, biology/mathematics

a. English, Physics, Chemistry, Botany, Zoology
b. English, Physics, Chemistry, Biology/Mathematics and any other language

4. He/she has attained the age of 17 years as on 31st December of the year of admission.

5. He/she has to furnish at the time of submission of application form, a certificate of Physical fitness from a registered medical practitioner and two references from persons other than relatives testifying to satisfactory general character.

a. During subsequent counselling (s) the seat will be allotted as per the merit of the candidate depending on the availability of seats on that particular day.
b. Candidate who fails to attend the Medical Examination on the notified date(s) will forfeit the claim for admission and placement in the waiting list except permitted by the competent authority under special circumstances.
c. The name of the student(s) who remain(s) absent from classes for more than 15 days at a stretch after joining the said course will be struck off from the college rolls without giving any notice.

Provision of Lateral Entry:

Lateral entry to second year of undergraduate optometry programme for candidates who have passed diploma in Optometry/ vision technician/ophthalmic assistant programs from the Government Boards and recognized by State/Central University, fulfilling the conditions specified and these students are eligible to take admission on lateral entry system only if the related subjects have been studied at diploma level with appropriate transfer of credits.

Duration of the course

The B. Optom undergraduate degree program is of five years duration (4+1) including one year of compulsory internship.
Duration of the course: 5 (4+1) years or 10 (8+2) semesters.
Total hours –6000 (didactics+ practical +internship)
Semesters - An academic year consists of two semesters Odd
Semester: June/July to November/December
Even Semester: November/December to April/May

Medium of instruction:

English shall be the medium of instruction for all the subjects of study and for examination of the course.

Attendance:

A candidate has to secure minimum-

1. 75% attendance in theoretical
2. 80% in Skills training (practical and clinical training) for qualifying to appear for the examination.

Assessment:

Assessments should be completed by the academic staff, based on the compilation of the student"s theoretical & clinical performance throughout the training programme. To achieve this, all assessment forms and feedback should be included and evaluated.

Competency Standards

Classification Units of Competency Skills at Entry level for optometrists

1. Communication Skills
2. Professional Conduct
3. Patient Examination and management.
4. Optical Dispensing
5. Documentation

Bachelor of Optometry [5 year program]
Proposed Scheme

Year	Semester	Hours
1	1	450
1	2	450
2	3	450
2	4	450
3	5	450
3	6	450
4	7	450
4	8	450
5	9	1200
5	10	1200
Total		6000

Credit details:

One credit implies one hour lecture per week or two hours of laboratory/practical per week or two hours of clinics per week or two hours of Research project per week

A semester is considered to have 15 weeks. For example, 1 credit course = 15 hours of lectures per semester

3 credits course = 45 hours of lectures per semester

0.5 credit course = 15 hours of practical/laboratory.

CL	CP	L	P
3	0.5	45	15

CL: Credit for Lecture CP:
Credit for Practicals L:
Hours for Lecture
P: Hours for Practicals

Curriculum Outline

First Semester

Sl. No.	Course Titles	Hours/semester		
		Lecture	Practicals	Total
BOP101	General Anatomy	45	15	60
BOP102	General Physiology	45	15	60
BOP103	General Biochemistry	45	15	60
BOP104	Physical Optics	45	15	60
BOP105	Mathematics & Geometrical Optics-I	45	15	60
BOP106	Introduction to Optometry#	30	0	30
BOP107	Nutrition#	15	0	15
BOP108	Communication#	15	60	45
BOP109	Clinical Optometry I	0	30	60
TOTAL		**285**	**165**	**450**

Course code	Course Titles	Credits/Week			Hours/Semester			Assessments		Total
		L	P	C	L	T/P	Total	IA*	UE**	(IA+UE)
BOP101	General Anatomy	3	0.5	3.5	45	15	60	30	70	100
BOP102	General Physiology	3	0.5	3.5	45	15	60	30	70	100
BOP103	General Biochemistry	3	0.5	3.5	45	15	60	30	70	100
BOP104	Physical Optics	3	0.5	3.5	45	15	60	30	70	100
BOP105	Mathematics & Geometrical Optics-I	3	0.5	3.5	45	15	60	30	70	100
BOP106	Introduction to Optometry#	2		2	30		30	100	-	100
BOP107	Nutrition#	1		1	15		15	100	-	100
BOP108	Communication#	1	2	3	15	60	75	100	-	100
BOP109	Clinical Optometry I #		1	2		30	30	100	-	100
Total		**19**	**5.5**	**255**	**285**	**165**	**450**	**550**	**350**	**900**

Second Semester

Sl. No.	Course Titles	Hours/semester		
		Lecture	Practicals	Total
BOP201	General Pharmacology	45	0	45
BOP202	General Pathology	30	0	30
BOP203	Ocular and related neuroanatomy	45	15	60
BOP204	Ocular and related neurophysiology	45	30	75
BOP205	Ocular Biochemistry	45	30	75
BOP206	Geometrical Optics-II	45	30	75
BOP207	Basics of Computers[#]	0	30	30
BOP208	Clinical Optometry-II	0	60	60
TOTAL		**255**	**195**	**450**

Course code	Course Titles	Credits/Week			Hours/Semester			Assessments		Total
		L	P	C	L	T/P	Total	IA*	UE**	(IA+UE)
BOP201	General Pharmacology	3		3	45		45	30	70	100
BOP202	General Pathology	2		2	30		30	30	70	100
BOP203	Ocular and related neuroanatomy	3	0.5	3.5	45	15	60	30	70	100
BOP204	Ocular and related neurophysiology	3	1	4	45	30	75	30	70	100
BOP205	Ocular Biochemistry	3	1	4	45	30	75	30	70	100
BOP206	Geometrical Optics-II	3	1	4	45	30	75	30	70	100
BOP207	Basics of Computers[#]		1	1		30	30	100	-	100
BOP208	Clinical Optometry-II [#]		2	2		60	60	100	-	100
Total		**17**	**6.5**	**23.5**	**255**	**195**	**450**	**380**	**420**	**800**

Non-university exams

Third Semester

Sl. No.	Course Titles	Hours per semester		
		Lecture	Practicals	Total
BOP301	General and Ocular Microbiology	45	15	60
BOP302	Ocular Pharmacology	45	0	45
BOP303	Visual optics –I	45	30	75
BOP304	Optometric optics	45	30	75
BOP305	Ocular Disease –I	45	0	45
BOP306	Indian Medicine and Telemedicine[#]	30	0	30
BOP307	Clinical Optometry-III	0	120	120
TOTAL		**255**	**195**	**450**

Course code	Course Titles	Credits/Week			Hours/Semester			Assessments		Total
		L	P	C	L	T/P	Total	IA*	UE**	(IA+UE)
BOP301	General and Ocular Microbiology	3	0.5	3.5	45	15	60	30	70	100
BOP302	Ocular Pharmacology	3		3	45		45	30	70	100
BOP303	Visual optics –I	3	1	4	45	30	75	30	70	100
BOP304	Optometric optics	3	1	4	45	30	75	30	70	100
BOP305	Ocular Disease –I	3		3	45		45	30	70	100
BOP306	Indian Medicine and Telemedicine[#]	2		2	30		30	100	-	100
BOP307	Clinical Optometry-III		4	4		120	120	30	70	100
Total		**17**	**6.5**	**23.5**	**255**	**195**	**450**	**280**	**420**	**700**

Non-university exams

Fourth Semester

Sl. No.	Course Titles	Hours per semester		
		Lecture	Practicals	Total
BOP401	Optometric Instruments	45	15	60
BOP402	Clinical examination of visual system	15	60	75
BOP403	Visual perception and psychophysics	30	15	45
BOP404	Visual Optics- II	45	30	75
BOP405	Ocular Disease –II	45	0	45
BOP406	Behavioral Health Psychology[#]	15	0	15
BOP407	Introduction to Quality & Patient safety[#]	15	0	15
BOP408	Clinical Optometry-IV		120	120
	TOTAL	**210**	**240**	**450**

Non-university exams

Course code	Course Titles	Credits/Week			Hours/Semester			Assessments		Total
		L	P	C	L	T/P	Total	IA*	UE**	(IA+UE)
BOP401	Optometric Instruments	3	0.5	3.5	45	15	60	30	70	100
BOP402	Clinical examination of visual System	1	2	3	15	60	75	30	70	100
BOP403	Visual perception and psychophysics	2	0.5	2.5	30	15	45	30	70	100
BOP404	Visual Optics- II	3	1	4	45	30	75	30	70	100
BOP405	Ocular Disease –II	3		3	45		45	30	70	100
BOP406	Behavioural Health Medical Psychology [#]	1		1	15		15	100	-	100
BOP407	Introduction to Quality & Patient safety #	1		1	15		15	100	-	100
BOP408	Clinical Optometry-IV		4	4		120	120	30	70	100

Fifth Semester

Sl. No.	Course Titles	Hours per semester		
		Lecture	Practicals	Total
BOP501	Systemic Disease	30	0	30
BOP502	Dispensing Optics	30	30	60
BOP503	Geriatric Optometry	45	0	45
BOP504	Paediatric Optometry	45	15	60
BOP505	Diagnostics and therapeutics of Anterior Segment diseases	60	15	75
BOP506	Innovation and technology[#]	15	15	30
BOP507	Clinical Optometry V	30	120	150
TOTAL		**255**	**195**	**450**

Course code	Course Titles	Credits/Week			Hours/Semester			Assessments		Total
		L	P	C	L	T/P	Total	IA*	UE**	(IA+UE)
BOP501	Systemic Disease	2		2	30		30	30	70	100
BOP502	Dispensing Optics	2	1	3	30	30	60	30	70	100
BOP503	Geriatric Optometry	3		3	45		45	30	70	100
BOP504	Paediatric Optometry	3	0.5	3.5	45	15	60	30	70	100
BOP505	Diagnosticsand therapeutics of Anterior Segment diseases	4	0.5	4.5	60	15	75	30	70	100
BOP506	Innovation and technology [#]	1	0.5	1.5	15	15	30	100	-	100
BOP507	Clinical OptometryV	2	4	6	30	120	150	30	70	100
Total		**17**	**6.5**	**23.5**	**255**	**195**	**450**	**280**	**420**	**700**

Non-university exams

Sixth Semester

Sl. No.	Course Titles	Hours per semester		
		Lecture	Practicals	Total
BOP601	Contact lens –I	30	30	60
BOP602	Low Vision care and Rehabilitation	30	30	60
BOP603	Binocular Vision- I	30	30	60
BOP604	Diagnostics and therapeutics of Posterior segment diseases	60	15	75
BOP605	Optometry and Multidisciplinary aspects of Health[#]	15	0	15
BOP606	Research Methodology & Biostatistics[#]	30	0	30
BOP607	Clinical Optometry VI	30	120	150
TOTAL		**225**	**225**	**450**

Course code	Course Titles	Credits/Week			Hours/Semester			Assessments		Total
		L	P	C	L	T/P	Total	IA*	UE**	(IA+UE)
BOP601	Contact lens –I	2	1	3	30	30	60	30	70	100
BOP602	Low Vision care and Rehabilitation	2	1	3	30	30	60	30	70	100
BOP603	Binocular Vision- I	2	1	3	30	30	60	30	70	100
BOP604	Diagnostics and therapeutics of Posterior segment diseases	4	0.5	4.5	60	15	75	30	70	100
BOP605	Optometry and Multidisciplinary aspects of Health #	1		1	15		15	100	-	100
BOP606	Research Methodology & Biostatistics	2		2	30		30	100	-	100
BOP607	Clinical Optometry VI	2	4	6	30	120	150	30	70	100
Total		**15**	**7.5**	**22.5**	**225**	**225**	**450**	**350**	**350**	**700**

Seventh Semester

Sl. No.	Course Titles	Hours per semester		
		Lecture	Practicals	Total
BOP701	Contact Lens –II	30	30	60
BOP702	Binocular Vision –II	30	30	60
BOP703	Public Health & Epidemiology	30	0	30
BOP704	Law and Professional ethics-Optometry. #	15	0	15
BOP705	Community eye health#		45	45
BOP706	Clinical Optometry VII	30	120	150
BOP707	Research Project – I #	0	90	90
TOTAL		**135**	**315**	**450**

Course code	Course Titles	Credits/Week			Hours/Semester			Assessments		Total
		L	P	C	L	T/P	Total	IA*	UE**	(IA+UE)
BOP701	Contact Lens –II	2	1	3	30	30	60	30	70	100
BOP702	Binocular Vision –II	2	1	3	30	30	60	30	70	100
BOP703	Public Health & Epidemiology	2		2	30		30	30	70	100
BOP704	Law and professional ethics – Optometry. #	1		1	15		15	100	-	100
BOP705	Community eye health #		1.5	1.5		45	45	100	-	100
BOP706	Clinical Optometry VII	2	4	6	30	120	150	30	70	100
BOP707	Research Project – I #		3	3		90	90	100		100
Total		**9**	**10.5**	**19.5**	**135**	**315**	**450**	**420**	**280**	**600**

Eighth Semester

Sl. No.	Course Titles	Hours per semester		
		Lecture	Practicals	Total
BOP801	Occupational optometry	30	15	45
BOP802	Practice Management	30	0	30
BOP803	Community eye health and Tele-optometry[#]	15	60	75
BOP804	Data science for healthcare[#]	15	15	30
BOP805	Clinical Optometry VIII	30	120	150
BOP806	Research Project – II	0	120	120
TOTAL		**120**	**330**	**450**

Non-university exams

Course code	Course Titles	Credits/Week			Hours/Semester			Assessments		Total
		L	P	C	L	T/P	Total	IA*	UE**	(IA+UE)
BOP801	Occupational Optometry	2	0.5	2.5	30	15	45	30	70	100
BOP802	Practice Management	2		2	30		30	30	70	100
BOP803	Community eye health and Tele-optometry [#]	1	2	3	15	60	75	100	-	100
BOP804	Data science for healthcare [#]	1	0.5	1.5	15	15	30	100	-	100
BOP805	Clinical Optometry VIII	2	4	6	30	120	150	30	70	100
BOP806	Research Project – II		4	4		120	120	30	70	100
Total		**8**	**11**	**19**	**120**	**330**	**450**	**320**	**280**	**600**

Ninth and tenth Semester (Considering 24 weeks per semester)

Sl. No.	Course Titles	Hours per semester		
		Lecture	Practicals	Total
BOP901	B Optom Internship -I	45	1155	1200
BOP1001	B Optom Internship -II	45	1155	1200
				2400

Non-university exams

Course code	Course Titles	Credits/Week			Hours/Semester			Assessments		Total
		L	P	C	L	T/P	Total	IA*	UE**	(IA+UE)
BOP901	B Optom Internship				50	1150	1200	50	-	50
BOP1001	B Optom Internship				50	1150	1200	50	-	50
Total		**0**	**0**	**0**	**100**	**2300**	**2400**	**100**	**-**	**100**

Non-university exams

First Semester

GENERAL ANATOMY

CL	CP	L	P
3	0.5	45	15

INSTRUCTOR IN CHARGE: MD Anatomy, M.Sc Anatomy or M Optom with experience in handling Anatomy.

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

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

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the 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.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

PREREQUISITES: Higher secondary level biology or remedial biology

COURSE PLAN:

Unit	Topic	Hours
1	Introduction to Human Anatomy: Anatomy: Definition and its relevance in medicine and optometry Planes of the body, relationship of structures, organ system Skeletal System	9
2	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	9
3	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	9
4	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	9
5	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	9

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

CL	CP	L	P
3	0.5	45	15

GENERAL PHYSIOLOGY

INSTRUCTOR IN CHARGE: MD Physiology, MSc Physiology or M Optom with experience in handling Physiology

COURSE DESCRIPTION: General physiology deals with the entire human anatomy with emphasis on different organ systems, their physiological functions with special emphasis on blood and neurophysiology.

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

TEXT BOOKS:

1. Human physiology - C C Chatterjee 14th edition 2 volumes
2. Essentials of human physiology - K Sembulimgam 8th edition

REFERENCE BOOKS:-

1. A C Guyton: Text book of Medical Physiology, 8th edition, saunders company, Japan,
2. G J Tortora, B Derrickson: Principles of anatomy & physiology,11th edition, Harper & Row Publishers, New York
3. John Wiley & Sons Inc, New Jersey, 2007

PREREQUISITES: Higher secondary level biology or remedial biology

COURSE PLAN:

Unit	Topics	Hours
1	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	7
2	Blood: Composition, Volume measurement & variations, Plasma proteins –classification & functions, Red blood cells – development, morphology & measurements –functions & dysfunctions., White blood cells –development –classification, morphology –functions & dysfunctions, Platelets –morphology – development, functions & dysfunctions, Clotting –factors – mechanism –anti- coagulants dysfunctions, Blood grouping – classification –importance in transfusion, Rh factor & incompatibility, Suspension stability, Osmotic stability, Reticulo endothelial system: Spleen,lymphatic tissue, Thymus, bone marrow, immune system, cellular, Humoral, Autoimmune system	9
3	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	9
4	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.	10

5	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	10

PRACTICAL*:

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

*Videos can be shown to make the student understand the functions

GENERAL BIOCHEMISTRY

CL	CP	L	P
3	0.5	45	15

INSTRUCTOR IN CHARGE: Ph D or MD in biochemistry with adequate exposure to the profession of optometry or M Optom with experience in handling Biochemistry

COURSE DESCRIPTION: This course will be taught in two consecutive semesters. General Biochemistry deals with the biochemical nature of carbohydrates, proteins, minerals, vitamins, lipids etc. A detailed study of these, emphasizing on their chemical composition and their role in metabolism is the required aim of this course.

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

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

TEXT BOOK:

1. Essentials of biochemistry - Shivananda Nayak 3rd edition
2. Textbook of biochemistry for medical students - D M Vasudevan 8th edition

REFERENCE BOOKS:

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

PREREQUISITES: Higher secondary level chemistry with good knowledge of organic chemistry.

COURSE PLAN

Unit	Topics	Hours
1	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	9
2	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	9
3	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	9
4	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	9
5	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	9

PRACTICALS

- 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)

PHYSICAL OPTICS

CL	CP	L	P
3	0.5	45	15

INSTRUCTOR IN CHARGE: A post-graduate, preferably a Ph D, in physics, with adequate exposure to the profession of optometry as evidenced by previous teaching experience or publications in optometry journals/magazines Or M Optom/ Ph D in Optometry with experience in handling Optics

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

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

TEXT BOOK: Keating NM. P, Geometric, Physical and Visual Optics, Butterworth- Heinemann, Massachusetts, USA, 2002.

Unit	Topics	Hours
1	Nature of light –light as electromagnetic oscillation –wave equation; ideas of sinusoidal oscillations –simple harmonic oscillation; transverse nature of oscillation; concepts of frequency, wavelength, amplitude and phase. Sources of light; Electromagnetic Spectrum, 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	9
2	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.	9

3	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; Raleigh‟s scattering; Tyndall effect.	9
4	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	9
5	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.	9

PRACTICALS

The practical to be done include the following:

- 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‟sInterferometer
- Photometry of Images: Verification of Inverse Square Law; Effect of aperture size on image illuminance

CL	CP	L	P
3	0.5	45	15

MATHEMATICS & GEOMETRICAL OPTICS-I

INSTRUCTOR IN CHARGE:

Mathematics: A post-graduate, preferably a PhD, in mathematics, with adequate exposure to the profession of optometry as evidenced by previous teaching experience or publications in optometry journals/magazines OR M Optom/Ph D in Optometry with experience in handling mathematics and optics

Geometrical optics: A post-graduate, preferably a Ph D, in physics, with adequate exposure to the profession of optometry as evidenced by previous teaching experience or publications in optometry journals/magazines OR An optometrist with a post-graduate degree, preferably a Ph D OR An optometrist with an undergraduate degree

COURSE DESCRIPTION:

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

OBJECTIVE:

The objective of the mathematics units is to introduce the basic principles of mathematics involved in optometry, optics and other applied diagnostic divisions of optometry. The objective of the geometric optics units is to equip the students with a thorough knowledge of mirrors and lenses. At the end of this course, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.

TEXT BOOK:

1. Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.
2. B. S. Grewal, Higher Engineering Mathematics, 43/e, Khanna Publishers, 2014.

REFERENCE BOOKS:

1. Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.
2. Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw-Hill, New York, USA, 2002.

Course plan:

Unit	Topic	Hours
1	Trigonometry: Complex numbers, DeMoivre‟s Theorem and important deductions, Trigonometric and exponential forms of complex numbers and applications. Expansion of sinq, cosq and tanq in terms of q. Algebra: Combinations; Binomial theorem for any index	9
2	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	9
3	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	9
4	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	9
5	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; it dependence on refractive index	9

PRACTICALS

- 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

CL	CP	L	P
2	0	30	0

INTRODUCTION TO OPTOMETRY INSTRUCTOR IN CHARGE: M. Optom in Optometry with experience in teaching basic or core optometry courses.

COURSE DESCRIPTION: This course aims to orient the students with basic concepts of optometry, highlighting its role and importance in comprehensive ocular evaluation

OBJECTIVES:

1. This course provides the students with basic knowledge on optometry, its disciplines, and its importance in enabling comprehensive ocular evaluation
2. The course introduces the various roles that optometrists can play in terms of clinical, community, academic and research services and how different courses in the curriculum enable them towards achieving this objective

TEXT BOOK: J. Boyd Eskridge, John F. Amos, Jimmy D. Bartlett, Clinical Procedures in Optometry

COURSE PLAN:

Unit	Topic	Hours
1	Introduction to optometry, Definition, Rights and Responsibilities Integration of basic sciences and support courses to Optometry Role of optometry in comprehensive eye care.	10
2	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.	10
3	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?	10

NUTRITION

CL	CP	L	P
1	0	15	0

COURSE DESCRIPTION: This course covers the basic aspects of Nutrition for good health. It also includes nutrients and nutrient derivatives relevant to ocular health, nutrition deficiency and ocular disease, Nutrition and ocular aging, and contraindications, adverse reactions and ocular nutritional supplements.

OBJECTIVES: At the end of the course student would have gained the knowledge of the following: Balanced diet. • Protein, carbohydrates, vitamins, Minerals, carotenoids and eye. • Nutrition and Ocular aging • Adverse effects of ocular nutritional supplements.

TEXT BOOK:

1. Textbook on nutrition and dietetics - Clement I 1st edition.

REFERENCE BOOKS:

1. M Swaminathan: Hand book of Food and Nutrition, fifth edition, Bangalore printing & publishing Co.Ltd, Bangalore, 2004
2. C Gopalan, BV Rama Sastri, SC Balasubramanian: Nutritive Value of Indian Foods,

Unit	Topic	Hours
1	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.	5
2	Nutrition deficiency and ocular disease: Vitamin A deficiency, Vitamin C deficiency and ocular disease, Vitamin E deficiency, retinitis pigmentosa.	5
3	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),	5

CL	CP	L	P
1	2	15	60

COMMUNICATION

INSTRUCTOR IN CHARGE PhD/ Masters in the field of communication preferable.

COURSE DESCRIPTION: This course deals with essential functional English aspects and nuances of the communication skills essential for the health care professionals.

OBJECTIVES:

1. This course trains the students in oral presentations, expository writing, logical organization and structural support.
2. By acquiring skills in the use of communication techniques the students will be able to express better, grow personally and professionally, develop poise and confidence and achieve success.

TEXT BOOK:

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

REFERENCE BOOKS: Faculty may decide.

PREREQUISITES: Basic English-speaking writing comprehension skills

COURSE PLAN

Unit	Topics	Hours
1	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	5
2	Communication process, Elements of communication, Barriers of communication and how to overcome them. Nuances for communicating with patients and their attenders in hospitals.	5
3	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)	5

PRACTICALS

- 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

CL	CP	L	P
0	1	0	30

CLINICAL OPTOMETRY I

INSTRUCTOR IN CHARGE: M Optom with experience in teaching basic or core optometry courses

COURSE DESCRIPTION: This course deals with introducing the students to the optometric clinical rotations in a clinic or a hospital.

OBJECTIVES:

The objective is to introduce the student to the working of a clinic/ hospital

To introduce different departments in a hospital/ non-optometry services in a clinic

TEXT BOOK: Faculty to decide

REFERENCE BOOKS: Relevant Hospital Administrative Manuals (Faculty may decide)

COURSE PLAN

Practicals:

1. Observe the basic operations of the optometry clinic while interacting with the team members involved in providing optimal care to patients.
2. Setting up of an optometric work up room
3. Introduction to relevant terminologies, equipment and techniques used for treatment.
4. Tour the hospital and get to know other departments in a tertiary eye care hospital and provide a report on the observation
5. Coverage on the process of the clinic/ hospital, creating and maintaining medical records (electronic),
6. Processes and guidelines in the Human resources department during the studentship along with the roles and responsibilities of the students,
7. Observation in clinical and non-clinical processes of the Optometry/ Opticals 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.
8. Basic Life Support Skills Training
9. Observation at the Hospital infection control and Safety and the Quality Control System
10. Training on basic clinical protocol for community outreach

Second Semester

GENERAL PHARMACOLOGY

CL	CP	L	P
3	0	45	0

INSTRUCTOR INCHARGE: MD Pharmacology/M.Pharm or Pharm D who have adequate experience in teaching pharmacology.

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

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

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

TEXT BOOK/REFERENCE BOOKS:

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

PREREQUISITES: General Physiology & Biochemistry

COURSE PLAN

Unit	Topics	Hours
1	General Pharmacology: Introduction & sources of drugs, Routes of drug administration, Pharmacokinetics (emphasis on ocular pharmacokinetics), Pharmacodynamics & factors modifying drug actions	15
2	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	10
3	General & local anaesthetics, Opioids & non-opioids; Chemotherapy : Introduction on general chemotherapy, Specific chemotherapy – Antiviral, antifungal, antibiotics; Hormones : Corticosteroids, Antidiabetics; Blood Coagulants	10
4	Principles and classification of autonomic drugs, Sympathomimetics – Sympatholytics, Parasympathomimetics – Parasympatholytics, Diagnostic use of autonomic drugs, Sulfonamides, Antibiotics, Anaesthetics-Proteolytic enzymes	10

GENERAL PATHOLOGY

CL	CP	L	P
2	0	30	0

INSTRUCTOR INCHARGE: MD Pathology.

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

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

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

TEXT BOOK

1. Textbook of pathology - Harsh Mohan 8th edition

REFERENCE BOOKS:

1. CORTON KUMAR AND ROBINS: Pathological Basis of the Disease, 7th Edition, Elsevier, New Delhi, 2004.
2. S R Lakhani Susan AD & Caroline JF: Basic Pathology: An introduction to the mechanism of disease, 1993.

PREREQUISITES: Higher Secondary Biology, General and Ocular Anatomy, General and Ocular Physiology

COURSE PLAN

Unit	Topics	Hours
1	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	15
2	Neoplasia, Haematology, Anemia, Leukemia, Bleeding disorders. Circulatory disturbances: Thrombosis, Infarction, Embolism, Hypersensitivity reactions	10
3	Clinical pathology: Immune system, Shock, Anaphylaxis, Allergy	5

OCULAR AND RELATED NEURO-ANATOMY

CL	CP	L	P
3	0.5	45	15

INSTRUCTOR IN CHARGE: M Optom who have adequate experience in teaching anatomy or MD (Anatomy) or M.Sc (Anatomy).

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

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

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

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

PREREQUISITES: General anatomy

COURSE PLAN

Unit	Topics	Hours
1	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.	9
2	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	9
3	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.	9

4	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	9
5	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	9

PRACTICAL (15 Hours)

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

OCULAR AND RELATED NEUROPHYSILOGY

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

CL	CP	L	P
3	1	45	30

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

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

TEXT BOOK:

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

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

REFERENCE BOOKS:

1. PL Kaufman, A Alm: Adler‟s Physiology of the eye clinical application, 10th edition, Mosby, 2002

PREREQUISITES: General Physiology

COURSE PLAN:

Unit	Topics	Hours
1	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	9
2	Cornea, Aqueous humor and vitreous: Intra ocular pressure, Iris and pupil, Crystalline lens and accommodation – presbyopia, Mechanism of accommodation, Retina – structure and functions	9
3	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	9
4	Visual pathway, central and cerebral connections, Introduction to electro physiology, Retinal sensitivity and Visibility, Receptive stimulation and flicker	9
5	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)	9

PRACTICALS (30 Hours)

1. Examination of Lid movements and Extra ocular movements
2. Tests for lacrimation
3. Experiments on Binocular vision(Accommodation, Vergence, Disparity, Single Vision, Fusion & Stereopsis)
4. Examination of Pupillary reflexes
5. Experiments on Light and dark adaptation
6. Experiments on Colour Vision

OCULAR BIOCHEMISTRY INSTRUCTOR IN CHARGE: M Optom with experience in teaching Biochemistry or Masters or PhD in Biochemistry

CL	CP	L	P
3	1	45	30

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

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

1. Structure ,function and interrelationship of biomolecules and consequences of deviation from the normal
2. Integration of various aspects of metabolism and their regulatory pathways
3. Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data
4. Understand metabolic processes taking place in different ocular structures.

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

REFERENCE BOOKS:

1. S. Ramakrishnan, K G Prasannan and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990

2. D R Whikehart: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003

PREREQUISITES: Higher secondary level chemistry with good knowledge of organic chemistry and knowledge of Basic Biochemistry

COURSE PLAN:

Unit	Topics	Hours
1	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	9
2	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	9
3	Retina – structure – composition – photoreceptor cell – metabolism and functions – phagocytosis; Retinal neurochemistry – Monoamines – acetylcholine – GABA – amino acids – taurine – neuropeptides – Biochemical correlates of retinal diseases	9
4	Biochemistry of the visual process; Photopigments – Rhodopsin & Iodopsin. Chemical nature of Rhodopsin. Visual cycle (Bleaching of Rhodopsin, Transducin cycle, Role of Phosphodiesterases)	9
5	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.	9

PRACTICAL (30 Hours)

- Quantitative and qualitative analysis by spectrophotometry
- Electrophoresis
    - Chromatography – Lysozyme, Lactoferin, 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
    - Demonstration of various techniques as given in unit 5.

GEOMETRICAL OPTICS II

CL	CP	L	P
3	1	45	30

INSTRUCTOR IN CHARGE: A post-graduate, preferably a Ph D, in physics, with adequate exposure to the profession of optometry as evidenced by previous teaching experience or publications in optometry journals/magazines OR M Optom

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

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

TEXT BOOK:

1. Tunnacliffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990.
2. Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.

REFERENCE BOOKS:

1. Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.
2. Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw- Hill, New York, USA, 2002.

PREREQUISITES: Higher secondary level mathematics, physics, Geometric Optics I.

COURSE PLAN:

Unit	Topics	Hours
1	Vergence and vergence techniques revised. Gullstrand‟s schematic eyes, visual acuity, Stile Crawford. Emmetropia and ametropia	10
2	Blur retinal Imaginary, Correction of spherical ammetropia, vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptoric power, angular magnification of spectacles in aphakic. Astigmatism. - To calculate the position of the line image in a sphero-cylindrical lens.	15
3	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.	10
4	Telescopes and Microscopes, Accommodation – Accommodation formulae and calculations. angular magnification of spectacle lens, near point, calculation of add, depth of field.	10

PRACTICAL (30 Hours)

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

BASICS OF COMPUTERS INSTRUCTOR IN CHARGE: M Optom with adequate computer knowledge and with teaching experience or Graduate in Information and technology

CL	CP	L	P
0	1	0	30

COURSE DESCRIPTION: The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation.

OBJECTIVES: The students will be able to appreciate the role of computer technology and some extent able to gain hand-on experience in using computers.

TEXTBOOK: Faculty can decide

COURSE PLAN:

1. 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
2. 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.
3. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
4. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
5. Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), Internet and its Applications.
6. Introduction to computer applications in health and hospital data management system

CL	CP	L	P
0	2	0	60

CLINICAL OPTOMETRY II

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:

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

Third Semester

GENERAL AND OCULAR **MICROBIOLOGY**

CL	CP	L	P
3	0.5	45	30

INSTRUCTOR IN CHARGE:

Microbiologist with Masters or Ph D qualification.

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

OBJECTIVES The objectives of the course are:

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

TEXT BOOK:

Textbook of microbiology - Ananthanarayan and Paniker 11th edition

REFERENCE BOOKS:

1. 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
2. SYDNEY M. FINEGOLD & ELLEN JO BARON: Diagnostic Microbiology (DM)

PREREQUISITES: Higher secondary Biology

COURSE PLAN:

Unit	Topics	Hours
1	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.	9
2	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.	9
3	Ocular Immunology: Innate and adaptive immunity; Hypersensitivity responses - Anaphylactic hypersensitivity, cytotoxic hypersensitivity, Complex-mediated hypersensitivity, Delayed hypersensitivity; Autoimmunity; Host parasite relationship.	9
4	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	9
5	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	9

PRACTICALS:

1) Sterilization & Disinfection procedures and quality control
2) Collection of specimens from conjunctiva, lid margin (using sterile cotton swabs), Specimen processing
3) Isolation & Purification of microbes from collected specimens
4) Characteristic growth on different culture media
5) Characterization & Identification
   - Staining – Gram staining, Acid fast staining, Spore Staining, Flagella staining
   - Motility – Hanging drop method
   - Biochemical tests
   - Antibiotic sensitivity test
6) Isolation and identification of various fungal strains in the laboratory
7) 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.
8) Lab tour/ orientation to the PCR facility in diagnosis of ocular infections
9) Impression Cytology of conjunctiva

OCULAR PHARMACOLOGY

CL	CP	L	P
3	0	45	0

INSTRUCTOR INCHARGE: M Optom or MD Pharmacology or MS Ophthalmology with experience in teaching Phramacology

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

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

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

TEXT BOOK/REFERENCE BOOKS:

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

PREREQUISITES: General Physiology &Biochemistry

COURSE PLAN:

Unit	Topic	Hours
1	Ocular Pharmacology: Ocular preparations, formulations and requirements of an ideal agent. Ocular Pharmacokinetics, methods of drug administration & Special drug delivery system; Ocular Toxicology	9
2	Diagnostic & Therapeutic applications of drugs used in Ophthalmology: Diagnostic Drugs & biological agents used in ocular surgery, Anaesthetics used in ophthalmic procedures, Anti-glaucoma drugs	9
3	Pharmacotherapy of ocular infections –Bacterial, viral, fungal & chlamydial infections	9
4	Pharmacotherapy of Drugs used in allergic, inflammatory & degenerative conditions of the eye	9
5	Pharmacotherapy of Immune modulators in Ophthalmic practice, Wetting agents & tear substitutes, Antioxidants	9

VISUAL OPTICS I

CL	CP	L	P
3	1	45	30

INSTRUCTOR IN CHARGE: M Optom with teaching experience in optics.

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

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

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

TEXT BOOK:

1. A H Tunnacliffe: Visual optics, The Association of British Optician, 1987
2. AG Bennett & RB Rabbets: Clinical Visual optics, 3rd edition, Butterworth Heinemann, 1998
3. T Grosvenor: Primary Care Optometry,4th edition, Butterworth – heinneman,USA,2002

REFERENCE BOOKS:

1. M P Keating: Geometric, Physical and Visual optics, 2nd edition, Butterworth-Heinemann, USA, 2002
2. HL Rubin: Optics for clinicians, 2nd edition, Triad publishing company. Florida, 1974.
3. H Obstfeld: Optic in Vision- Foundations of visual optics & associated computations, 2nd edition, Butterworth, UK, 1982.
4. WJ Benjamin: Borish‟s clinical refraction,2nd edition, Butterworth Heinemann, Missouri, USA,2006

PREREQUISITES: Geometrical optics, Physical optics, Ocular Physiology

COURSE PLAN

Unit	Topic	Hours
1	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	**10**
2	Optics of Ocular Structure: Cornea and aqueous, Crystalline lens, Vitreous, Schematic and reduced eye	**10**
3	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	**10**
4	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	**15**

PRACTICAL (30 HOURS)

1. Study of Purkinje images I to IV.
2. Measurement of corneal curvature.
3. Measurement of corneal thickness.
4. Mathematical models of the eye - emmetropia, Hyperopia, Myopia
5. Conjugate points - demonstration - worked examples.
6. Axial and refractive ametropia - hyperopia, myopia - worked examples.
7. Construction of Visual acuity charts

8. Effect of lenses in front of the eye
9. Effect of prisms in front of the eye
10. Vision through pinhole, slit, filters, etc.

OPTOMETRIC OPTICS

CL	CP	L	P
3	1	45	30

INSTRUCTOR IN CHARGE: M Optom with teaching experience in Optics

COURSE DESCRIPTION: This course deals with understanding the theory behind spectacle lenses and frames, their materials, types, advantages and disadvantages, calculations involved, when and how to prescribe. It will impart construction, design application and development of lenses, particularly of the methods of calculating their power and effect.

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

1. Measurement of lens power , lens centration using conventional techniques
2. Transposition of various types of lenses Knowledge to identify different forms of lenses (equi- convex, 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

TEXT BOOK: Jalie M: The principles of Ophthalmic Lenses, The Association of Dispensing Opticians, London, 1994.

REFERENCE BOOKS:

1. David Wilson: Practical Optical Dispensing, OTEN- DE, NSW TAFE Commission,1999
2. C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth-Heinemann, USA, 1996

PREREQUISITES: Physical Optics, Geometrical Optics

COURSE PLAN

Unit	Topics	Hours
1	Introduction –Light, Mirror, Reflection, Refraction and Absorption. Lenses –Definition, units, terminology used to describe, form of lenses Vertex distance and vertex power, Effectivity calculations	9
2	Lens shape, size and types i.e. Spherical, cylindrical and Sphero-cylindrical Transpositions –Simple, Toric and Spherical equivalent, Surfacing of spherical and cylindrical lenses	9
3	Spherometer & Sag formula, Edge thickness calculations, Manufacturing of lenses, Inspection of Lenses	9
4	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	9
5	Lens Designs: Single Vision, Bifocals and Multifocal Lenses. Tints and Protective Lenses, Special design lenses, Aberration in Ophthalmic Lenses	9

PRACTICAL (30 HOURS)

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

OCULAR DISEASES I

CL	CP	L	P
3	0	45	0

INSTRUCTOR IN CHARGE: MS Ophthalmology or M Optom/PhD in Optometry with experience in teaching ocular diseases

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

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

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

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

REFERENCE BOOKS:

1. A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
2. Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990

PREREQUISITES: Ocular anatomy and Ocular Physiology, Ocular Biochemistry and Microbiology, Pharmacology

COURSE PLAN

Unit	Topics	Hours
1	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	7
2	Lids Applied Anatomy, Congenital anomalies (Ptosis, Coloboma, Epicanthus, Distichiasis, Cryptophthalmos) Oedema of the eyelids(Inflammatory, Solid, Passive edema) Inflammatory disorders (Blepharitis, External Hordeolum, Chalazion ,Interalhordeolum, 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)	6
3	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)	6
4	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	8
5	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	10
6	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	8

INDIAN MEDICINE AND TELEMEDICINE

C L	C P	L	P
2	0	30	0

INSTRUCTOR IN CHARGE: Public health professional or M Optom who have knowledge in National health care system.

COURSE DESCRIPTION: This course insight into existing healthcare system in India.
OBJECTIVES: At the end of the course student will be aware of the traditional and the latest healthcare system. The student also will get basic knowledge about the telemedicine practices in India especially in eye care.
TEXT BOOK: Margie Lovett Scott, Faith Prather. Global health systems comparing strategies for delivering health services. Joney & Bartlett learning, 2014
REFERENCE BOOKS: Faculty may decide.

COURSE PLAN:

Unit	Topics	Hours
1	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	8
2	National Health Programme-Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Programme.	8
3	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	8
4	Health scenario of India- past, present and future Telemedicine: Structure, components, Dissemination and Impact	6

CLINICAL OPTOMETRY III

CL	CP	L	P
0	4	0	120

Students will gain additional skills in clinical procedures, interaction with patients andprofessional 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

Fourth Semester

OPTOMETRIC INSTRUMENTS

CL	CP	L	P
3	0.5	45	15

INSTRUCTOR IN CHARGE: M Optom with experience in teaching instrument course or Bioengineer with experience in teaching

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

OBJECTIVES: Upon completion of the course, the student should be able to gain theoretical knowledge and basic practical skill in handling the instruments that are utilised for a comprehensive ocular examination

TEXT BOOK: David Henson: Optometric Instrumentations, Butterworth- Heinnemann, UK, 1991

REFERENCE BOOKS:

1. P R Yoder: Mounting Optics in Optical Instruments, SPIE Society of Photo- Optical Instrumentation, 2002
2. G Smith, D A. Atchison: The Eye and Visual Optical Instruments, Cambridge University Press, 1997

PREREQUISITES: Geometrical optics

COURSE PLAN

Unit	Topics	Hours
1	Optotypes and MTF, Spatial Frequency Test charts standards. Choice of test charts Trial case lenses Refractor (phoropter) head units Optical considerations of refractor units	7
2	Trial frame design Near vision difficulties with units and trial frames Retinoscope – types available Adjustment of Retinoscopes- special features Objective optometers. Infrared optometer devices	7
3	Projection charts Illumination of the consulting room. Brightness acuity test Vision analyzer Pupilometer Potential Acuity Meter Abberometer	7
4	Ophthalmoscopes and related devices, Design of ophthalmoscopes – illumination, Design of ophthalmoscopes- viewing, Ophthalmoscope disc Filters for ophthalmoscopy, Indirect ophthalmoscope	6
5	Lensometer Lens gauges or clock Slit lamp Tonometers	6
6	Keratometer and corneal topography Refractometer Orthoptic Instruments (Synaptophore Only) Color Vision Testing Devices	6
7	Fields of Vision And Screening Devices Scans Electrodiagnostics New Instruments	6

PRACTICALS

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

CLINICAL EXAMINATION OF THE VISUAL SYSTEM

CL	CP	L	P
1	2	15	60

INSTRUCTOR IN CHARGE: M.Optom in Optometry with relevant experience in teaching

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

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

TEXT BOOK: T Grosvenor: Primary Care Optometry, 5th edition, Butterworth – Heinneman, USA, 2007.

REFERENCE BOOKS:

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

PREREQUISITES: Optometric Instruments, Visual optics

COURSE PLAN

Unit	Topics	Hours
1	History taking, Visual acuity estimation, Extraocular motility, Cover teat, Alternating cover test, Hirschberg test, Modified Krimsky, Maddox Rod, Saccades and pursuit test	5
2	Pupils Examination, Color Vision, Stereopsis, Confrontation test, Photostress test, Amsler test, Contrast sensitivity function test	5
3	External examination of the eye, Slit lamp biomicroscopy, Van Herrick, Tonometry, ROPLAS, Schirmer‟s, TBUT, tear meniscus level, NITBUT (keratometer), Ophthalmoscopy	5

PRACTICALS

1. History taking
2. Visual acuity estimation
3. Extraocular motility, Cover teat, Alternating cover test
4. Hirschberg test, Modified Krimsky
5. Pupils Examination
6. Maddox Rod
7. Van Herrick
8. External examination of the eye, Lid Eversion
9. Schirmer‟s, TBUT, tear meniscus level, NITBUT (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

VISUAL PERCEPTION AND PSYCHOPHYSICS

CL	CP	L	P
2	0.5	30	15

INSTRUCTOR IN CHARGE: M Optom or PhD in Optometry and/or Vision Science with experience in psychophysics

COURSE DESCRIPTION: The course covers the entire pathway of visual perception from image formation to brain resolving of images. The course covers various domains of visual perception including Spatial, Temporal, Depth, Motion and colour vision

OBJECTIVES:

The course aims to provide the leaners with a clear understanding of the processes involved in the perception of various domain of vision. Specifically, the leaners will study about the various processes in the visual system to analyze the image that is formed on the retina.

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

PREREQUISITES: Visual Optics -1, Neuro Physiology of vision

COURSE PLAN

Unit	Topics	Hours
1	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	7
2	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	8
3	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	8

	depth cues	
4	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	7

PRACTICALS

1. Determination of blur threshold
2. Visual acuity testing
3. Colour vision examination

VISUAL OPTICS II

CL	CP	L	P
3	1	45	30

INSTRUCTOR INCHARGE: M.Optom with relevant experience in teaching optics

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

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

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

TEXT BOOK/REFERENCE BOOKS:

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

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

COURSE PLAN

Unit	Topics	Hours
1	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	9
2	Convergence: Type, Measurement and Anomalies Relationship between accommodation and convergence-AC/A ratio	9
3	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	9
4	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	9
5	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	9

PRACTICALS:

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

CL	CP	L	P
3	0	45	0

OCULAR DISEASE II

INSTRUCTOR INCHARGE: MS Ophthalmology or M Optom

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

OBJECTIVES: At the end of the course the students will be knowledgeable in the following aspects of ocular diseases: knowledge on Etiology, Epidemiology, Symptoms, Signs, Course sequelae of ocular disease

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

TEXT BOOK: A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007

REFERENCE BOOKS:

1. Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990
2. Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth- Heinemann, 2007

PREREQUISITES: Ocular anatomy and Ocular Physiology, Ocular Biochemistry and Microbiology, Ocular Disease - I

COURSE PLAN

Unit	Topics	Hours
1	Retina and Vitreous: Applied Anatomy, Congenital and Developmental disorders (Optic Disc: Coloboma, Drusen, Hypoplasia, Medullated nerve fibers; Persistent Hyaloid Artery) Inflammatory disorders (Retinitis : Acute purulent , Bacterial, Virus, mycotic) Retinal Vasculitis (Eales‟s) Retinal Artery Occlusion (Central retinal Artery occlusion) Retinal Vein occlusion (Ischaemic, Non Ischaemic, Branch retinal vein occlusion) Retinal degenerations : Retinitis Pigmentosa, Lattice degenerations Macular disorders: Solar retinopathy, central serous retinopathy, cystoid macular edema, Age related macular degeneration. Retinal Detachment: Rhegmatogenous, Tractional, Exudative) Retinablastoma Diabetic retinopathy	9
2	Ocular Injuries: Terminology : Closed globe injury (contusion, lamellar laceration) Open globe injury (rupture, laceration, penetrating injury, perforating injury) Mechanical injuries (Extraocular foreign body, blunt trauma, perforating injury, sympathetic ophthalmitis) Non Mechanical Injuries (Chemical injuries, Thermal, Electrical, Radiational), Clinical approach towards ocular injury patients	9

3	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.	9
4	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 Robetson pupil, Adie‟s tonic pupil) Optic neuritis, Anterior Ischemic optic neuropathy, Pappilloedema, optic atrophy Cortical blindness Malingering Nystagmus, Clinical examination	9
5	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	9

BEHAVIORAL HEALTH PSYCHOLOGY

CL	CP	L	P
1	0	15	0

INSTRUCTOR INCHARGE: MSc Psychology or PhD in Psychology or M Optom with experience in teaching Psychology

COURSE DESCRIPTION: This course covers various aspects of Behavioral health psychology essential for the optometrist.

OBJECTIVES: At the end of the course, the student would have gathered knowledge various aspects of Behavioral health psychology essential for him to apply in the clinical scenario during his clinical postings.

TEXT BOOK: Patricia Barkway. Psychology for health professionals, 2nd edition, Elsevier, 2013

REFERENCE BOOKS: Faculty may decide.

PREREQUISITES: Basic clinical knowledge**.**

COURSE PLAN

Unit	Topics	Hours
1	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.	5
2	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.	5
3	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.	5

CL	CP	L	P
1	0	15	0

INTRODUCTION TO QUALITY AND PATIENT SAFETY

INSTRUCTOR INCHARGE: Qualified personnel to handle the subject, preferably who have experience in handling such scenarios practically or at least experience in teaching**.**

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

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

TEXT BOOK: Faculty can decide

COURSE PLAN:

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

CL	CP	L	P
0	4	0	120

CLINICAL OPTOMETRY IV

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

Fifth Semester

SYSTEMIC DISEASES

CL	CP	L	P
2	0	30	0

INSTRUCTOR INCHARGE: MD General Medicine with adequate experience in academic teaching and handling patients.

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

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

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

TEXT BOOKS:

1. 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
2. Basic and clinical Science course: Update on General Medicine, American Academy of Ophthalmology, Section 1, 1999

COURSE PLAN

Unit	Topics	Hours
1	Hypertension , Diabetes Mellitus, Acquired Heart disease, Thyroid Disease: Definition, classification, Epidemiology, clinical examination, complications, and management. Ophthalmic considerations for the diseases	10
2	Cancer, Tropical infections, Tuberculosis, Herpes virus, Hepatitis, Acquired Immunodeficiency Syndrome: Definition, classification, Epidemiology, clinical examination, complications, and management. Ophthalmic considerations for the diseases	10
3	Anaemia, Nutritional and metabolic disorders, Myasthenia Gravis, Connective Tissue Disease: Definition, classification, Epidemiology, clinical examination, complications, and management. Ophthalmic considerations for the diseases	10

DISPENSING OPTICS

CL	CP	L	P
2	1	30	30

INSTRUCTOR INCHARGE: M.Optom with experience in Optical Dispensing & Optical Laboratory

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

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

1. To select the tool power for grinding process
2. Different types of materials used to make lenses and its characteristics
3. Lens designs–Bifocals, progressive lens
4. Tinted, Protective & Special lenses
5. Spectacle frames –manufacture process & materials
6. Art and science of dispensing spectacle lens and frames based on the glass prescription.
7. Reading of spectacle prescription. Counseling the patient
8. Lens edge thickness calculation
9. Frame & lens measurements and selection
10. Writing spectacle lens order
11. Facial measurements - Interpupillary distance measurement and measuring heights (single vision, multifocal, progressives)
12. Lens verification and axis marking and fitting of all lens types
13. Final checking of finished spectacle with frame adjustments
14. Delivery and follow-up
15. Troubleshooting complaints and handling patient‟s questions

TEXT BOOK/REFERENCE BOOKS

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

Heinemann, 2002

5. A handbook on practical approach to troubleshooting and solution in spectacle dispensing - Lavanya Kalikivayi, Venkataramana Kalikivayi

PREREQUISITES: Geometrical Optics, Physical Optics & Ocular Physiology, Optomteric Optics

COURSE PLAN

Unit	Topic	Hours
1	Lens designs - compatible to contemporary eye frames. Components of spectacle prescription & interpretation, transposition, Add and near power relation	6
2	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	6
3	Neutralization –Hand & lensometer, axis marking, prism marking. Faults in spectacles (lens fitting, frame fitting, patients complaints, description, detection and correction).	6
4	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	6
5	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	6

PRACTICALS (30 hours)

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

GERIATRIC OPTOMETRY

CL	CP	L	P
3	0	45	0

INSTRUCTOR INCHARGE: M Optom with adequate experience in handling geriatric patients.

COURSE DESCRIPTION: This course deals with general and ocular physiological changes of ageing, common geriatric systemic and ocular diseases, clinical approach of geriatric patients, pharmacological aspects of ageing, and spectacle dispensing aspects in ageing patients.

COURSE OBJECTIVES: The student on taking this course should

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

TEXT BOOKS: Changes and Diseases of the Aging Eye by Bruce P. Rosenthal

REFERENCE BOOKS:

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

PREREQUISITES: Ocular anatomy, Physiology, Ocular Disease

COURSE PLAN

Unit	Topic	Hours
1	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	10
2	Effects of ageing on Cardiovascular system, respiratory system, gastro- intestinal, excretory and central nervous system.	12
3	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	10
4	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	13

PEDIATRIC OPTOMETRY

CL	CP	L	P
3	0	45	0

INSTRUCTOR INCHARGE: M Optom with adequate experience in handling paediatric patients.

COURSE DESCRIPTION: This course is designed to provide the students adequate knowledge in theoretical and practical aspects of diagnosis, and management of eye conditions related to paediatric population. Also it will inculcate the skill of transferring / communicating the medical information to the attender / patient by the students. The scope of this subject is to train the

optometrists to develop a systematic way of dealing with children below 12, so as to implement primary eye care and have better, specialized management of anomalies.

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

1. Have a knowledge of the 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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

PREREQUISITES: Ocular anatomy, Physiology, Ocular Disease

COURSE PLAN

Unit	Topic	Hours
1	Development of the eye and the paediatric milestones: Ocular Embryology, Developmental Milestones	5
2	Normal appearance, pathology and structural anomalies: Orbit, Eye lids, Lacrimal system, Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil, Lens, vitreous, Fundus Oculomotor system	10
3	Paediatric eye disorders : Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics, Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism	10
4	Paediatric eye examination: Overview – Paediatric eye examination, History taking Paediatric subjects, Visual Acuity Assessment in different age groups, Refractive Examination	10

5	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	10

PRACTICALS

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

DIAGNOSTICS AND THERAPEUTICS OF ANTERIOR SEGMENT DISEASES

CL	CP	L	P
4	0.5	60	15

INSTRUCTOR INCHARGE: M Optom with adequate experience in clinical routine, diagnostic technique and interpretation and handling patients.

COURSE DESCRIPTION

This course consists of the pathophysiology, pharmacotherapy, and clinical management of systemic and ocular disease through a combination of lectures and team-based learning approaches. The basic principles of pharmacology will be followed by overviews of drugs used to treat diseases of each system. The role of the optometrist in the health care system will be emphasized.

OBJECTIVES

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

TEXT BOOKS:

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

PREREQUISITES: Ocular anatomy, Physiology, Ocular Disease, Ocular pharmacology

COURSE PLAN:

Unit	Topic	Hours
1	Pathophysiology and clinical management of systemic and anterior segment ocular disease	10
2	Overview of drugs used in treatment of anterior segment disease	10
3	LASER for anterior segment disease management, overview of surgical intervention for anterior segment disease	10
4	Vertical Integration of all treatment options of anterior segment disease with special emphasis on optometric management	10
5	Interpretation and diagnose conditions using – Biometry (Contact and Non-Contact), Corneal Topography, Pentacam, Anterior Segment Optical Coherence Tomography, Specular Microscopy, Meibography	10

6	Interpretation and diagnose conditions using – Perimetry, Posterior segment Optical Coherence Tomography, Ultrasound Biomicroscopy, Heidelberg Retinal Tomography (Cornea and Optic Nerve)	10

PRACTICALS

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

INNOVATION AND TECHNOLOGY

CL	CP	L	P
1	0.5	15	15

Instructor in charge: M Optom with adequate experience in research, medical technology

Course Description

The course will cover advancements and innovations in medical and optometric instruments, ocular diagnostics, service delivery and management of ocular diseases. Students will get an opportunity to learn, develop and validate new instruments, softwares for vision and eye testing and data managing systems.

Objectives

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

Text book: Faculty can decide

Prerequisites: Core optometry and specialty optometry courses

Course plan

Unit	Topic	Hours
1	Research & Ideation: Concepts. Understanding design and optics behind ophthalmic instruments	5
2	Prototype development	5
3	Clinical validation	5

PRACTICAL (15 hours)

1. Develop a prototype of a simple clinical instrument and validate for clinical use

CL	CP	L	P
2	4	30	120

CLINICAL OPTOMETRY V

The course provides students the opportunity to continue to develop confidence and increased skill in diagnosis and treatment delivery. Students will demonstrate competence in basic, intermediate and advanced procedures in those areas. Students will participate in advanced and specialized diagnostic and management procedures. Students will get practical experience of the knowledge acquired from geriatric and paediatric optometry courses. Hands-on experience under supervision will be provided in various outreach programmes namely, school vision screening, glaucoma and diabetic retinopathy screening etc., Students also get hand-on practical sessions on the following courses namely, contact lens, low vision care, geriatric optometry and paediatric optometry. This course will also offer a systematic introduction to the scope and framework to keep us up-to-date and examine the knowledge we use and the treatment and management recommendations we make.

COURSE PLAN

Unit	Topic	Hours
1	Evidence Based Practice on the following Common Clinical Conditions Myopia/ Hyperopia Astigmatism Presbyopia Headache	15
2	Evidence Based Practice on the following Common Clinical Conditions Cataract Open Angle Glaucoma Angle closure glaucoma	15

PRACTICALS:

1. Lens fitting
2. Frame measurements
3. Ocular Measurements - Axial, ACD, LT
4. Slit Lamp evaluation of anterior segment
5. Retina Evaluation

a. 78D and 90 D
b. Direct Ophthalmoscopy
c. Indirect Ophthalmoscopy

6. Topography, Pentacam, Pachymetry,Specular Microscopy and Aberrometry Interpretation
7. Meibography Interpretation
8. OCT Interpretation
9. Visual Field Interpretation

Sixth Semester

CONTACT LENSES I

CL	CP	L	P
2	1	30	30

INSTRUCTOR INCHARGE: M.Optom practicing contact lens specialties

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

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

1. Understand the basics of contact lenses
2. List the important properties of contact lenses
3. 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

TEXT BOOKS:

1. IACLE modules A-F
2. CLAO Volumes 1, 2, 3
3. IACLE case discussion series also for resources for teaching
4. Anthony J. Phillips : Contact Lenses, 5thedition, Butterworth-Heinemann, 2006

REFERENCE BOOKS

1. Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004.

2. E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008

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

COURSE PLAN

Unit	Topics	Hours
1	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	6
2	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	6

3	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.	6
4	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 Dont‟s	6
5	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	6

PRACTICAL (30 hours)

1. Measurement of Ocular dimensions
2. Pupillary diameter and lid characteristics
3. Blink rate and TBUT
4. Schrimers test, Slit lamp examination of tear layer
5. Keratometry
6. Placido‟s disc
7. Soft Contact Lens fitting – Aspherical
8. Soft Contact Lens fitting – Lathecut lenses
9. Soft Contact Lens over refraction
10. Lens insertion and removal
11. Lens handling and cleaning
12. Examination of old soft Lens
13. RGP Lens fitting
14. RGP Lens Fit Assessment and fluorescein pattern
15. Special RGP fitting (Aphakia, pseudo phakia & Keratoconus)
16. RGP over refraction and Lens flexure
17. Examination of old RGP Lens
18. RGP Lens parameters
19. Slit lamp examination of Contact Lens wearers

LOW VISION CARE AND REHABILITATION

CL	CP	L	P
2	1	30	30

INSTRUCTOR INCHARGE: M Optom practicing low vision and rehabilitation

COURSE DESCRIPTION: This course deal with the definition of low vision, epidemiology aspect of visual impairment, types of low vision devices and its optical principles, clinical approach of the low vision patients, assistive devices for totally visually challenged, art of prescribing low vision devices and training the low vision patients and other rehabilitation measures.

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

1. Definition and epidemiology of 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

TEXT BOOKS:

1. Functional Assessment of Low Vision by Bruce P.Rosenthal

2. Remediation and Management of Low Vision Mosby's optometric problem solving series; Editors, Roy Gordon Cole, *Bruce* P. *Rosenthal*

REFERENCE BOOKS:

1. Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth-Heinemann, 1998
2. Sarika G, Sailaja MVSE Vaithilingam: practice of Low vision –A guide book, Medical Research Foundation, 2015.
3. Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999
4. Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991
5. A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinnemann, 2007

COURSE PLAN:

Unit	Topics	Hours
1	Definitions & classification of Low vision, Epidemiology of low vision, Model of low vision service	7
2	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	7
3	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	8
4	Visual rehabilitation & counselling, Legal aspects of Low vision in India, Case Analysis	8

PRACTICALS (30 hours)

1. Attending in low vision care clinic and history taking.
2. Determining the type of telescope and its magnification (Direct comparison method & calculated method)
3. Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers.
4. Inducing visual impairment and prescribing magnification.
5. Determining reading speed with different types of low vision aids with same magnification.
6. Determining reading speed with a low vision aid of different magnifications

BINOCULAR VISION I

CL	CP	L	P
2	1	30	30

INSTRUCTOR INCHARGE: M Optom practicing in Binocular Vision and Vision Therapy.

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

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

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

TEXT BOOKS:

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 VisionHeterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

PREREQUISITES: Ocular anatomy, Physiology

COURSE PLAN

Unit	Topics	Hours
1	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.	6
2	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	6

3	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.	6
4	Sensory adaptations: Confusion, Suppression, Investigations, Management. Abnormal Retinal Correspondence: Investigation and management, Blind spot syndrome. Eccentric Fixation: Investigation and management.	6
5	Amblyopia : Classification, Aetiology, Investigation, Management	6

PRACTICALS: (30 hours)

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

DIAGNOSTICS AND THERAPEUTICS OF POSTERIOR SEGMENT DISEASES

Instructor in charge: M Optom with adequate experience in clinical routine, diagnostic technique and interpretation and handling patients

CL	CP	L	P
4	0.5	60	15

Course description

This course consists of the pathophysiology, pharmacotherapy, and clinical management of systemic and ocular disease through a combination of lectures and team-based learning approaches. The basic principles of pharmacology will be followed by overviews of drugs used to treat diseases of each system. The role of the optometrist in the health care system will be emphasized.

Objectives

- To Diagnose and sequential posterior segment ocular disease management
- To list down management options in terms of optometric, pharmacological, LASER and surgical categories
- To determine sequential management protocolo and other referral needs
- To propose schematic management options available for all posterior segment disease
- To sequence management options in terms of optometric, pharmacology, LASER and surgery.
- To identify stakeholders for referral

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

Prerequisites: Ocular diseases, ocular diagnostics, optometric instruments, ocular pharmacology

Course plan

Unit	Topics	Hours
1	Pathophysiology and clinical management of systemic and posterior segment ocular disease	10
2	Overview of drug used in treatment of posterior segment disease	10
3	LASER for posterior segment disease management, overview of surgical intervention for posterior segment disease	10
4	Vertical Integration of all treatment options of posterior segment disease with special emphasis on optometric management	10

5	Perform, interpret and diagnose anterior and posterior segment diseases images, Fundus Fluorescein Angiography, Electrodiagnostics and Visual Evoked Potential	10
6	Perform, interpret and diagnose conditions using – Contrast acuity, Potential acuity meter, Retinometer, Brightness acuity test, Photostress test, Amsler charting	10

PRACTICAL (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
- Amsler charting

OPTOMETRY AND MULTIDISCIPLINARY ASPECTS OF HEALTH

CL	CP	L	P
4	1	60	15

Instructor in charge: M Optom with adequate experience in clinical routine, diagnostic technique and interpretation and handling patients**.**

Course Description

The course will cover integrating eye health systems into multispecialty care. This would help students understand about the holistic needs of the patients and gain knowledge on the health care delivery systems. Setting up independent optometry practices integrated with other healthcare disciplines would enable co management, improve the referral pattern, provide convenient and cost effective care for patients.

Objectives

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

TEXT BOOKS: Faculty to decide

Prerequisites: Good knowledge on ocular diseases, systemic diseases, pediatric and geriatric optometry, low vision and rehabilitation.

Course plan

Unit	Topics	Hours
1	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	15
2	General and systemic rehabilitation services 1. Models of health care for different systemic illness 2. Rehabilitation models 3. Referral to rehabilitation setups	15
3	Primary, secondary and tertiary eye care models 1. Preventive, promotive and curative eyecare 2. Primary, secondary and tertiary eye care	15
4	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	15

PRACTICAL (15 hours)

Visit to Public health centres

RESEARCH METHODOLOGY & BIOSTATISTICS

CL	CP	L	P
2	0	30	0

INSTRUCTOR INCHARGE: M.Optom with experience in biostatistics and research methodology or Biostatistician/Epidemiologist

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

TEXT BOOKS:

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

COURSE PLAN

Unit	Topics	Hours
1	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	10
2	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	10
3	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	10

CLINICAL OPTOMETRY VI

CL	CP	L	P
2	4	30	120

The course is the final series of five directed clinical courses. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. Practical aspects of Binocular vision II, public health & community optometry, and occupational optometry will be covered under the studentship. This course will also offer a systematic introduction to the scope and framework to keep us up-to-date and examine the knowledge we use and the treatment and management recommendations we make.

COURSE PLAN

Unit	Topic	Hours
1	Evidence Based Practice on the following Common Clinical Conditions Blepharitis/ Chalazion /Stye Pinguecula,Conjunctival Cyst, Concretions, Conjunctival Naevus Pterygium Pseudophakia/ Aphakia	15
2	Evidence Based Practice on the following Common Clinical Conditions Dry eye Esotropia/ Exotropia/ Other types of Squint Acute Red eye/ Subconjunctival Hemorrhage/ Conjunctivitis	15

Practicals:

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

Seventh Semester

CONTACT LENSES II

CL	CP	L	P
2	1	30	30

INSTRUCTOR INCHARGE: M Optom practicing contact lens specialties

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

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

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

TEXT BOOKS:

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

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

COURSE PLAN

Unit	Topics	Hours
1	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	5
2	Soft Toric CL 1. Stabilization techniques 2. Parameter selection 3. Fitting assessment	4
3	Common Handling Instructions 1. Insertion & Removal Techniques 2. Do‟s and Dont‟s Complications of Soft lenses	4

4	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	5
5	Therapeutic contact lenses 1. Indications 2. Fitting consideration	5
6	Specialty fitting 1. Aphakia 2. Pediatric 3. Corneal ectasia 4. Post refractive surgery 5. Ocular surface disease 6. Occupational fitting	5
7	Management of Presbyopia with Contact lenses	2

PRACTICAL (30 HOURS)

1. Examination of old soft Lens
2. RGP Lens fitting
3. RGP Lens Fit Assessment and fluroscein pattern
4. Special RGP fitting (Aphakia, pseudo phakia&Keratoconus)
5. RGP over refraction and Lens flexure
6. Examination of old RGP Lens
7. RGP Lens parameters
8. Fitting Cosmetic Contact Lens
9. Slit lamp examination of Contact Lens wearers
10. Fitting Toric Contact Lens
11. Bandage Contact Lens
12. SPM & Pachymetry
13. Specialty Contact Lens fitting.

BINOCULAR VISION II

CL	CP	L	P
2	1	30	30

INSTRUCTOR INCHARGE: M Optom practicing Binocular Vision and Vision Therapy

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

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

TEXT BOOKS:

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. Von Noorden: BURIAN- VON NOORDEN‟S Binocular vision and ocular motility theory and management of strabismus, Missouri, Second edition, 1980, C. V. Mosby Company
4. Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

PREREQUISITES: Ocular Anatomy, Ocular Physiology, Binocular Vision –I.

COURSE PLAN

Unit	Topics	HOURS
1	Neuro-muscular anomalies 1. Classification and etiological factors History – recording and significance	1
2	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	8

3	Investigations 1. History and symptoms 2. Head Posture 3. Diplopia Charting 4. Hess chart 5. PBCT 6. Nine directions 7. Binocular field of vision	8
4	Treatment of Amblyopia Nystagmus	4
5	Non-surgical Management of Squint	2
6	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	6
7	Surgical management of squint	1

PRACTICAL (30 HOURS)

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

PUBLIC HEALTH & EPIDEMIOLOGY INSTRUCTOR INCHARGE: M Optom with public health experience or Public Health professional

CL	CP	L	P
2	0	30	0

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

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

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

TEXT BOOKS:

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

REFERENCE BOOKS: MC Gupta, Mahajan BK, Murthy GVS, 3rd edition. Text Book of Community Medicine, Jaypee Brothers, New Delhi, 2002

PREREQUISITES: Ocular Disease, Visual optics, Optometric Instruments, Clinical Examination of Visual System

COURSE PLAN

Unit	Topics	Hours
1	Public Health Optometry: Concepts and implementation, Stages of diseases Dimensions, determinants and indicators of health	5
2	Levels of disease prevention and levels of health care patterns	5
3	Contrasting between Clinical and community health programs Community based rehabilitation programs	5
4	National and International health agencies, Organization and Management of Eye Care Programs – Service Delivery models	5
5	Health manpower and planning & Health Economics Evaluation and assessment of health programmes IEC Materials, KAP survey	5
6	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	5

LAW AND PROFESSIONAL ETHICS – OPTOMETRY

CL	CP	L	P
1	0	15	0

INSTRUCTOR INCHARGE: M Optom or Lawyer with relevant experience in teaching legal aspects of medicine

COURSE DESCRIPTION: Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice". Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum.

TEXTBOOK:

1. Medico-Legal and Ethical Issues in Eye Care: Case Senarios for Optometrists, Opticians, Ophthalmologists and Family Physicians by Kah Guan Au Eong , Catherine Tay
2. Law and Ethics for the Eye Care Professional Barbara K Pierscionek London : Butterworth Heinemann Elsevier 2008
3. Code of conduct and ethics document for optometrists on OCI website

Reference:

Law and Optometry: A guide for optometry professionals and optometry students in India, Vijaya kumar

COURSE PLAN

Unit	Topics	Hours
1	Medical ethics - Definition - Goal - Scope · Introduction to Code of conduct · Basic principles of medical ethics –Confidentiality	2
2	Malpractice and negligence - Rational and irrational drug therapy · Autonomy and informed consent - Right of patients	3
3	Care of the terminally ill- Euthanasia · Organ transplantation	2
4	Medico legal aspects of medical records –Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.	5
5	Professional Indemnity insurance policy Development of standardized protocol to avoid near miss or sentinel events Obtaining an informed consent.	3

COMMUNITY EYE HEALTH

Instructor in charge: Optometrist (M Optom/ Ph D) with adequate experience in planning and delivery community eye health projects

CL	CP	L	P
0	1.5	0	45

Course description

The course would help students apply theories taught in the public health and epidemiology course. The basic principles of public health, Ten Commandments of screening, screening of specific eye health ailments, data collection, data management and technical and non-technical reporting of the screenings conducted will be emphasized.

Students will be posted in community outreach activities of the organization. Students will get hands-on experience in handling community eye health programmes including school eye screening programs, adult comprehensive eye examination, cataract screening etc.

Objectives

- Learn the principles and commandments of Screening
- Learn Implementation and evaluation of a community outreach program
- Participate in community outreach programs
- To organize and conduct an Eye camp

TEXT BOOKS:

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

REFERENCE BOOKS: Faculty may decide.

PREREQUISITES: All core Optometry courses

COURSE PLAN

To be involved in all community outreach activities of the institution.

Unit	Topics	Hours
1	Exclusive training of • School screenings. • Vision screening of different ages and occupations. • Diabetic retinopathy screening, • Glaucoma Screening, • Geriatric doorstep care, • Special children vision screening.	5

CLINICAL OPTOMETRY VII

CL	CP	L	P
2	4	30	120

The course is the final series of five directed clinical courses. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. Practical aspects of Binocular vision II, public health & community optometry, and occupational optometry will be covered under the studentship. This course will also offer a systematic introduction to the scope and framework to keep us up-to-date and examine the knowledge we use and the treatment and management recommendations we make.

COURSE PLAN:

Unit	Topic	Hours
1	Evidence Based Practice on the following Common Clinical Conditions Corneal abrasion/ Corneal Ectasia/ Corneal Ulcer/Corneal Opacity Ptosis Proptosis Ectropion, Entropion	15
2	Evidence Based Practice on the following Common Clinical Conditions Uveitis Acute Dacryocystitis Ocular Trauma	15

PRACTICALS:

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

RESEARCH PROJECT 1

CL	CP	L	P
0	3	0	90

Instructor in charge: M Optom with experience in handling Research projects

Course description

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

Objectives

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

TEXT BOOKS: Faculty can decide REFERENCE BOOKS: Faculty may decide.

PREREQUISITES: All core Optometry courses
Project is spread from seventh to eighth semester.

Eighth Semester

OCCUPATIONAL OPTOMETRY

CL	CP	L	P
2	0.5	30	15

INSTRUCTOR INCHARGE: M Optom with relevant experience in occupational eye health

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

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

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

TEXT BOOKS:

1. PP Santanam, R Krishnakumar, Monica R. Dr. Santanam‟s text book of Occupational optometry. 1st edition, Published by Elite School of optometry , unit of Medical Research Foundation, Chennai, India , 2015
2. R V North: Work and the eye, Second edition, Butterworth Heinemann, 2001

REFERENCE BOOKS:

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

COURSE PLAN:

Unit	Topics	Hours
1	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.	10
2	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.	10
3	Case studies on visual health in various occupations.	10

PRACTICALS:

1. Perform visual task analysis
2. Industrial Vision Screening – Modified clinical method and Industrial Vision test

PRACTICE MANAGEMENT

CL	CP	L	P
2	0	30	0

INSTRUCTOR INCHARGE: M Optom with experience of running private clinical services or Management professional with masters‟ qualification in Management

COURSE DESCRIPTION: This course deal with all aspects of optometry practice management – business, accounting, taxation, professional values, and quality & safety aspects.

COURSE OBJECTIVES: At the end of the course, student would have gained knowledge on various aspects of private optometric practice from Indian perspective.

TEXTBOOK:

A. S. Thal, S. Quintero, *Business aspects of Optometry*, 3rd edition - Association of Practice Management Educators – Butterworth Heinemann Elsevier, USA, 2010

REFERENCE BOOKS:

1. I. Bennett, *Optometric Practice Management*, 2nd edition, Butterworth Heinemann, 2003
2. A. Hanks, *What Patients want?* AJ Hanks & VJ Hanks, 2010
3. N. Gailmard, *Practice management in optometry*, Walnut Ridge Publishing, 2017.

PREREQUISITES: Basic Clinical experience

COURSE PLAN

Unit	Topics	Hours
1	Business Management: Practice establishment and development, Stock control and costing, Staffing and staff relations, Business computerization	10
2	Accounting Principles: Sources of finance, Bookkeeping and cash flow. Taxation and taxation planning	10
3	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	10

COMMUNITY EYE HEALTH AND TELE OPTOMETRY

CL	CP	L	P
1	2	15	60

Instructor in charge: M Optom with adequate experience in planning and delivery community eye health projects.

Course description

The course would help students apply theories taught in the public health and epidemiology course. The basic principles of public health, Ten Commandments of screening, screening of specific eye health ailments, data collection, data management and technical and non-technical reporting of the screenings conducted will be emphasized.

Students will be posted in community outreach activities of the organization. Students will get hands-on experience in handling community eye health programmes including school eye screening programs, adult comprehensive eye examination, cataract screening etc.

Objectives

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

TEXT BOOK

1. Newcomb RD, Jolley JL: Public Health and Community Optometry, Charles C Thomas Publisher, Illinois, 1980

2. K Park: Park‟s Text Book of Preventive and Social Medicine, 19th edition, Banarsidas Bhanot publishers, Jabalpur, 2007

COURSE PLAN

Unit	Topics	Hours
1	Epidemiology of blindness – Defining blindness and visual impairment. Prevalence, incidence and distribution of visual impairment. Eye in primary health care. Community Eye Care Programs	5
2	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	5
3	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	5

CL	CP	L	P
1	0.5	15	15

DATA SCIENCE FOR HEALTHCARE

Instructor in charge: M Optom with adequate experience and knowledge of big data, data science and health informatics**.**

Description

This course offers a systematic introduction to the scope and contents of health data arising from public health and the biomedical sciences. It focuses on rules and techniques for handling health data. Through both regular lectures and guest lectures, this course covers a broad range of health data.

Learning Objectives

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

TEXT BOOK: Faculty can decide

COURSE PLAN

Unit	Topics	Hours
1	Foundations of data science: Probability and statistics, Linear algebra for data science, Optimisation for data science	5
2	Health care systems, types of data in healthcare Healthcare data literacy Health care data security, compliance and privacy	5
3	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	5

CLINICAL OPTOMETRY VIII

CL	CP	L	P
2	4	30	120

The course is the final series of seven directed clinical courses. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. Practical aspects of Binocular vision II, public health & community optometry, and occupational optometry will be covered under the studentship. This course will also offer a systematic introduction to the scope and framework to keep us up-to-date and examine the knowledge we use and the treatment and management recommendations we make.

COURSE PLAN:

Unit	Topic	Hours
1	Evidence Based Practice on the following Common Clinical Conditions Convergence insufficiency/ Divergence excess Post refractive surgery Optic atrophy Retinal Detachment	15
2	Evidence Based Practice on the following Common Clinical Conditions Retinitis pigmentosa, CSNB, Stargardt's Disease Age related macular Degeneration Diabetic retinopathy Hypertensive Retinopathy	15

RESEARCH PROJECT- II

CL	CP	L	P
0	4	0	120

Instructor in charge: M Optom with experience in handling research projects

Course description

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

Objectives

· To acquire the basic knowledge and experience of collecting necessary data for the research topic

· To demonstrate an understanding of the relevant roles and responsibilities involved

· To conduct basic statistical analysis on the collected data

· To consolidate and report the results collected

TEXT BOOKS AND REFERENCE BOOKS: Faculty may decide.

PREREQUISITES: All core Optometry courses.

Ninth and Tenth Semester

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 Corneal, retinal, cataract etc)	10% 10% 10% 10% 5%	20 10 10 100* 50
3	Community Rotations	School eye screening, Adult screening, Occupational Optometry etc.	10%	10 camps

Weightage and the number of cases are decided based on the number of weeks per year (48) and six working days and a minimum of 5 independent cases/ day for the OPD.

*Opticals postings: Scientific dispensing in cases of single vision, bifocals, progressives and specialty lenses (a minimum of 25 each) should be covered.

Faculty are encouraged to utilize modalities of teaching that are relevant to the health care professions for the lecture hours during internship. Emphasis on Evidence based practice should be considered. One such model is outlined here:

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.

Assessments

Internship will be assessed using continuous and final assessments

- Continuous Assessments
- Logbook
- One Case Report each month
- Attendance
- Evaluations at the end of each specialty/diagnostic posting
- Mid Semester Clinical Evaluation - One Full Workup to be evaluated by an Optometrist
- End Semester Clinical Evaluation
- Written Examination (MCQ/Case-based covering topics from all the courses)
- One Full Workup to be evaluated by an Optometrist
- Clinical & Diagnostics reports interpretation
- Specialty Optometry Clinics(BVC, LVC, CL, Dispensing) Evaluation
- Viva Voce

Skills based outcomes and monitorable indicators for Optometrist

First year:

1. Role play
2. Clinical Observations
3. Vision Check
4. Basic Lensometry
5. Basic Life Skills

Second year:

1. History taking
2. CEVS practical
3. Refraction Hands On including optical dispensing
4. Clinical Observations
5. Vision screening camps

Third Year:

1. Clinical Observation
2. Hands-on under senior optometrists
3. Case reporting
4. Case discussion
5. Vision screening camps
6. Diagnostic interpretations

Fourth year:

1. Clinical Observation
2. Hands-on under senior optometrists
3. Case reporting
4. Case discussion
5. Vision screening camps
6. Diagnostic interpretations

Internship

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

UG Log book:

The table below outlines the minimum number of procedures required/suggested to be documented in the record note book for each semester. Between the 5th and 8th semesters, students should aim to complete approximately half (50%) of the recommended patient cases, all of which must be recorded in a logbook. Moreover, during the internship, it's essential to maintain a separate log book, adhering to the guidelines specified in the aforementioned table (page 135).

Semester	Procedures	Minimum Number (Mandatory requirements) *	Comments
I Year 1st Semester CLINICAL OPTOMETRY - I	Role Play (Patient-Optometrist)	3 cases	
	Organising an optometry practice clinic		
	Illumination, measurements and setting up of an Optometry Practice Clinic		
I Year 2nd Semester CLINICAL OPTOMETRY - II	Clinical Observation and Report writing	6 cases	
	Vision Check (Snellen‟s Chart) – Distance + Near	12 cases	
	Lensometry (Spherical lenses)		
II Year 1st Semester CLINICAL OPTOMETRY - III	History taking • General • Specific • Conditions	9 cases	Can practice on the following complaints : Blurred Vision, Headache, Pain, redness, Watering, Flashes, Floaters, Blackspots
	Lensometry	100 cases	Simple Sphere, Simple cylinder, Spherocylinder (90, 180, Oblique degrees), Bifocals, PAL

Semester	Procedures	Minimum Number (Mandatory requirements) *	Comments
	Vision Check (log MAR) Pinhole acuity	100 cases	Simulation, especially to show and ask the students to interpret the findings.
	Extraocular Motility	10 cases	
	Cover test	10 cases	Video output Simulation of various conditions
	Alternate Cover test	10 cases	Video output Simulation of various conditions
	Hirschberg test	10 cases	Video output Simulation of various conditions
	Modified Krimsky test	3 cases	Video output Simulation of various conditions
	Push up test (Amplitude of Accommodation)	10 cases (1 case in presbyopic age)	
	Push up test (Near point of Convergence)	10 cases	
	Stereopsis test	10 cases	
	Tear Break up time	10 cases	
	Amsler‟s Grid test	10 cases (simulate)	Simulation of various conditions
	Photostress test	10 cases (Normals)	

Semester	Procedures	Minimum Number (Mandatory requirements) *	Comments
	Color vision test	10 cases	
	Schirmer‟s test	10 cases	
	Confrontation test	10 cases	
II Year 2nd Semester CLINICAL OPTOMETRY - IV	Retinoscopy- Static, Dynamic and Cycloplegic Retinoscopy	25 + 25 +25 cases	Model eye for retinoscopy.
	Keratometry	25 cases	
	Subjective Refraction JCC Clock Dial Duochrome Borish Delayed	25 cases	
	Addition calculation	25 cases	Give more simulated problems and discuss on it
III Year 1st Semester CLINICAL OPTOMETRY -V	Slit lamp illumination	3 cases	
	Slit lamp examination	10 cases	
	Finger tension	10 cases (Normals)	
	Applanation Tonometry	10 cases (Normals)	
	Negative Relative Accommodation	10 cases	

Semester	Procedures	Minimum Number (Mandatory requirements) *	Comments
	Positive Relative Accommodation	10 cases	
	von Herick Grading of Anterior chamber depth	10 cases	
	Accommodative facility(± 2.00 D)	10 cases	
	Corneal Sensitivity test	10 cases	
	IPD	10 cases	
	Proptosis evaluation	1 demo	Video demonstration of cases
	Ptosis evaluation	1 demo	Video demonstration of cases
	Pupillary evaluation -Direct -Consensual -RAPD	10 cases	
	HVID	10 cases	
	Maddox rod (Phoria)	10 cases	
	Negative Fusional vergence	10 cases	
	Positive Fusional Vergence	10 cases	
III Year 2nd Semester CLINICAL OPTOMETRY - VI	Direct ophthalmoscope	10 cases (Normals)	Show slides of various commonly seen retinal conditions

Semester	Procedures	Minimum Number (Mandatory requirements) *	Comments
	Visual Field chart interpretation	10 cases – discussion	Both kinetic and Static
	B scan Interpretation	5 cases – discussion	
	A scan chart Interpretation	10 cases – discussion	Discussion having different types of wave patterns
	Case Analysis	10 cases	
	+90 D lens	10 cases (Normals)	Slides of various Cup: Disc ratios can be shown
IV Year 1st Semester CLINICAL OPTOMETRY - VII	Gonioscopy	5 cases (Normals)	Slides of abnormal angles
	Posting in optometry clinics	5+5+5+5+10 cases	Pediatric/contact lens/Low vision/ Orthoptics/GOPD
	Camps	4 camps	School screening, Cataract
	IDO (on each other)	10 cases(Normals)	Slides of abnormal fundus
	Case Analysis	5+ 5+ 5+ 5 cases	Pathology Binocular Vision Clinical Refraction Dispensing optics

Semester	Procedures	Minimum Number (Mandatory requirements) *	Comments
IV Year 2nd Semester CLINICAL OPTOMETRY – VII	Gonioscopy	5 cases (Normals)	Slides of abnormal angles
	Posting in optometry clinics	5+5+5+5+10 cases	Pediatric/contact lens/Low vision/ Orthoptics/GOPD
	Camps	4 camps	School screening, Cataract
	IDO (on each other)	10 cases(Normals)	Slides of abnormal fundus
	Case Analysis -	5+ 5+ 5+ 5 cases	Pathology Binocular Vision Clinical Refraction Dispensing optics
V year **CLINICAL INTERNSHIP**	General OPD (History taking –DO)	5 cases (Normals)	
	Contact Lens	20 cases (5 RGP+ 5 Soft + 5 toric)	Totally 3 different case reports submission at the end of the postings
	Opticals	100 cases	Weekly 1 case report submission
	Low Vision care Clinic	10 cases	Totally 3 different case reports submission at the end of the postings

Semester	Procedures	Minimum Number (Mandatory requirements) *	Comments
	Binocular Vision clinic	10 cases	Totally 3 different case reports submission at the end of the postings
	General OPD (Common eye conditions)	50 cases	Totally 3 different case reports submission at the end of the postings
	Camps	10 camps	Camp report submission

PS:

- 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.
- For Practical examinations, an internal and external examiner will assess the candidates. All examinations will align with the IELOCS document

Research Project Guidelines

The candidate is required to submit a project under the guidance of an Optometry faculty member during the 7th and 8th semesters. The project may encompass a case study, examination of recent techniques, literature reviews, or similar endeavours aimed at fostering a research-oriented mind set and preparing for further academic pursuits.

All students are mandated to maintain comprehensive records of their research project activities, which must be verified and endorsed by the supervising Optometry faculty member. Subsequently, based on these records and the completed project, students are expected to present their work during the university exam for final assessment.

Internship guidelines

Candidates applying for entry to the internship period must have successfully passed all examinations in all subjects, demonstrating attainment of the total credits required for the Programme.

Duration: The internship spans a period of 12 months, inclusive of assignments in rural, Community Based camps (CBR), or similar setups.

During the internship, candidates are obligated to engage in full-time work, averaging 7 hours per day on each working day, for 6 days a week, over the course of 12 calendar months. Each candidate is entitled to a maximum of 12 holidays throughout the entirety of the Internship Programme, apart from the one day weekly off. In the event of any exigencies necessitating the candidate's absence for a period exceeding 6 days, the candidate is obliged to compensate by working additional days to cover the absence.

Assessment: Interns are required to maintain detailed records of their work, subject to verification and certification by the Head of the Department under whose supervision they operate. In addition to scrutinizing the work records, the Head of the Department conducts assessments and evaluations of the interns' training, encompassing aspects such as attendance, discipline, knowledge, skills, and attitude throughout the training period. Assessment reports are subsequently forwarded to the parent institution.

Upon review of the work records and assessment data, the Director or Principal shall issue a "Certificate of Satisfactory Completion of Training." This certificate serves as the basis for the University to award the Bachelor of Optometry Degree or declare the candidate eligible for the same.

In the event of an unsatisfactory assessment report, the intern in question will be required to repeat the internship for a duration determined by the relevant Head of the Institution.

Interns are expected to adhere to all rules and regulations established by the Institution or Hospital where they are assigned.

Interns are personally responsible for the proper use of equipment within the Institute or Hospital where they are stationed. Any damages resulting from improper use will incur liability for the intern to cover repair or replacement costs.

Extension of Internship Duration: The Principal or Director may extend the duration of the internship under specific circumstances, including prolonged absence exceeding the permitted leave period, unsatisfactory performance, or disciplinary issues.

Infrastructure Requirements: Institutions must ensure the availability of satisfactory infrastructure facilities for Optometry training sites. Guidelines suggest:

- The institution conducting the Optometry Programme must possess a fully equipped Optometry clinic in accordance with the curriculum.
- Optometry sections within Institutes or Hospitals should feature all necessary infrastructure facilities.
- Senior Optometrists with significant clinical experience must oversee Optometry departments.
- The Director or Principal may grant a No Objection Certificate (NOC) for internships conducted at alternative locations, provided that the respective Hospital meets the aforementioned criteria. Candidates must submit details regarding Optometry services available at their chosen internship site to obtain NOC.

  Upon the conclusion of the internship, it is mandatory for all students to successfully pass the clinical examination administered by the university/college. Upon satisfactory completion of this clinical examination, the university will confer the degree upon the candidate.