

**CENTURION UNIVERSITY OF TECHNOLOGY AND
MANAGEMENT, ODISHA**

SCHOOL OF PARAMEDICS & ALLIED HEALTH SCIENCES



Centurion
UNIVERSITY

4- YEAR B.Sc. PROGRAMME

IN

OPTOMETRY

2017-18

SYLLABUS

INTRODUCTION

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

Programmed: Bachelor of Science in Optometry (B.Sc. Optometry)

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

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

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

Internship:

A candidate will have to undergo internship for a period of 1 year in a Govt. hospital/ private hospital/ Tertiary center, which fulfill the norms decided by the University.

Degree:

On successful completion of Four year programmed the candidate will be awarded with “**Bachelor of Science in Optometry**” (B.Sc. Optometry) from Centurion University.

Internship

Internship is a phase of training wherein a graduate is expected to conduct actual practice of Clinical Optometry and acquires skills under supervision so that he /she may become capable of functioning independently.

Specific Objectives

At the end of internship training the graduate shall be able to:

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

Internship Time Period: 1 Year

Other Details

- i. Entire internship shall be done in a Hospital
- ii. Every candidate will be required after successfully completing the final Bachelor of Science in Optometry (B.Sc. Optometry) Examination, to undergo compulsory rotator internship to Satisfaction in the Hospital for a period of 1 Year so as to be eligible for the award of the Degree.

Assessment of Internship:

1. The Internee shall maintain the record of work, which is to be verified and certified by the senior Medical officer/Technician under whom he /she works. Apart from scrutiny of record of work, assessment and evaluation of training shall be undertaken by an objective approach using situation tests in knowledge, skills and attitude during at the end of training. Based on the record of work and date of evaluation The

Director/Principal shall issue certificate for satisfactory completion of training following which the university shall award the degree of B.Sc. OPTOMETRY (B.Sc. Optometry) to the candidate.

2. Satisfactory completion shall be determined on the basis of the following:

- a) Proficiency of knowledge required for each Optometric techniques.
- b) The competency and skills expected to manage each Optometric technique.
- c) Responsibility, punctuality works up of Optometric techniques, involvement in special Procedures and preparation of reports.
- d) Capacity to work in a team (behavior with colleagues, nursing staff and relationship with Medical and paramedical).

Project Work

Each B.Sc. Optometry students will carry out project work under the supervision of a faculty member (Guide). The progress of project work will be monitored regularly by the Guide. Project will be submitted by the candidate will be duly verified & a viva voce shall be conducted on the same at the time of Practical Examination of final year.

4 Year B.Sc. Optometry
Suggested Course Structure

Course structure

Total credits:-180

Semester-I

Sl. No	Code	Subject Name	L-T-P	Credits
1	MSIL1101	Oriya	2-0-0	2
	MSIL1102	Hindi		
2	BSOP1101	Optics-I	3-1-0	4
3	BSOP1102	General Anatomy & Nutrition	3-1-0	4
4	BSOP1103	General Physiology	3-1-0	4
5	BSOP1104	Basic Biochemistry	3-1-0	4
6	BSOL1101	Optics Laboratory-I	0-0-3	2
7	BSOL1102	Biochemistry Lab	0-0-3	2
8	BSOL1103	General Anatomy & Physiology Lab	0-0-3	2
Total				24

Semester-II

Sl. No	Code	Subject Name	L-T-P	Credits
1	MSEN1201	Communicative English-I	2-0-0	2
2	BSOP1201	Optics-II	3-1-0	4
3	BSOP1202	Ocular Anatomy	3-1-0	4
4	BSOP1203	Ocular Physiology	3-1-0	4
5	FCBS0101	Environmental Science	3-1-0	4
6	BSOL1201	Optics Laboratory-II	0-0-3	2
7	BSOL1202	Anatomy & Physiology Lab (Clinic-I)	0-0-3	2
8	BSOL1203	Communicative Practice Laboratory-I	0-0-3	2
Total				24

SUMMER INTERNSHIP-I (6 CREDITS)

Semester-III

Sl. No	Code	Subject Name	L-T-P	Credits
1	MSEN2301	Communicative English-II	2-0-0	2
2	BSOP2301	Ocular Microbiology And Pathology	3-1-0	4
3	BSOP2302	Visual Optics -I	3-1-0	4
4	BSOP2303	Optometric Optics-1	3-1-0	4
5	MSIS2301	Indian Society And Culture	3-1-0	4
6	BSOL2301	Clinical Examination of Visual System	0-0-3	2
7	BSOL2302	Clinical Optometry 1	0-0-3	2
8	BSOL2303	Communicative Practice Laboratory-II	0-0-3	2
Total				24

Semester-IV

Sl. No	Code	Subject Name	L-T-P	Credits
1	BSOP2401	Ocular Diseases -I	3-1-0	4
2	BSOP2402	Visual Optics II	3-1-0	4
3	BSOP2403	Optometric Optics II	3-1-0	4
4	BSOP2404	Basic and Ocular Pharmacology	3-1-0	4
5	MSFE2401	Free Elective-I	3-1-0	4
6	BSOP2405	Ocular Diseases II	3-1-0	4
7	BSOL2401	Clinical Optometry II	0-0-3	2
Total				26

Semester-V

Sl. No	Code	Subject Name	L-T-P	Credits
1	BSOP3501	Binocular Vision & Squint	4-1-0	5
2	BSOP3502	Contact Lenses	3-1-0	4
3	BSOP3503	Low Vision Aid	2-1-0	3
4	MSFE3501	Free Elective-II	3-1-0	4
5	BSOL3501	Squint Laboratory	0-0-3	2
6	BSOL3502	Contact Lens Laboratory	0-0-3	2
7	BSOL3503	Ocular Diseases Laboratory-II (Clinic-IV)	0-0-3	2
8	BSOL3504	Low Vision Aid Laboratory	0-0-3	2
		Total		24

Semester-VI

Sl. No	Code	Subject Name	L-T-P	Credits
1	BSOP3601	Statistics & Occupational Optometry	3+1+0	4
2	BSOP3602	Pediatric & Geriatric Optometry	3+1+0	4
3	BSOP3603	Systemic Diseases	3+1+0	4
4	BSOP3604	Community Optometry & Dispensing Optometry	3+1+0	4
5	MSFE3601	Free Elective-III	3+1+0	4
6	BSOL3601	Paediatric and Geriatric Optometry Laboratory	0+0+3	2
7	BSOL3602	Optometric Instruments Laboratory-II	0+0+3	2
8	BSOL3603	Ophthalmic Lense and Dispensing Optometry Lab	0+0+3	2
		Total		26

Semester-VII & VIII (Sessional)

Sl. No	Code	Subject Name	L-T-P	Credits
1		Project		12
2		Internship		14
		Total		26

MSIL1101 101 M.I.L (Odia) (2-0-0)
FIRST SEMESTER
(ଆଧୁନିକ ଭାରତୀୟ ଭାଷା, ଓଡ଼ିଆ)

ଆଧୁନିକ ଭାରତୀୟ ଭାଷା (ଓଡ଼ିଆ) ପାଠ୍ୟକ୍ରମ ପାଇଁ ୧୦୦ **Percentage Point** ରହିବ ।

ଉପାଂଶ-୧

ପ୍ରବନ୍ଧ ବାଚାୟନ - ସଂପାଦନା - ଶରତ ଚନ୍ଦ୍ର କର ।

- ପାଠ୍ୟ ୧) ଗୁରୁ ଓ ଶିଷ୍ୟ- ଅଧ୍ୟାପକ ବିପିନ ବିହାରୀ ରାୟ ।
୨) ଜନ୍ମଭୂମି-ଡ. କୃଷ୍ଣଚନ୍ଦ୍ର ପାଣିଗ୍ରାହୀ ।
୩) ଭୂଲ-ଡ: ଭୁବନେଶ୍ୱର ବେହେରା ।

ଉପାଂଶ-୨

କବିତାର ନୂଆ ମାନଚିତ୍ର- ସଂପାଦନା- ଦାଶରଥୀ ଦାସ ।

- ପାଠ୍ୟ - ୧) ମୁଁ ହାଟ ବାହୁଡ଼ା-ଫକୀର ମୋହନ ସେନାପତି ।
୨) ବନ୍ଦୀର ଆତ୍ମକଥା-ଗୋପବନ୍ଧୁ ଦାଶ ।
୩) ଆଗାମୀ - କାଳିନ୍ଦୀ ଚରଣ ପାଣିଗ୍ରାହୀ ।
୪) ଅପଥଗାମୀ - ରାଧାମୋହନ ଗଜନାୟକ ।
୫) ଝଡ଼- ସଚ୍ଚିଦାନନ୍ଦ ରାଉତ୍ରାୟ ।

(ଉପରୋକ୍ତ ଦୁଇଟି ଉପାଂଶରୁ ଦୀର୍ଘତର ମୂଳକ ପ୍ରଶ୍ନ ଦିଆଯିବ । ସେହିପରି ଉଭୟ ଉପାଂଶରୁ ଦୁଇଟି କବି ଚାରୋଟିର ସରଳାର୍ଥ ପ୍ରଶ୍ନ ଦିଆଯିବ ।

ଉପାଂଶ-୩

ପ୍ରବନ୍ଧ ଲିଖନ ।

(ସାହିତ୍ୟ- ବିଜ୍ଞାନ ଭିତ୍ତିକ ଚିନ୍ତାମୂଳକ ଓ ସମସ୍ୟା ଧର୍ମୀ) ।

ଉପାଂଶ-୪

ଭ୍ରମ ସଂଶୋଧନ

- କ) ଶବ୍ଦଗତ ଭ୍ରମ
ଖ) ବାକ୍ୟଗତ ଭ୍ରମ

First Semester

MSIL1102 101 M.I.L (Hindi) (2-0-0) FIRST SEMESTER

There shall be one paper carrying 100 percentage point in the First Semester.

1. गद्यपाठ : श्रेष्ठ हिन्दी निबन्ध : सम्पादक - डॉ अजय कुमार पट्टनायक,
शबनम पुस्तक महल, कटक।
पाठ्य विषय: ईर्ष्या : रामचन्द्र शुक्ल
कुटज : हजारी प्रसाद द्विवेदी
पर्वतपुत्र : महादेवी वर्मा
2. पद्यपाठ : काव्य सौरभ : सम्पादक : पुरुषोत्तम दास मोदी, विस्वविद्यालय
प्रकाशन, वाराणासी।
पाठ्य विषय क) कबीर - साखियाँ-----1-10
ख) सुरदास- बाल लीला : पद-3, बिनयपद : 4, 5
ग) जय शंकर प्रसाद - बीती बिभाबरी
घ) सुमित्रा नन्दन पंत - मौन निमन्त्रण
ङ) महादेवी वर्मा : गीत संख्या -2
(यह मन्दिर का दीप...)
3. व्याकरण (लिंग, वचन, क्रिया, कारक, वाक्य, शब्द क्रम सम्बन्धी वाक्य शुद्धि)
4. संक्षेपण (**Précis Writing**)
(A Passage about 150 words to be given for précis writing)

The division of the units for the examination will be as follows:

Unit-I

One long question from Prose.

Unit-II

One long question from Poetry.

Unit-III

- a) Explanation from Prose
- b) Explanation from Poetry.

Unit-IV

Grammar

Unit - V

Précis Writing

1. सन्दर्भ ग्रन्थ :
 1. आधुनिक हिन्दी व्याकरण ओर रचना - वासुदेव नन्दन प्रसाद.
 2. शुद्ध हिन्दी : डॉ. हरदेव बाहरी

BSOP1101 Optics-I

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP1101	Optics-I	Theory	4	3-1-0

Module-1: (16 Hrs.)

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. Polarized light; linearly polarized light and circularly polarized light. Intensity of polarized light; Malus' Law; polarizer and analyzers; Methods of producing polarized light; Brewster's angle. Birefringence; ordinary and extraordinary rays. Coherence; interference; constructive interference, destructive interference; Fringes; fringe width, relationship between amplitude and intensity

Double slits, multiple slits, gratings. Diffraction; diffraction by a circular aperture; Airy's disc. Resolution of an instrument (telescope, for example); Raleigh's criterion Scattering; Raleigh's scattering; Tyndall effect.

Module-2: (13 Hrs.)

Fluorescence and Phosphorescence. Basics of Lasers –coherence, population inversion, spontaneous emission. Einstein's theory of lasers. 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 Nature of light – light as electromagnetic oscillation; ideas of sinusoidal oscillations; amplitude and phase; speed of light in vacuum and other media; refractive index. Wave fronts – spherical, elliptical and plane; Curvature and vengeance; rays; convergence and divergence in terms of rays and vengeance; vengeance at a distance Refractive index; its dependence on wavelength, Fermat's and Huygens Principle – Derivation of laws of reflection and refraction (Snell's law) from these principles.

Module-3: (15 Hrs.)

Plane mirrors – height of the mirror; rotation of the mirror Reflection by a spherical mirror – paraxial approximation; sign convention; derivation of vengeance equation, Imaging by concave mirror, Imaging by convex mirror, Reflectivity; transitivity, Snell's Law. Refraction at a plane surface, Glass slab; displacement without deviation; displacement without dispersion. Thick prisms; angle of prism; deviation produced by a prism; refractive index of the prism Prisms; angular dispersion; dispersive power; Abbe's number. 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. Refraction by a spherical surface; *sign convention*; introduction to spherical aberration using image formed by a spherical surface of a distance object; *sag formula* Paraxial approximation; Derivation of vengeance equation. Imaging by a positive powered surface. Imaging by a negative powered surface. Vengeance at a distance formula. Effectivity of a refracting surface.

Textbooks:

1. Subrahmanyam.N, BrijLal, *A textbook of Optics*, S.Chand.Co Ltd, New Delhi, India,2003.
2. Tunnacliffe A. H, Hirst J. G, *Optics*, The association of British Dispensing Opticians, London, U.K., 1990.
3. Pedrotti L. S, Pedrotti Sr. F. L, *Optics and Vision*, Prentice Hall, New Jersey, USA, 1998.

Reference Books:

1. PedrottiL.S, PedrottiSr.F.L, *Optics and Vision*, Prentice Hall, New Jersey, USA, 1998.
2. Keating NM. P, *Geometric, Physical and Visual Optics*, Butterworth- Heinemann, Massachusetts, USA, 2002.
3. Loshin D. S. *The Geometric Optics Workbook*, Butterworth-Heinemann, Boston, USA, 1991.
4. Schwartz S. H. *Geometrical and Visual Optics: A Clinical Introduction*, McGraw-Hill, New York, USA, 2002.

BSOP1102 General Anatomy & Nutrition

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP1102	General Anatomy & Nutrition	Theory	4	3-1-0

Module-I: (13 Hrs.)

Introduction to Human Anatomy: Anatomy: Definition and its relevance in Medicine and optometry, Planes of the body, relationship of structures organ system. Skeleton System, Tissues of the Body: Epithelium, connective tissue, bone and cartilage, Embryology, histology, different types of each of them, types of cells, cellular differentiation and arrangement sin different tissues, Muscles: Different types of muscles, their functional differentiation, their relationship with different structures, their neural supply, Blood vessels: Differentiation between arteries and veins, embryology, histology of both arteries and veins, Functional differences between the two, anatomical differences at different locations, Skin and appendages: Embryology, anatomical differences in different areas, functional and protective variations, innervations, relationship with muscles and nerves.

Module-2: (12 Hrs.)

Lymphatic system: Embryology, functions, relationship with blood vessels and organs. Glands: Embryology, different types of glands (exocrine and endocrine), functional differences, neural control of glands, 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.

Module-3 (15 Hrs.)

Introduction to Nutrition and Food Science, Food Groups and Food Pyramid, Balanced diet for different age groups, recommended dietary Allowances, Assessment of Nutritional Status, Energy– Units, Metabolisms, Energy expenditure, and Energy imbalance, Digestion, absorption and transport of Food, Proteins and eye, Lipids and eye. Carbohydrates and eye, Vitamins and eye, Minerals and trace elements and eye, Carotenoids and eye, Oxidative stress and the eye, Vitamin A, C and E deficiency, Nutrition and ocular aging, Contraindications, Adverse reactions and ocular nutritional supplements.

Text Book:**General Anatomy:**

1. BD Chaurasia: Hand book of general Anatomy, Third edition, CBS Publishers, New Delhi, 1996
2. GJ Tortora, B Derrickson: Principles of Anatomy and Physiology, 11th edition, John Wiley & Sons Inc, 2007

Nutrition:

1. M Swaminathan: Handbook of Food and Nutrition, fifth edition, Bangalore printing & publishing Co.Ltd, Bangalore, 2004.
2. C. Gopalan, BV Rama Sastri, SC Bala subramanian: Nutritive Value of Indian Foods, National Institute of Nutrition, ICMR, Hyderabad, 2004
3. Frank Eperjesi & Stephen Beatty: Nutrition and the Eye: A practical Approach.
4. Elsevier Butterworth–Heinemann, USA, 2006

BSOP1103 General Physiology

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP1103	General Physiology	Theory	4	3-1-0

Module-1: (12 Hrs.)

Cell structure & organization Tissue organization, Epithelium, Connective tissue, Collagen fibers, Elastic fibers, Areola fibers, Cartilage–Bone, Contractile tissue–striated–skeletal– cardiac – non striated – plain –my epithelial, General principles of cell physiology, Physiology of skeletal muscle, Blood: Composition, Volume measurement & variations, Plasma proteins – classification & functions. Red blood cells– development, morphology & measurements – functions & dysfunctions. White blood cells – development – classification, morphology, functions & dysfunctions, Platelets–morphology–development, functions & dysfunctions Clotting–factors–mechanism–anti-coagulants dysfunctions. Blood grouping–classification – importance in transfusion, Rh factor & incompatibility Suspension stability, Osmotic stability.

Reticulo endothelial system: Spleen, lymphatic tissue, Thymus, bone marrow immune system, cellular, Humoral, autoimmune

Module-2: (11 Hrs.)

Digestion: General arrangement; functions and regulations of Salivary digestion, Gastric pancreatic digestion, Intestinal digestion; Liver & bile, Absorption, Motility, Deglutition, Vomiting, Defecation, Functions of large intestine, neuro-humoral regulations of alimentary functions. **Excretion:** Body fluids–distribution, measurement & exchange, Kidney – structure of nephron– mechanism of urine formation, composition of the urine and abnormal constituents, urinary bladder & micturition. **Endocrines:** Hormone mechanism–negative feed backs– tropic action– permissive action–cellular action, hypothalamic regulation; hormones, actions & regulations of Thyroid, Adrenal cortex, Adrenal medulla, Parathyroid, Islets of pancreas, Miscellaneous hormones, their actions and regulations, Common clinical disorders. **Reproduction:** Male

reproductive system–control & regulation. Female reproductive system–uterus–ovaries–menstrual cycle–regulation–pregnancy & delivery–breast–family planning. **Respiration:** Mechanics of respiration–pulmonary function tests–transport of respiratory gases–neural and chemical regulation of respiration–hypoxia, cyanosis, dyspnoea–asphyxia.

Module-3: (15 Hrs.)

Circulation: General principles, Heart: myocardium–innervations– transmission of cardiac impulse- Events during cardiac cycle–cardiac output. Peripheral circulation: peripheral resistances–arterial blood pressure–measurements–factors, Regulation variations–capillary circulation–venous circulation. Special circulation: coronary cerebral–miscellaneous, Environmental Physiology: Body temperature regulation (including skin Physiology). Exposure to low and high atmospheric pressure. Nervous System: Neuron–Conduction of impulse–synapse–receptor. Sensory organization–pathway sand perception, Reflexes–cerebral cortex–functions. Thalamus–Basal ganglia Cerebellum, hypothalamus. Autonomic nervous system–motor control of movements, posture and equilibrium– conditioned reflex, eye hand coordination. Special senses–(Elementary) Olfaction–Taste–Hearing.

Text Book:

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

Reference Book:

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

BSOP1104 Basic Biochemistry

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP1104	Basic Biochemistry	Theory	4	3-1-0

Module-1: (12 Hrs.)

Carbohydrates: Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function), Proteins: Amino acids, peptides and proteins (general properties & tests with a few examples like glycine, tryptophan, glutathione, albumin, hemoglobin and collagen). Lipids: Fatty acids, saturated and unsaturated, cholesterol and triacylglycerol, phospholipids and plasma membrane

Module-2: (12 Hrs.)

Vitamins: General with emphasis on A, B2, C, E and inositol (requirements, assimilation and properties), Minerals: Na, K, Ca, P, Fe, Cu and Se. (requirements, availability and properties) Hormones: Hormones and their receptors basic concepts in metabolic regulation with examples, insulin, glucagon and thyroxin. Metabolism: General whole body metabolism (carbohydrates, proteins, lipids)

Module-3: (11 Hrs.)

Ocular Biochemistry: Various aspects of the eye, viz. tears, cornea, lens, aqueous, vitreous, retina and pigment epithelium rhodopsin. (The important chemicals in each and their roles).

Clinical Biochemistry: Blood sugar, urea, creatinine and Bilirubin, cholesterol etc. and significance of their estimation.

Text Book:

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

Reference Book:

1. S.Ramakrishnan, KG Prasanna and R Rajan: Textbook of Medical Biochemistry, Orient Longman, Madras, 1990.

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

BSOL1101 Optics Laboratory-I

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL1101	Optics Laboratory-I	Practice	2	0-0-3

Physical Optics

1. Refractive index of prism for sodium D-Line using spectrometer
2. Dispersive power of prism for Hg source using spectrometer
3. Air wedge - Interference method to find diameter of an optically thin wire
4. Newton's ring - to find of sodium light
5. Biprism - To find of sodium light
6. Diffraction grating - (Minimum deviation method). of Hg prominent lines
7. Polarimeter - specific rotation of dextrose and concentration of IV injection
8. Lumen brodem Photometer - Comparison of luminous power
9. μ of liquid - using liquid prism - spectrometer
10. Michelson interferometer -wavelength of laser light.

BSOL1102 Biochemistry Lab

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL1102	Biochemistry Lab	Practice	2	0-0-3

Practical (20 Hours)

Quantitative exercises:

- i. Abnormal constituents in urine, sugar, proteins, ketones, blood and bile salts
- ii Detection of abnormal constituents in urine

Techniques:

Electrophoresis, Chromatography, Preparation of - normal, molar and percentage solutions, buffers, pH determination

Demonstration:

Estimation of blood cholesterol, estimation of alkaline phosphate, salivary amylase (effect of PH, etc.).

BSOL1103 General Anatomy & Physiology Lab

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL1103	General Anatomy & Physiology Lab	Practice	2	0-0-3

Practical: 10 Hours

ANATOMY:

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

PHYSIOLOGY:

Blood test:

1. Microscope
2. Haemo cytometer
3. Blood
4. RBC count
5. Hb
6. WBC count
7. Differential Count
8. Hematocrit demonstration
9. ESR
10. Blood group & Rh. Type

11. Bleeding time and clotting time.

Excretion:

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

Endocrinology and Reproduction:

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

Respiratory System:

- a. Clinical examination of respiratory system
- b. Spirometry
- c. Breath holding test

Cardio Vascular System:

1. Clinical examination of circulatory system
2. Measurement of blood pressure and pulse rate
3. Effect of exercise on blood pressure and pulse rate

Central Nervous System:

- a) Sensory system
- b) Motor system
- c) Cranial system
- d) Superficial and deep reflexes

SECOND SEMESTER
MSEN1201 Communicative English-1 (2-0-0)

Code	Course Title	Course Type	Credits	L-T-P (hrs)
MSEN1201	Communicative English-I	Theory	2	2-0-0

The paper in English is of 100 (Hundred) percentage marks.

Module-I: Communication Skill

Communication: Definition, concept

Channels of Communication: Sender, receiver, channel, message, encoding, decoding, context, feedback

Verbal & Non-Verbal Communication: Spoken & written-advantages & disadvantages

Bias free English,

Formal & informal style.

Module-II: Communicative Grammar

Time, Tense & Aspect

Verbs of state & events

Modality

Active & Passive voice

Antonyms, Synonyms, Homonyms, one word substitutions & correction of errors

Module-III: Sounds of English

Length of vowels:

Long vowels as in the words feel, food, shoot, card etc.

Short vowels as in the words pen, sun, cut, shut, etc.

Consonants

Stress pattern

Intonation: Rising & Falling.

Text Books:

Effective technical communication by M. A. Rizavi

Reference Books:

Communicative English & Business Communication by R.K Panda, J Khuntia M. Pati, Alok Publication.
Communicative Grammar of English Geoffery Leech.

BSOP1201 Optics-II

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP1201	Optics-II	Theory	4	3-1-0

Module-1: (19 Hrs.)

Definition of a lens as a combination of two surfaces; different types of lens shapes. Image formation by a lens by application of vergence at a distance formula; definitions of front and back vertex powers; equivalent power; first and second principal planes/points; primary and secondary focal planes/points; primary and secondary focal lengths Newton's formula; linear magnification; angular magnification Nodal Planes Thin lens as a special case of thick lens; review of sign convention Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions Imaging by a thin concave lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions Prentices Rule System of two thin lenses; review of front and back vertex powers and equivalent power, review of six cardinal points. System of more than two thin lenses; calculation of equivalent power using magnification formula. Cylindrical Lenses; image formation; relation between cylinder axis and line image orientation. Imaging due to two cylinders in contact with axes parallel. Two cylinders in contact with axes perpendicular; line images and their orientations to the cylinders' powers; Interval of Sturm; circle of least confusion (CLC); spherical equivalent; position of CLC

Module-2: (14 Hrs.)

Spherical lens and a cylindrical lens in contact; spherical equivalent; interval of Sturm and CLC. Sphero-cylindrical lens notations– plus/minus cylinder form, cross cylinder/meridian form; transformations between them. Field stops and apertures; entrance and exit pupils.

Apertures and defocus blur, Receiver/detector diameter; Depth of focus, Depth of field. Chromatic aberrations; methods of removing chromatic aberrations. Abbe number. Monochromatic aberrations –deviation from paraxial approximation, Difference between ray aberrations and wave-front aberrations. Third order aberrations–spherical aberrations, coma, astigmatism; distortion and curvature of fields, Ways of minimizing spherical aberrations–Pupil-size, bending of lens, shape factor, Lens tilt – astigmatism. Higher order aberrations; introduction to Zernike Polynomials.

Module-3: (16 Hrs.)

Telescopes– Keplerian, Galilean and Newtonian; position of cardinal points, entrance and exit pupils; magnifications; advantages and disadvantages. Microscopes–magnification, tube-length. Gullstrand's Schematic Eye (GSE). Calculation of the power of the cornea, the lens and the eye, axial length, Calculation of the position of the cardinal points, magnification. GSE-Purkinje images and their reflectance. GSE-entrance and exit pupils for a 3mm pupil; ocular aberrations–spherical aberrations and coma, chromatic aberrations. GSE–introduction to refractive errors- myopia and hyperopia; corneal curvature; axial length; far point; blur-size calculations; corrections; astigmatism; blur size; circle of least confusion; correction. GSE-Object closer than at infinity; Introduction to accommodation; far-point; near-point; presbyopia; spectacle and contact lens corrections- comparison of magnification

Textbook:

1. Tunnaclyffe 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.
3. Tunnacliffe A. H, Hirst J. G, *Optics*, The association of British Dispensing Opticians, London,U.K.,1990.
4. PedrottiL.S, PedrottiSr.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.
3. LoshinD.S.*TheGeometricOpticsWorkbook*, Butterworth-Heinemann,Boston, USA,1991.
4. Schwartz S.H. *Geometrical and Visual Optics: A Clinical Introduction*, McGraw- Hill, NewYork, USA, 2002

BSOP 1202 Ocular Anatomy

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP1202	Ocular Anatomy	Theory	4	3-1-0

Module-1: (12 Hrs.)

Cornea: Anatomy of all the layers, cellular structure, nerve supply, reason for transparency, refractive properties. Coats of eyeball: Sclera (epi sclera & sclera), Choroid (Iris, ciliary body, choroid), Retina. Detailed anatomy, cellular structure, vasculature, nerve supply for all the above coats, pupils, nerve supply for papillary actions, papillary pathway, Crystalline lens, Aqueous, anterior chamber, vitreous body.

Module-2: (10 Hrs.)

Ocular Embryology , Detailed study of orbit, Ocular Adnexa and lachrymal system, Extra ocular muscles (anatomy, innervations, action), Extra ocular muscles (anatomy, innervations, action), Orbital Blood supply.

Module-3: (12 Hrs.)

Cranial nerves: Detailed study of each of the following nerves in terms of their nuclei, course, relationship within brain, effects of compression etc. at different regions:-Optic nerve, Oculomotor nerve, Trochlear nerve, Trigeminal nerve, Abdu cent nerve, Facial nerve Visual Pathway, Autonomic Innervations of Ocular structures.

Textbook:

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

Reference Book:

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

BSOP 1203 Ocular physiology

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP1203	Ocular Physiology	Theory	4	3-1-0

Module-1: (14 Hrs.)

Protective mechanisms in the eye, Pre corneal tear film, eyelids and lacrimation, Extrinsic Ocular muscles: their actions and control of their movements, Saccadic, smooth pursuit and nystagmic eye movements, Coats of the eyeball, Corneal Physiology, Aqueous humor and vitreous: Intra ocular pressure.

Module-2: (12 Hrs.)

Iris and pupil, Crystalline lens and accommodation– Presbyopia, Retina–structure and functions, dark and Light Adaptations, Vision–general aspects of sensation, Pigments of the eye and photo chemistry, electrophysiology.

Module-3: (16 Hrs.)

The visual stimulus, refractive errors Visual acuity, vernier acuity and principle of measurement, Visual perception–Binocular vision, stereoscopic vision, optical illusions, Visual pathway, central and cerebral connections, lesions of pathway and effects, Color vision and color defects. Theories and diagnostic tests.

Textbook:

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

Reference Book:

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

FCBS0101 Environmental Science

Code	Course Title	Course Type	Credits	L-T-P (hrs)
FCBS0101	Environmental Science	Theory	4	3-1-0

Course Objectives:

1. To understand the concept of multi-disciplinary nature of Environmental Science where different aspects are dealt with a holistic approach.
2. Students will develop a sense of community responsibility by becoming aware of environmental issues in the larger social context.
3. One must be environmentally educated.

MODULE-I

Environment and its multidisciplinary nature; Need for public awareness; Renewable and non-renewable resources–forest, water, mineral, land, food and energy resources; Structure and function of ecosystems of forest, grass land, desert and aquatic types.

MODULE -II

Biodiversity and its conservation: Biodiversity at global, national and local levels; Threats to biodiversity - Habitat loss; wild life poaching and man - wildlife conflicts; Endangered and endemic species; conservation measures.

Causes, effects and control measures of pollution, air, water and noise pollution; Nuclear hazards; solid-waste management–Causes, effects and control measures; Management of disasters due to natural causes of floods, earthquakes, cyclones and landslides.

MODULE-III

Social issues and the environment; Sustainable environment, Water conservation measures; Rain water harvesting; Resettlement and rehabilitation of people; Climate change and global warming; Acid rain; Ozone layer depletion; water land reclamation; Consumerism and waste products; Features of Environment Protection Act, Air pollution and Control of Pollution Acts; Water Pollution and its Control Act. Effects of Pollution explosion on environment and public health; Need for value education to Protect environment and resources.

Learning Outcomes:

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

Text Book:

1. Anubhav Kaushik & C.P. Kaushik: Environmental Studies-New age International Publishers.

Reference Books:

1. Benny Joseph: Environmental Studies-Tata Mac Graw Hill
2. E. Bharucha: Text book of Environmental Studies for under graduate courses– Universities Press. (Book prepared by UGC Committee).

BSOL1201 Optics Laboratory-II

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL1201	Optics Laboratory-II	Practice	2	0-0-3

Geometric Optics

1. f & μ of convex lens (f by u-v and shift method)
2. f & μ of concave lens (f of concave lens by u-v method, combined lens u-v method, R - Boy's method)
3. μ of the prism (i-d curve)
4. μ of slab - shift method (traveling microscope)
5. μ of liquid - shift method (traveling microscope)
6. f of convex of mirror
7. f of concave mirror (u-v graph)
8. Verification of laws of reflection - plane mirror.
9. Verification of laws of refraction - glass slab - pin method (μ by lateral shift)
10. Resolving power of telescope.
11. Photodiode – characteristics.
12. Plank's constant.

BSOP1202 Anatomy & Physiology Lab (Clinic-I)

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL1202	Anatomy & Physiology Lab (Clinic-I)	Practice	2	0-0-3

Practical: (10 Hours)

1. Eye dissection of bull's eye
2. Orbital bones and landmarks using Skull

Practical (14 Hours):

1. Eye movements
2. Tests for lachrymal secretion (Schirmer's)
3. Break up time
4. Anterior segment examination – Slit lamp examination - demo
5. Pupillary reflexes
6. Schiottz tonometry
7. Measurement of accommodation
8. Visual acuity measurement
9. Ophthalmoscopy and retinoscopy
10. Light and dark adaptation
11. Binocular vision
12. Color vision
13. Electrophysiology

All the above procedures are demonstrated to enable students to understand the physiological concepts.

BSOL1203 Communicative Practice Lab-II

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL1203	Communicative Practice Laboratory-I	Practice	2	0-0-3

Listening Skills

Listening for information

- The students can listen to a given speech in normal speed (150/200 words per min) and locate important points and arrange them in logical order.
- While listening to a speech given in normal speed the student can fill up blanks, spaces, flow charts and can take notes.

Speaking Skills

Conversation Situations and Role Plays:

Introductions, greetings, giving directions, appointments, seeking permissions, requesting for information, asking for help and similar kind of activities.

Reading Skills

The student can read a scientific passage for moderate length (300-400 words) for the purpose of skimming, scanning, note making and vocabulary building.

Writing Skills

- Paragraph construction from general - specific, data - comment, problem- solution, process-description
- Précis writing and summarization
- Official notices and business letters

THIRD SEMESTER

MSEN2301-Communicative English-II

Code	Course Title	Course Type	Credits	L-T-P (hrs)
MSEN2301	Communicative English-II	Theory	2	2-0-0

The paper in English is of 100 (Hundred) percentage marks.

Module-I: Communication in Organizational Setting

General Communication & Business Communication

Internal & External Communication

Dimensions of Communication in an Organization: Upward, Downward, Horizontal & Grapevine 7 Cs of Communication

Barriers of Communication

Module-II: Writing Skill

Paragraph writing: Topic sentence & Main idea

Cohesion & Coherence: Sentence linkers

E-mails & Business letters

Preparing business reports & proposals

Note making & summarizing

Preparing resume, CV & Cover letters

Module-III: Presentation

Meeting documentation: Preparing an agenda, drafting resolutions & writing minutes Presentations: Oral &

Written Interviews: Types, decorum & other formalities Group discussions.

Text Books:

Effective technical communication by M.A.Rizvi

Reference Books:

Business communication by Urmila Rai & S.M.Rai

Communicative English & Business Communication by R.K.Panda, J.Khuntia, M.Pati, Alok Publication

BSOP2301- Ocular Microbiology & Ocular Pathology

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP2301	Ocular Microbiology and Pathology	Theory	4	3-1-0

Module-I (18hrs)

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

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

Module-II (17hrs)

Ocular Bacteriology-Gram positive, (Staphylococcus auras, Staphylococcus epidermis, Streptococcus, propionic bacterium, actinomyces Nocardia) Bacteria including acid fast bacilli, Mycobacterium tuberculosis, Myobacterium leprae) Ocular Bacteriology - Gram negative Bacteria (pseudomonas, haemophiilus, Brucella, Neisseria, Moraxella).

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

Module-III (15hrs)

Spirochetes (Treponema, Leptospiraceae), Virology: Classification of Viruses in Ocular Disease, Rubella, Adenovirus, Oncogenic Viruses (HPV, HBV, EBV, and Retroviruses), HIV, Fungi: Yeasts, Filamentous, Dimorphic, Intracellular parasites - Chlamydia, Protozoa (Taxoplasmosis, Acanthamoeba,) Helminthes (Toxocariasis, Filariasis, Onchocerciasis, Trematodes)

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

Text Books:

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

Reference Books:

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

BSOP 2302 Visual Optics I

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP2302	Visual Optics -I	Theory	4	3-1-0

Module-I (17hrs)

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 application Spherical and Chromatic

Module-II (18hrs)

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

Module-III (15hrs)

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.

Text Books:

1. Visual Optics and Refraction- A clinical approach David D Michaels:. The C.V. Mosby Co., 1985.
2. Clinical Visual optics Arthur G Bennett Ronald B Rabbetts -Butterworth- Heinemann Second edition 1989
3. Optics and Refraction A User friendly guide David Miller 1991 Gower Medical Publishing

Reference Books:

1. Clinical Optics, Andrew R Elkington & Helena J Frank - Blackwell Scientific PublicationsOxford–London.

BSOP2303 Optometric Optics I

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP2303	Optometric Optics-I	Theory	4	3-1-0

Module-I (18hrs)

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

Prisms – Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel’s prisms, rotary prims ,Lenses – Definition, units, terminology used to describe, form of lenses

Module-II (17hrs)

Vertex distance and vertex power, Effectivity calculations , Lens shape, size and types i.e. spherical, cylindrical and sphero-cylindrical ,Transpositions – Simple, Toric and Spherical equivalent ,Prismatic effect, centration, decent ration and Prentice rule, Prismatic effect of Plano-cylinder and sphero-cylinder lenses .

Module-III (15hrs)

Spherometer & Sag formula, Edge thickness calculations, Magnification in high plus lenses, Minification in high minus lenses, Tilt induced power in spectacles, Aberration in Ophthalmic Lenses

Text Books:

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

Reference Books:

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

MSIS2301 Indian Society and Culture

Code	Course Title	Course Type	Credits	L-T-P (hrs)
MSIS2301	Indian Society and Culture	Theory	4	3-1-0

Module-I

- i. Indus Civilization – Society, Religion and economic life.
- ii. Vedic Civilization – Society and Religion, The position of women.

Module –II

- i. Religious upheaval in the 6th century B.C.
- ii. Emergence of Jainism & its impact on Indian Society
- iii. Emergence of Buddhism and its contributions to the field of Indian art & architecture.

Module – III

- i. Cultural efflorescence during Kushanas & Guptas.
- ii. Cultural synthesis, Gandhara school art, Mathura art.
- iii. Literature – Sanskrit literature.
- iv. Hindu cultural expansion – South – East Asia.

Module – IV

Emergence of religious movements in medieval period.

- i. Emergence of Bhakti Movement – Kabir, Nanak, Chaitanya.
- ii. Rise of Sufi Movement
- iii. Medieval Education

Module – V

- i. Socio – Religious Movements during 19th century – Raja Ra, Mohan Roy, Dayananda Saraswati, Vivekananda.
- ii. The growth and development of Modern education (1835-1905)

Text Books:

1. The wonder that was India by A.L.Basham, Picador India.

Reference Books:

1. Life & Culture in Ancient India – B.N.Lunia.
Ancient Indian History – K.L.Khurana
2. Cultural history of India - K.L.Khurana
3. Social & Cultural history of India – O.M.Prakash
4. Glimpses of Medieval Indian Culture – Yusuf Hussain

BSOL2301 Clinical Examination of the Visual System (0-0-3)

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL2301	Clinical Examination of Visual System	Practice	2	0-0-3

Module-I (20Hrs.)

History taking ,Visual acuity estimation , Extra ocular motility, Cover test, Alternating cover test, Hirschberg test, Modified Krimsky , Pupils Examination, Maddox Rod , van Herrick , External examination of the eye.

Module-II (15 Hrs.)

Lid Eversion, Schirmer’s Test, TBUT, tear meniscus level, NITBUT (kerato meter), Color vision, Stereopsis, Confrontation test, Photo stress test. Slit lamp bio microscopy, Direct Ophthalmoscopy,

Module – III (15 Hrs)

Digital pressure, Schiottz Tonometry, Applanation Tonometry, Gonioscop, ROPLAS, Amsler test, Corneal Sensitivity, HVID, Saccades and Pursuits

Text Books:

1. Basic Ophthalmology, Cynthia A. Bradford, American Academy of Ophthalmology, 7th edition, 1999
2. Practical Ophthalmology, A manual for beginning residents, American academy of Ophthalmology
3. R Norman Bailey, Elizabeth Heitman, An optometrist’s guide to clinical ethics, American
4. Optometric Association, St. Louis, Missouri, 2000 (<http://www.aoa.org/documents/optometrists/book.pdf>)

Reference Books:

1. Deborah Pavan- Langston, Manual ocular diagnosis and therapy, 6th edition, Lippincott Williams & Wilkins, Wolters Kluwers, 2008

BSOL2302 Clinical Optometry-I

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL2302	Clinical Optometry-I	Practice	2	0-0-3

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a registered optometrist. Students are tested on intermediate clinical optometry skills.

Ocular Microbiology Practice

Slide demonstrations of various stains in pathological conditions. Visit to microbiology and pathology lab.

Optometric Optics I Practice

1. Lensometry
2. Measurements in bifocals
3. Problem solving:
 - a. Curvature
 - b. Transposition

Visual Optics I Practice

1. Introduction to visual optics
2. Properties of retinal Image
 - a. Experiment 1: Inversion of retinal image
 - b. Experiment 2: Image shift with prisms
 - c. Demonstration 1: Point spread function
3. Illusions based on lateral inhibition
 - a. Demonstration 2: Mach bands
 - b. Demonstration 3: Hermann grid
 - c. Demonstration 4: Pyramidal illusion
4. Making use of the reflected light from cornea
 - a. Experiment 3: Purkinje images
 - b. Experiment 4: Measurement of corneal curvature
5. Entopic phenomenon 5: Negative Afterimage

- a. Demonstration
- b. Experiment
 - i. Pupil
 - ii. Phosphorescence's
 - iii. Purkinje Tree
 - iv. Blue-field entopic phenomena
 - v. Haidinger Brushes
- 6. Visual perception
 - a. Demonstration 6: Benham's Top
 - b. Experiment 6: Finger Sausage trick
 - c. Experiment 7: Understanding about Dominant eye
 - d. Demonstration/ Activity 7: Attention
 - d. Demonstration/ Activity 8: Persistence of Vision
 - e. Experiment 8: The Stroop Test
 - f. Experiment 9: The caloric reflex test
 - g. Experiment 10: Relative size
- 7. Visual acuity experiments
 - a. Experiment 11: Effect of testing distance on visual acuity measured
 - b. Experiment 12: Measurement of Central and Peripheral visual acuity
 - c. Experiment 13: External illumination
 - d. Experiment 14: Adaptation state of the eye
 - e. Experiment 15: Pupil size and Accommodation

MSEL2301 Communicative Practice Lab-II

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL2303	Communicative Practice Laboratory-II	Practice	2	0-0-3

Listening Skills

- a. Listening to news bulletins
- b. Viewing and reviewing documentaries and short films

Speaking Skills

- a. Situational Dialogues / Role Plays
- b. Oral Presentations- Prepared and Extempore
- c. Just a minute' Sessions (JAM)
- d. Group Discussions on current topics

Reading Skills

- a. Reading comprehension exercises
- b. Newspaper / article reading

Writing Skills

- a. Creative Writing
- b. Email Messages
- c. Report Writing
- d. Writing Resumes and Cover Letters

Grammar

- a. Minimizing errors/ mistakes in sentences
- b. Exercises on articles, prepositions, subject-verb agreement, tense, conditionals, voice change.

FOURTH SEMESTER
BSOP2401 Ocular Disease I (3-1-0)

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP2401	Ocular Diseases -I	Theory	4	3-1-0

Module- I (18Hrs.)

Orbit: Applied Anatomy, pro ptosis (classification, causes, and investigation), Craniosynostosis, Enophthalmos, Development, Anomalies craniofacial Dysostosis. Hypertelorism, Median facial cleft syndrome), Orbital Inflammations (Preseptal cellulites, Orbital cellulitis Orbital Periostitis, cavernous sinus Thrombosis), Grave's Ophthalmopathy, Orbital tumors (Dermoids, capillary haemangioma, Optic nerve glioma), Orbital blowout fractures, Orbital Surgery (Orbitotomy), Orbital tumors, Orbital trauma, Approach to a patient with proptosis.

Lids: Applied Anatomy, Congenital anomalies (Ptosis, Coloboma, Epicanthus, Distichiasis, Cryptophthalmos), Oedema of the eyelids (Inflammatory, Solid, Passive edema), Inflammatory disorders (Blepharitis, External Hordeolum, Chalazion, Internal hordeolum, Molluscum Contagiosum), Anomalies in the position of the lashes and Lid Margin (Trichiasis, Ectropion, Entropion, Symblepharon, Blepharophimosis, Lagophthalmos, Blepharospasm, Ptosis). Tumors (Papillomas, Xanthelasma, Haemangioma, Basal carcinoma, Squamous cell carcinoma, sebaceous gland melanoma).

Module-II (15 hrs)

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

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

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

Module-III (17 hrs)

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

Uveal Tract and Sclera: Applied Anatomy, Classification of uveitis, Etiology, Pathology, Anterior Uveitis, Posterior Uveitis, Purulent Uveitis, Endophthalmitis, Panophthalmitis, Pars Planitis, Tumors of uveal tract (Melanoma), Episcleritis and scleritis, Clinical examination of Uveitis and Scleritis.

Text Books:

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

Reference Books:

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

BSOP 2402 Visual Optics II (3-1-0)

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP2402	Visual Optics II	Theory	4	3-1-0

Module-I (17hrs)

1. Refractive conditions: Emmetropia, Myopia, Hyperopia, Astigmatism, Accommodation, Presbyopia, Anisometropia and Aniseikonia, Aphakia and Pseudophakia.
2. Accommodation: Far and near points of accommodation, Correction of spherical ametropia, Axial versus refractive ametropia, Relationship between accommodation and convergence, AC / A ratio.

Module-II (17hrs)

Objective refraction: Streak Retinoscopy only

Subjective Refraction: Review of subjective refractive methods, Cross cylinder methods for astigmatism, Astigmatic Fan Test, Difficulties in subjective and objective tests and their avoidance, Ocular refraction versus spectacle refraction.

Module-III (16hrs)

Subjective Refraction: Ocular accommodation versus spectacle accommodation, Spectacle magnification and relative spectacle magnification, Retinal image blur; depth of focus and depth of field, Prescribing Prisms / Binocular Refraction.

Text Books:

1. Visual Optics and Refraction- A clinical approach David D Michaels.: The C.V. Mosby Co., 1985.
2. Clinical Visual optics Arthur G Bennett Ronald B Rabbetts -Butterworth- Heinemann Second edition 1989
3. Optics and Refraction A User friendly guide David Miller 1991 Gower Medical Publishing

Reference Books:

1. Clinical Optics, Andrew R Elkington & Helena J Frank - Blackwell Scientific Publications Oxford – London.

BSOP 2403 Optometric Optics II

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP2403	Optometric Optics II	Theory	4	3-1-0

Module-I (17hrs)

Raw materials – History and General Outline, Manufacturing of Ophthalmic Blanks – Glass & Plastics, Terminology used in Lens Workshops, Surfacing process from Blanks to lenses ,Definition & Materials (Glass, Plastics, Polycarbonate, Triology) types and Characteristics , Properties (Refractive index, specific gravity, UV cut off, impact resistance – include drop ball test, abbe value, Center thickness) ,Best form of lenses & Safety standards for Ophthalmic lenses (FDA, ANSI, ISI, Others) ,Design of High Powered Lenses

Module-II (17hrs)

Hi-index lenses, Calculation of Refractive index, Bifocal designs, their manufacturing & uses (Kryptok , Unis D, Executive, Invisible, Occupational)

Progressive Addition Lenses, modified near vision lenses (designs, advantages, limitations) ,Lens enhancements (Scratch resistant coatings – spin/dip, Anti-reflection coating, UV coating, Hydrophobic coating, anti-static coating

- a. Lens defects – Description and Detection
- b. Glazing & edging (manual & automatic)
- c. Special lenses
- d. Lenticulars
- e. Aspheric
- f. Fresnel lenses & Prisms
- g. Aniseikonic lenses
- h. Photochromic
- i. Polaroid's
- j. Tinted lenses – Tints, filters

Module-III (16hrs)

Project to ensure awareness on lens availability in Indian market, History of Spectacles, manufacturing overview, Definition, parts & measurements

Classification of frames – Materials (cover in detail), Colors and Temple position (advantages & disadvantages, where to use), Special purpose frames (sports, kids, reading)

Text Books:

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

Books:

- 1) CLIFFORD W BROOKS & IRVIN M BORISH: System for Ophthalmic Dispensing.
- 2) M.Jalie: Ophthalmic lenses and dispensing.

BSOP 2404 Basic & Ocular Pharmacology (3-1-0)

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP2404	Basic and Ocular Pharmacology	Theory	4	3-1-0

Module-I (16hrs)

Pharmacokinetics: Drug absorption, distribution, metabolism and excretion

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

Module-II (18hrs)

Ocular Pharmacology: Drug handling by cells and Tissues – Pharmacokinetics, and Pharmacodynamics–specific to ocular – surface and intraocular conditions. Delivery methods of Ocular Medication: Residence in the conjunctival sac, drug vehicles affect drug delivery, advanced ocular delivery systems, Reconstituting the tear film: Tear Substitutes, Ocular Drugs and the Autonomic Nervous system: Parasympathetic(anti muscarinic) and Sympathetic

Module-III (16hrs)

Intraocular pressure Drugs, Eicosanoids: prostaglandins, thromboxanes and leukotrienes, Serotonin: Neurotransmitter; Glucocorticoids, Immunosuppressive agents, Local Anesthetics, Ocular Toxicity from systemic administration of Drugs supervised setting.

Text Books

1. K D TRIPATHI: Essentials of Medical Pharmacology. 4th Ed., 2003
2. T S MAUGER & E L CRAIG - MOSBY'S - Ocular Drug Handbook

Reference Books

1. Zimmerman: Text Book of Ocular Pharmacology, 1999.
2. Bartlett and Jaanus: Clinical Ocular Pharmacology
3. S P RANG, M M DALE, RITTER – Pharmacology, Ed.3 Churchill 1995.

BSOP 2405 OCULAR DISEASE II

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP2405	Ocular Diseases II	Theory	4	3-1-0

Module-I (18hrs)

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

retinal Artery occlusion) , Retinal Vein occlusion (Ischemic, Non Ischemic , Branch retinal vein occlusion) g. Retinal degenerations : Retinitis Pigmentosa, Lattice degenerations, Macular disorders: Solar retinopathy, central serous retinopathy, cystoid macular edema, Age related macular degeneration, Retinal Detachment: Rhegmatogenous, Tractional, Exudative) ,Retinoblastoma

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

Module-II (17hrs)

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

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

Module-III (15hrs)

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

Text Books:

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

Reference Books:

1. Ophthalmology: A.K. Khurana, 2000
2. Ophthalmolos (Theory & Practical) : Satyen Nabar & P Samant, 2000
3. Barie Ophthalmology: Renu Jogi (1999)
4. MILLER S J H: Parson's Diseases of the Eye, 18th Ed., Churchill Livingstone, 2003. (Parson's)

MSFE2401 FREE ELECTIVE (3-1-0)

BSOL2401 Clinical Optometry II (0-0-3)

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL2401	Clinical Optometry II	Practice	2	0-0-3

Students will improve their skills in clinical procedures, then Progressive interacting with patients and professional personal are monitored as students practice optometry in supervised setting. Additional area includes problem solving and complications of various managements will be inculcated. Students will demonstrate competence in basic, intermediate and Advance procedures. 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.

Visual Optics II Practice

1. Photometry
2. Practice of Retinoscopy – Emmetropia
3. Practice of Retinoscopy - Spherical Ammetropia
4. Practice of Retinoscopy - Simple Astigmatism
5. Practice of Retinoscopy – Compound hyperopia
6. Practice of Retinoscopy – Compound Myopia
7. Practice of Retinoscopy – in media opacities
8. Practice of Retinoscopy – Oblique Astigmatism.
9. Practice of Retinoscopy – in irregular astigmatism
10. Practice of Retinoscopy – Strabismus and Eccentric fixation
11. Myopia and Pseudo myopia myopia and visual acuity
12. Myopic correction - subjective verification Monocular and Binocular.
13. Hypermetropia : Determination or manifest error subjectively
14. Hypermetropic correction : subjective verification
15. Demonstration of astigmatism. Use of Slit and Keratometry to find the principal meridians.
16. Astigmatism: Subjective verification. Fan subjective verification test
17. Astigmatism: Cross Cyl. - Subjective verification tests.
18. Measurement of accommodation: Near and far points and range.
19. Presbyopia correction and methods :
 - a. Accommodative, reserve, balancing the relative accommodation and Cross Grid test
20. Methods of differentiating axial and refractive ametropia
21. Interpretation of Cycloplegic Retinoscopic findings Prescription writing
22. Binocular refraction
23. Vision therapy
24. Exercises for vergence

Optometric Optics II Practice

1. Lensometry
2. Measurements in multi focal lenses
3. Problem solving- Prismatic effects

Ocular Diseases I Practice Lab

1. Slide demonstration of Ocular Conditions
2. Case Analysis

Ocular Disease II Practice Lab

1. Slide demonstration of Ocular Conditions
2. Case Analysis

FIFTH SEMESTER

BSOP3501 Binocular Vision & Squint

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP3501	Binocular Vision & Squint	Theory	5	4-1-0

Module-1(20 Hrs.)

Grades of binocular vision-simultaneous perception (first grade of binocular vision), fusion, stereopsis (third grade of binocular single vision). Advantages of binocular vision. Visual direction and the horopter_visual direction, corresponding point and normal retinal correspondence, horopter, physiologic diplopia. Binocular fusion-panum's area, fixation disparity, theories of binocular fusion, synergy hypothesis of panum, local sign hypothesis of hering, eye movement hypothesis of helmholts, suppression hypothesis of du tour and verhoeff, physiologic basis of fusion.

Dihoptic stimulation-depth with fusion and depth with diplopia, diplopia without depth, retinal rivalry and suppression, binocular lussure. Stereopsis-physiological basis of stereopsis, local and global stereopsis and fusion, stereopsis acuity neurophysiology of stereopsis. Depth perception-steropsis, nonstereoscopic clues to the

perception of depth under binocular condition, monocular clues (non stereoscopic clues to spatial orientation)-parallax movements, linear perspective overlay of contours, sizedistance from horizon ,distribution of highlights, shadow, shades and light .aerial perspective ,influence of accommodation and convergence on depth perception, conclusion. Integration of the motor and sensory system into binocular vision.

Module-2(17 Hrs.)

Binocular defects: Binocular optical defects-anisometropia-vision in anisometropia, treatment, Binocular optical defects-aniseikonia symptoms, clinical investigation, treatment. Binocular muscular co-ordination-orthophoria. Binocular muscular anomalies- heterophoria- ,exophoria, esophoria, hyperphoria, cyclophoria, esotropia ,exotropia, Binocular muscular anomalies-anomalies of convergence and other reading difficulties—insufficiency of convergence, convergence excess, the ophthalmologist and the reading ability of children.

Module-3(17 Hrs.)

Neurogenic palsies- Etiology of cranial nerve palsy, Diagnosis, characteristic, management of III nerve palsy, Etiology of IV nerve palsy, Diagnosis, characteristic, managements. Etiology of VI nerve palsy, Diagnosis, characteristic, management.

Mechanical palsies – Duane’s retraction syndrome, Browns syndrome, General fibrosis syndrome, Blow out fractures, Thyroid eye diseases, Anomalies of binocular vision in congenital syndrome- Downs syndrome, cerebral palsy craniofacial anomalies. Amblyopia

Text Book:

Binocular vision Anomalies & Procedures for vision therapy, By Griffies.

BSOP3502 Contact Lenses

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP3502	Contact Lenses	Theory	4	3-1-0

Module-1: (18 Hrs.)

1. Introduction to contact lenses
 - 1.1 Definition
 - 1.2 Classification/ Types
2. History of Contact Lenses
3. Optics of Contact Lenses
4. Review of Anatomy & physiology of
 - 4.1 Tear film
 - 4.2 Cornea
 - 4.3 Lids & conjunctiva
5. Introduction to CL materials
6. Properties of CL materials
 - 6.1 Physiological (DK, Ionicity, Water content)
 - 6.2 Physical (Elasticity, Tensile strength, Rigidity)
 - 6.3 Optical (Transmission, Refractive index)
7. Indications and Contraindications
8. Parameters/ Designs of Contact Lenses & Terminology
9. RGP contact Lens materials
10. Manufacturing Rigid and Soft Contact Lenses- various methods
11. Pre-fitting examination

Module-2 :(17 Hrs.)

12. Correction of Astigmatism with RGP lens
13. Types of fit- Steep, Flat, Optimum- on spherical cornea with spherical lenses
14. Types of fit- Steep, Flat, Optimum- on Toric cornea with spherical lenses
15. Calculation and finalising Contact lens parameters
16. Ordering of contact Lenses- writing a prescription

17. Checking and verifying Contact lenses
18. Common Handling Instructions
19. Insertion & Removal Techniques
- 19.1 Do's and Don'ts
20. Care and Maintenance
- 20.1 Cleaning agents & Importance
- 20.2 Rinsing agents & Importance
- 20.3 Disinfecting agents & importance
- 20.4 Lubricating & Enzymatic cleaners
21. Follow up visit examin

Module-3:(16 Hrs.)

22. SCL Materials & Review of manufacturing techniques
23. Comparison of RGP vs. SCL
24. Pre-fitting considerations for SCL
25. Fitting philosophies for SCL
26. Fit assessment in Soft Contact Lenses: Types of fit-Steep, Flat, Optimum
27. Disposable lenses
28. Advantages and availability
29. Soft Toric CL
30. Stabilization techniques
31. Parameter selection
32. Fitting assessment
33. Complications of Soft lenses
34. Therapeutic contact Lens
35. Aphakia
36. Pediatric
37. Post refractive surgery
38. Management of Presbyopia with Contact lenses

Text Books

1. IACLE modules 1 - 10
2. CLAO Volumes 1, 2, 3
3. Anthony J. Phillips : Contact Lenses, 5th edition, Butterworth-Heinemann, 2006
4. Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
5. E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008

BSOP3503 Low Vision Aid

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP3503	Low Vision Aid	Theory	3	2-1-0

Module-1: (15 Hrs.)

1. Definitions & classification of Low vision
2. Epidemiology of low vision
3. Model of low vision service
4. Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psycho-social impact of low vision

Module-2: (13 Hrs.)

5. Types of low vision aids – optical aids, non-optical aids & electronic devices
6. Optics of low vision aids

7. Clinical evaluation – assessment of visual acuity, visual field, selection of low vision aids, instruction & training
8. Pediatric Low Vision

Module-3: (12 Hrs.)

9. Low vision aids – dispensing & prescribing aspects
10. Visual rehabilitation & counseling
11. Legal aspects of Low vision in India

Text Books:

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

Reference Books:

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

BSOL3501 Squint Laboratory

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL3501	Squint Laboratory	Practice	2	0-0-3

1. Demonstration of following Orthoptic instruments/methods and their uses –
2. Prism Bar
3. Maddox Rod
4. Red Green Goggles
5. RAF Gauge
6. Cover test
7. Hirschberg test
8. Krimsky test
9. Accommodative flipper
10. Orthoptic Investigative & Therapeutic Procedure.
11. Case records.
12. Case Handling

BSOL3502 Contact Lenses Laboratory

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL3502	Contact Lens Laboratory	Practice	2	0-0-3

1. Routine clinical Procedure for contact lens & selection of contact lens.
2. Slit lamp examination of contact lenses wearers.
3. Insertion & removal of soft & RGP contact lenses.
4. Contact lens handling, cleaning & maintenance.
5. Fitting and assessment of contact lenses-steep, flat.
6. Teaching the patient to insert and remove contact lenses.
7. Writing contact lens prescriptions.
8. Examination of old soft lenses.
9. Special RGP fitting(Aphakia, pseudophakia and keratoconus)
10. Fitting cosmetic contact lenses.
11. Bandage contact lenses.

BSOL3503 Ocular Disease Laboratory-2(Clinic -IV)

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL3503	Ocular Diseases Laboratory-II (Clinic-IV)	Practice	2	0-0-3

1. History of the ophthalmic subject.
 - 1.1 Ocular symptoms
 - 1.2 The past prescription and its influence
2. Visual acuity testing- distance and near, and color vision.
 - 2.1. Examination of muscle balance& eye motility
 - 2.3. Objective refraction
3. Slit lamp examination
 - 3.1. Examination of eye lids, conjunctiva, sclera
 - 3.2. Examination of cornea
 - 3.3. Examination of iris, ciliary body, and pupil
 - 3.4. Examination of lens.
 - 3.5. Slit lamp photography.
4. Examination of intraocular pressure and examination of angle of anterior Chamber. (Gonioscopy)
5. Ophthalmoscopy- indirect and direct.
6. Examination of fundus (vitreous and disc), (choroid and retina)
7. Examination of the lacrimal system & lacrimal function tests
8. Examination of the orbit
10. Macular function test
11. Visual field charting (central)&(peripheral) & Interpretation of Humphrey Visual field
12. Neuro-ophthalmological examination.
15. Color perception & color vision.
16. Diplopia charting
17. Electro diagnostic procedures.
18. Cases work – up
19. Radiology.
20. Removal of foreign body

BSOL3504 Low Vision Aid Laboratory

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL3504	Low Vision Aid Laboratory	Practice	2	0-0-3

- a) Case history.
- b) Assessment.
- c) Application of devices.
- d) Rehabilitation.

SIXTH SEMESTER**BSOP3601 Statistics & Occupational Optometry**

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP3601	Statistics & Occupational Optometry	Theory	4	3-1-0

Module-1 (18 Hrs.)

1. Basics of Biostatistics

- 1.1 Introduction of Biostatistics
- 1.2 Measures of Morality
- 1.3 Sampling
- 1.4 Statistical significance
- 1.5 Correlation
- 1.6 Sample size determination.
- 1.7 Statistics –Collection of Data - presentation including classification and diagrammatic representation –frequency distribution. Measures of central tendency; measures of dispersion.
- 1.8 Theoretical distributions.
 - 1.8.1 Binomial
 - 1.8.2 Normal
 - 1.8.3 Sampling –necessity of methods and techniques.
 - 1.8.4 Chi. Square test (2 x 2)
2. Hospital Statistics
3. Use of computerized software for statistics

Module-2 (17 Hrs.)

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

Module-3 (12 Hrs.)

10. Industrial Vision Screening – Modified clinical method and Industrial Vision test
11. Vision Standards – Railways, Roadways, Airlines
12. Visual Display Units
13. Contact lens and work

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

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

BSOP3602 Paediatric & Geriatric Optometry

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP3602	Paediatric & Geriatric Optometry	Theory	4	3-1-0

Module-1 (16 Hrs.)

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

Module-2 (18 Hrs.)

10. The Development of Eye and Vision
11. History taking Paediatric subjects
12. Assessment of visual acuity
13. Normal appearance, pathology and structural anomalies of
 - 13.1 Orbit, Eye lids, lacrimal system,
 - 13.2 Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil
 - 13.3 Lens, vitreous, Fundus Oculomotor system
14. Refractive Examination
15. Determining binocular status
16. Determining sensory motor adaptability

Module-3 (16 Hrs.)

17. Compensatory treatment and remedial therapy for: Myopia, Pseudomyopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia
18. Remedial and Compensatory treatment of Strabismus and Nystagmus
19. Paediatric eye disorders: Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics
20. Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism
21. Spectacle dispensing for children
22. Paediatric contact lense
23. Low vision assessment in children

Text Books:

1. A.J. ROSSENBLOOM Jr & M.W.MORGAN: Vision and Aging, Butterworth-Heinemann, Missouri, 2007.

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

Paediatric Text Books:

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

Reference Books:

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

BSOP3603 Systemic Diseases

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP3603	Systemic Diseases	Theory	4	3-1-0

Module-1 (17 Hrs.)

1. Hypertension
 - 1.1. Definition, classification, Epidemiology, Clinical examination, Complications, and management.
 - 1.2. Hypertensive retinopathy
2. Diabetes Mellitus
 - 2.1. Classification, Pathophysiology, Clinical presentations, Diagnosis, and Management, Complications
 - 2.2. Diabetic Retinopathy
3. Thyroid Disease
 - 3.1. Physiology, Testing for thyroid disease, Hyperthyroidism, Thyroiditis, Thyroid tumors
 - 3.2. Grave's Ophthalmopathy
4. Acquired Heart Disease
 - 4.1. Ischemic Heart Disease, Congestive heart Failure, Disorders of cardiac rhythm
 - 4.2. Ophthalmic considerations
5. Cancer
 - 5.1. Incidence
 - 5.2. Etiology
 - 5.3. Therapy
 - 5.4. Ophthalmologic consideration

Module-2 (16 Hrs.)

6. Connective Tissue Disease
 - 6.1 Rheumatic arthritis
 - 6.2 Systemic lupus erythematosus
 - 6.3 Scleroderma
 - 6.4 Polymyositis and dermatomyositis
 - 6.5 Sjogren syndrome
 - 6.6 Behcet's syndrome
 - 6.7 Eye and connective tissue disease
7. Tuberculosis
 - 7.1 Aetiology, Pathology, clinical features, pulmonary tuberculosis, diagnosis, complications, Treatment tuberculosis and
8. Herpes virus (Herpes simplex, Varicella Zoster, Cytomegalovirus, Epstein Barr Virus)
 - 8.1 Herpes and the eye
9. Hepatitis (Hepatitis A, B, C)
10. Acquired Immunodeficiency syndrome
11. Anemia (Diagnosis, Clinical evaluation, consequences, Sickle cell disease, treatment, Ophthalmologic considerations)

Module-3 (15 Hrs.)

12. Common Tropical Medical Ailments
 - 12.1 Malaria
 - 12.2 Typhoid
 - 12.3 Dengue
 - 12.4 Filariases
 - 12.5 Onchocerciasis
 - 12.6 Cysticercosis
 - 12.7 Leprosy
13. Nutritional and Metabolic Disorders:
 - 13.1 Obesity
 - 13.2 Hyperlipidaemias
 - 13.3 Kwashiorkor
 - 13.4 Vitamin A Deficiency
 - 13.5 Vitamin D Deficiency
 - 13.6 Vitamin E Deficiency
 - 13.7 Vitamin K Deficiency
 - 13.8 Vitamin B₁, B₂, Deficiency
 - 13.9 Vitamin C Deficiency
14. Myasthenia Gravis

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), 20022.
2. Basic and clinical Science course: Update on General Medicine, American Academy of Ophthalmology, Section 1, 1999

BSOP3604 Community Optometry & Dispensing Optometry

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOP3604	Community Optometry & Dispensing Optometry	Theory	4	3-1-0

Module-1 (15 Hrs.)

1. Public Health Optometry: Concepts and implementation, Stages of diseases
2. Levels of disease prevention and levels of health care patterns
3. Epidemiology of blindness – Defining blindness and visual impairment
4. Eye in primary health care
5. Contrasting between Clinical and community health programs
6. Community Eye Care Programs
7. Community based rehabilitation programs
8. Nutritional Blindness with reference to Vitamin A deficiency
9. Vision 2020: The Right to Sight

Module-2 (14 Hrs.)

10. Screening for eye diseases
11. National and International health agencies, NPCB
12. Role of an optometrist in Public Health
13. Organization and Management of Eye Care Programs – Service Delivery models
14. Health manpower and planning & Health Economics
15. Evaluation and assessment of health programmes
16. Optometrists role in school eye health programmes
17. Basics of Tele Optometry and its application in Public Health
18. Information, Education and Communication for Eye Care programs

Module-3 (16 Hrs.)

19. Components of spectacle prescription & transposition, Add and near power relation
20. Frame selection –based on spectacle prescription, professional requirements, age group, face shape.
21. Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height
22. Lens & Frame markings, pupillary centers, bifocal heights, Progressive markings.
23. Recording and ordering of lenses (power, add, diamete, material type, lens enhancements)
24. Neutralization –Hand & lensometer, axis marking,
25. Faults in spectacles (lens fitting, frame fitting, patient’s complaints, description, detection and correction)
26. Final checking & dispensing of spectacles to customers, counseling on wearing & maintaining of spectacles, Accessories –Bands, chains, boxes, slevets, cleaners, screwdriver kit
27. Spectacle repairs –tools, methods, soldering, riveting, frame adjustments
28. Special types of spectacle frame
 - Industrial safety glasses
 - Welding glasses
29. Frame availability in Indian market

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,
4. Banarsidas Bhanot publishers, Jabalpur, 2007

Reference Books:

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

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, Phisical& Visual Optics, 2nd edition, Butterworth –Heinemann, 2002

BSOL3601 Paediatric & Geriatric Optometry Laboratory

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL3601	Paediatric and Geriatric Optometry Laboratory	Practice	2	0-0-3

1. Assessment of children Vision & Pediatric evaluation, diagnosis & management.
2. Strabismus & Amblyopia.
3. Neuro- Optometric Rehabilitation.
4. Evaluation, Diagnosis & Optometric management of children with mental retardation C.P. Dyslexia,
5. Multiple Sensory Motor Handicap.
6. Visual Disorders in senior citizens, evaluation, diagnosis management.
7. Refraction in special cases
8. Congenital cataract, glaucoma.
9. Pediatric and Geriatric low vision.
11. Patient with anisometropia

12. History taking of Pediatric and Geriatric patients.

BSOL3602 Optometric Instruments Laboratory -2

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL3602	Optometric Instruments Laboratory-II	Practice	2	0-0-3

1. Visual Acuity chart/drum
2. Retinoscope
3. Trail Box
4. Direct ophthalmoscope
5. Slit lamp Biomicroscope
6. Ophthalmoscopy
7. Tonometer: Schiottz Tonometer
8. Keratometer
9. Perimeter
10. Electrodiagnostic instrument (ERG, VEP, EOG)
11. A –Scan Ultrasound
12. Lensometer
13. Colour vision

BSOL3603 Ophthalmic Lens and Dispensing Optometry Laboratory

Code	Course Title	Course Type	Credits	L-T-P (hrs)
BSOL3603	Ophthalmic Lense and Dispensing Optometry Lab	Practice	2	0-0-3

- a) Find out the meridian & optical center of ophthalmic lens
- b) Neutralization – manual & help of lensometer
- c) Identification of lens-spherical, cylindrical & sphero-cylindrical lenses.
- d) Lens-surfacing & edging, cutting & marking of single vision bifocal progressive.
- e) Frame measurement: The boxing system, the datum system. Comparison of the two systems, Lens position, segment specification.
- f) Frame selection: Fashion, function & standard alignment.
- g) Lens selection: Ground rule for selection, selection criteria.
- h) Facial measurements: The PD, Visual axes, & measuring inter-pupillary distance using P.D ruler. Common difficulties in measuring P.D, Measuring monocular P.D, measuring near C.D.
- i) Measuring heights: - single vision, bifocal, multifocal, progressive
- j) Pediatric dispensing

SEVENTH AND EIGHT SEMESTER

Project work:-

Suggested sample Project title

- **Ocular Microbiology & Pathology :-**
 1. Investigation of the epidemiology and pathology of ocular infectious diseases.
 2. Emerging antibiotics resistance and treatment outcomes in any ocular microbial infection.
 3. Impact of biofilm on the recovery and treatment of ocular infections.
 4. Mechanism of interspecies signaling in ocular infections.
 5. Role of infection control and prevention in Reducing ocular infections and antibiotic resistance.
- **General Anatomy and Nutrition:-**
 1. Vitamin 'A' Deficiency sometime creates no. of serious ocular disorders.
 2. Neurology is completely related with visualization.
 3. 'Diabetes'/'Hypertension' are the alarm for ocular disorder.
 4. Is nutrition play important role in ocular disorder?

5. Ocular surface physiology and pathology.
 - **Ocular diseases:-**
 1. Ocular allergy
 2. Ocular surface innervation
 3. Genetic predisposition to ocular disease.
 4. Animal models of ocular disease.
 5. Retinal anatomy, physiology and pathology.

Internship:-

- Case record
- Lab management and ethics
- Evaluation -Guide(internal)
 - Industries guide (external)
 - University-project report/ Viva

Organizational Behavior

Module- 1

Introduction to Organization Behavior Introduction to organization, organization and managers, manager' roles and skills, behavior at work, introduction to organization behavior, major behavioral science disciplines contributing to OB, challenges and opportunities managers have in applying OB concepts, OB model (including motivation models) and levels of OB model

Individual behavior Introduction to individual behavior, values, attitudes, job satisfaction, personality, perception and individual decision making, learning, motivation at work, managing emotions and stress (Meaning-Definition Stress and job performance relationship Approaches to stress management (Coping with stress)

Module-2

Interpersonal behavior Interpersonal Behavior, Johari Window, Transactional Analysis – ego states, types of transactions, life positions, applications of T.A., managerial interpersonal style

Group behavior Introduction to group behavior, foundations of group behavior, concept of group and group dynamics, types of groups, formal and informal groups, theories of group formation, group norms, group cohesiveness, group decision making, inter group behavior, concept of team vs. group, types of teams, building and managing effective teams, leadership theories and styles, power and politics, conflict and negotiation.

Module-3

Organizational behavior Foundations of organization structure, organization design, organization culture, organization change, managing across cultures, human resource management policies and practices, diversity at work.

Books Recommended:

1. Robbins, S. P/ Judge, T. A/ Sanghi, S., Organizational Behavior, Pearson Publication
2. Aswathappa, K., Organisational Behaviour– Text and Problem, Himalaya Publication
3. Pardeshi, P. C., Organizational Behaviour & Principles & Practice of Management, Nirali public

Medical Psychology

Module-1

1. Introduction to Psychology
2. Intelligence Learning, Memory, Personality, Motivation
3. Body Integrity – one's body image

Module-2

4. The patient in his Milen
5. The self-concept of the therapist, Therapist-patient relationship – some guidelines
6. Illness, its impact on the patient

Module-3

7. Maladies of the age and their impact on the patient's own and others concept of his body image
8. Adapting changes in Vision
9. Why Medical Psychology demands commitment?

Books Recommended:

1. Text book of clinical Psychology by M.S.Bhattia
2. Medical Psychology, Charles k. prokop, Laurence A. Bradley

Medical Law and Ethics**Module-1**

1. Medical ethics - Definition - Goal - Scope
2. Introduction to Code of conduct
3. Basic principles of medical ethics – Confidentiality

Module-2

4. Malpractice and negligence - Rational and irrational drug therapy
5. Autonomy and informed consent - Right of patients
6. Care of the terminally ill- Euthanasia
7. Organ transplantation

Module-3

8. 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.
9. Professional Indemnity insurance policy
10. Development of standardized protocol to avoid near miss or sentinel events
11. Obtaining an informed consent

Books Recommended:

1. Reflections on Medical law and Ethics in India by B. Sandeepa bhat, publisher Eastern law house.