



**YENEPLOYA**

(DEEMED TO BE UNIVERSITY)

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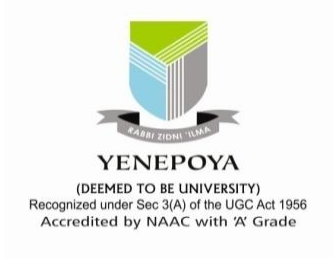
Accredited by NAAC with 'A' Grade

# **YENEPLOYA MEDICAL COLLEGE**

**Deralakatte, Mangaluru, Karnataka - 575018**

**REGULATIONS AND CURRICULUM GOVERNING**

**B.Sc. OPTOMETRY TECHNOLOGY**



**Office of the Registrar  
University Road  
Deralakatte, Mangalore – 575 018  
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Ref: No. Y/REG/ACA/Notification/2021

08.03.2021

**NOTIFICATION**

Sub: Addendum to the in B.Sc. Optometry Technology Program regulations 2017-18 based on the revisions approved by the Academic Council and Board of Management meetings: Regarding

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With reference to the subject cited above the University is pleased to consolidate the various revisions approved by the Academic Council and Board of Management for implementation effective from the academic year indicated in the respective revisions.

  
REGISTRAR



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University Road,  
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Ref: No.YU/REG/ACA/25-ACM/2016

03.10.2016

**NOTIFICATION**

Sub: Starting of B.Sc. course in Optometry from the academic year 2016-17

Ref: 25<sup>th</sup> meeting of the Academic Council held on 22.08.2016

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The Academic Council at its meeting held on 22.08.2016, vide agenda – 7 has approved the proposal to start 3 year B.Sc. Optometry course as proposed by the Board of Studies concerned and recommended by the Faculty of Medicine.

The course shall start from the academic year 2017-18.

  
**(Dr. G. Shreekumar Menon)**  
**Registrar**

Copy to:

1. The Principal – YMC
2. HoD, dept. of Ophthalmology
3. Controller of Examinations
4. Academic Section

**NOTIFICATION – 34-ACM/2019 dtd.20.03.2019**

Sub: Amendment in the syllabus of B.Sc. Optometry under Department of Ophthalmology  
Ref: Resolution of the Academic Council at its 34<sup>th</sup> meeting held on 08.02.2019 vide Agenda - 28

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The Academic council at its 34<sup>th</sup> meeting held on 08.02.2019 and subsequently the Board of Management at its 45<sup>th</sup> meeting has approved the amendment in the syllabus of B.Sc. Optometry as suggested by the Board of Studies and recommended by the Faculty of Medicine as follows:-

<b>Curriculum</b>	<b>Existing</b>	<b>Now Amended</b>
Attendance Requirements for eligibility for University Examination	Not mentioned in the curriculum	Each semester of the course will be treated as a separate unit to determine the attendance. A student shall be considered to have satisfied the attendance requirements if he/she has attended not less than 75 percent of the class in each subject of all the semesters (separately for both theory and practical) actually conducted up to the end of the semester. A student who does not satisfy the attendance requirements, mentioned as above, shall not be eligible to appear for the examination in the respective subjects.
Internal Assessment marks Eligibility for University examination	Not mentioned in the curriculum	A candidate should secure 35% in internal assessment in each subject in order to appear for the university examination in that subject.
Criteria for pass in subjects	Not mentioned for subsidiary subjects	It is mandatory to pass in all the non credit subjects.
Maximum period permissible to clear all examinations	Not mentioned in the curriculum	A maximum of 6 years will be allowed for the candidate to clear all the subjects of 6 semesters during the course. A fail in any subject will mean the student reappears for the exam in that subject only. Odd semester exams will be conducted only in ODD semester (Jan –Feb) and EVEN semester exams will be conducted only in EVEN semester(August-September)
Carry over benefit	Not mentioned in the curriculum	If a candidate fails in any subject in any of the six semesters, he/she shall be permitted to carry over the subjects, but has to clear all subjects in order to be eligible for the final one year of clinical internship

<p>University exam total marks</p>	<p><u>THEORY SUBJECTS</u> 80(U.E)+ 20(I.A) = 100</p> <p><u>THEORY + PRACTICAL SUBJECTS</u> 60(U.E)+ 10(I.A) = 70 for Theory 20(U.E)+ 10(I.A) = 30 for Practical</p> <p><u>ONLY PRACTICAL SUBJECTS</u> 80(U.E)+ 20(I.A) = 100</p>	<p><u>THEORY SUBJECTS</u> 40 (U.E)+ 10(I.A) = 50</p> <p><u>THEORY + PRACTICAL SUBJECTS</u> 40 (U.E)+ 10(I.A) = 50 for Theory 40 (U.E)+ 10(I.A) = 50 for Practical</p> <p><u>ONLY PRACTICAL SUBJECTS</u> 40 (U.E)+ 10(I.A) = 50</p> <p>U.E= University Exam I.A= Internal Assessment</p>
<p>Question paper pattern changes</p>	<p><u>40 MARK PAPER</u> <b>Long essays</b> 1x 6 marks = 6 marks <b>Short Essays</b> 4x 4 marks = 16 marks <b>Short Answers</b> 4 x2 marks = 8 marks <b>MCQ's</b> 20x ½ marks = 10 marks</p> <p><u>60 MARK PAPER</u> <b>Long essay</b> 1x10 marks = 10marks <b>Short essays</b> 6x 5 marks = 30 marks <b>Short answers</b> 5x2 marks = 10 marks <b>Multiple Choice Questions</b> 20x ½ mark = 10 marks</p> <p><u>80 MARKS PAPER</u> <b>Long essay</b> 1x10 marks = 10marks <b>Short essays</b> 8x5 marks = 40 marks <b>Short answers</b> 10x 2 marks = 20 marks <b>Multiple Choice Questions</b> 20x ½ mark = 10 marks</p>	<p><u>40 MARK PAPER (Both Internal and University Exams)</u> <b>Long essay</b> 1 X 10 marks = 10 marks <b>Short essays</b> 4 X 5 marks = 20 marks <b>Short answers</b> 5X 2 marks = 10 marks</p>

Semester	Subject	Existing	Now Amended
First semester	General Anatomy	<p>1. Introduction to Human Anatomy: Anatomy: Definition and its relevance in medicine and optometry Planes of the body, relationship of structures, organ system</p> <p>2. Skeletal System</p> <p>3. Tissues of the Body: Embryology, Epithelium, connective tissue, bone and cartilage, neural tissue, arrangement in different tissues</p> <p>4. Muscles: Different types of muscles, their functional differentiation, their relationship with different structures, their nerves supply</p> <p>5. Blood vessels Differentiation between arteries and veins anatomically and functionally</p> <p>6. Skin and appendages: Embryology, functional and protective variations, innervations, relationship with muscles and nerves</p> <p>7. Lymphatic system: Embryology, functions, relationship with blood vessels and organs</p> <p>8. Glands: Embryology, different types of glands (exocrine and endocrine), functional differences, neural control of glands</p> <p>9. Nervous system: Parts of Nervous system, cell types of nervous system, Blood-brain barrier, Reflex arc, Peripheral Nerves, Autonomic Nervous system</p> <p>10. Central nervous system: Parts of Brain, Meninges, Cerebrospinal Fluid, Cranial nerves</p>	<p>S. No 3- Deleted - Embryology Added-Glands</p> <p>S.NO 4- Deleted – Nerve supply of muscles Added - Major muscles of face, head &amp; neck region, muscles of the orbit</p> <p>S.NO 5 Deleted – Differentiation between arteries and veins anatomically and functionally Added: classification of blood vessels, major vessels of head and neck of the orbit</p> <p>S.NO 6 Deleted - Embryology, functional and protective variations, innervations, relationship with muscles and nerves Added - Structure of skin</p> <p>S.NO 7 Deleted - Lymphatic system: Embryology, functions, relationship with blood vessels and organs Added- lymphoid tissues classification – lymph nodes and lymphatics of head &amp; neck, structure of lymph node</p> <p>S.No 8 Deleted – Glands- functional differences, neural control Of glands Added - salivary glands in brief. Endocrine glands- thyroid, pituitary, adrenal gland and pancreas in brief</p> <p>S.No 9 Deleted - Nervous system Blood-brain barrier, Reflex arc Added - plexuses of head neck Brain – parts, meninges, ventricles, CSF, Cranial nerves</p> <p><b>Introduction</b> to human Anatomy , anatomical terminologies, its relevance in optometry <b>Skeletal system</b> - structure &amp; classification of bones and examples bones of head &amp; neck, Orbit <b>Tissues of the body</b> – classification, epithelial tissue, glands, connective tissues, fibrous tissues, adipose tissue, cartilages <b>Muscular system</b> – classification of muscles and their structure, major muscles of face, head &amp; neck region, muscles of the orbit</p>

			<p><b>Joints:</b> classification with examples. Different joints of head &amp; neck</p> <p><b>Blood Vessels</b> – classification of blood vessels, major vessels of head and neck of the orbit</p> <p><b>Skin and its appendages</b> – structure of skin</p> <p><b>Lymphatic system</b> – lymphoid tissues classification – lymph nodes and lymphatics of head &amp; neck, structure of lymph node</p> <p><b>Glands:</b> classification (Exocrine &amp; Endocrine) salivary glands in brief. Endocrine glands- thyroid, pituitary, adrenal gland and pancreas in brief</p> <p><b>Nervous system</b> - parts of nervous system, nervous and neurones cells. Peripheral nerves Peripheral nerves and plexuses of head neck</p> <p>Brian – parts, meninges, ventricles, CSF, Cranial nerves- All Autonomic nervous system</p> <p><b>PRACTICALS</b></p> <p>Demonstration of organs, muscles of head &amp; neck, structures of orbit, endocrine glands.</p> <p>Histology of epithelium, cartilages, bones, vessels, lymph node, muscles, nerves.</p>
Third semester	General Pharmacology	<p>1. General Pharmacology: Introduction &amp; sources of drugs, Routes of drug administration, Pharmacokinetics – Special emphasis on ocular pharmacokinetics), Pharmacodynamics &amp; factors modifying drug actions</p> <p>2. Systemic Pharmacology: Autonomic nervous system: Drugs affecting pupillary size and light reflex, Intraocular tension, Accommodation; Cardiovascular system: Anti-hypertensive and drugs useful in Angina; Diuretics : Drugs used in ocular disorders; Central Nervous System: Alcohol, sedative hypnotics, General &amp; local anaesthetics, Opioids &amp; non-opioids; Chemotherapy: Introduction of general chemotherapy, Specific chemotherapy – Antiviral, antifungal, antibiotics; Hormones: Corticosteroids, Antidiabetics; Blood Coagulants</p> <p>3. Ocular Pharmacology: Ocular preparations, formulations and require</p>	<p>S. No 1 to 4 of the existing syllabus retained.</p> <p>Additional 4 topics were added as given below</p> <ol style="list-style-type: none"> <li>1. Autonomic nervous system: introduction, Neurotransmitters, their mechanism of action.</li> <li>2. Skeletal muscle relaxants</li> <li>3. Drug treatment of accommodative esotropia and ocular myasthenia</li> <li>4. Use of other agents in ophthalmic practice, Enzymes, Vitamins, Trace elements</li> </ol>

		<p>ments of an ideal agent; Ocular Pharmacokinetics, methods of drug administration &amp; Special drug delivery system; Ocular Toxicology</p> <p>4. Diagnostic &amp; Therapeutic applications of drugs used in Ophthalmology: Diagnostic Drugs &amp; biological agents used in ocular surgery, Anaesthetics used in ophthalmic procedures, Anti-glaucoma drugs; Pharmacotherapy of ocular infections – Bacterial, viral, fungal &amp; chlamydial; Drugs used in allergic, inflammatory &amp; degenerative conditions of the eye; Immunomodulators in Ophthalmic practice, Wetting agents &amp; tear substitutes, antioxidants</p>	
Third semester	General and Ocular Pathology	<ol style="list-style-type: none"> <li>1. Inflammation and repair</li> <li>2. Infection in general</li> <li>3. Specific infections <ol style="list-style-type: none"> <li>3.1 Tuberculosis</li> <li>3.2 Leprosy</li> <li>3.3 Syphilis</li> <li>3.4 Fungal infection</li> <li>3.5 Viral chlamydial infection</li> </ol> </li> <li>4. Neoplasia</li> <li>5. Haematology <ol style="list-style-type: none"> <li>5.1 Anemia</li> <li>5.2 Leukemia</li> <li>5.3 Bleeding disorders</li> </ol> </li> <li>6. Circulatory disturbances <ol style="list-style-type: none"> <li>6.1 Thrombosis</li> <li>6.2 Infarction</li> <li>6.3 Embolism</li> </ol> </li> <li>7. Clinical pathology <ol style="list-style-type: none"> <li>7.1 Interpretation of urine report</li> <li>7.2 Interpretation of blood smears.</li> </ol> </li> <li>8. Immune system</li> <li>9. Shock, Anaphylaxis.</li> <li>10. Allergy</li> </ol>	<p>S. No 1 to 10 of the existing syllabus retained.</p> <p>Additional Ocular Pathology 7 topics were added as given below</p> <ol style="list-style-type: none"> <li>1. Pathology of the diseases in eyelids &amp; Adnexa</li> <li>2. Pathology of the diseases of Conjunctival diseases</li> <li>3. Pathology of the diseases of Cornea</li> <li>4. Pathology of Crystalline lens disorders</li> <li>5. Pathology of Uveitis</li> <li>6. Pathology of Glaucoma</li> <li>7. Pathology of Optic nerve disorders</li> </ol>
Third semester	Ocular diseases I	<ol style="list-style-type: none"> <li>1. Refresher of anterior segment ocular diseases, diagnosis and therapeutics</li> <li>2. Refresher of glaucoma diagnosis and therapeutics</li> <li>3. Surgical treatment of anterior segment diseases</li> <li>4. Anterior segment Diagnostics <ol style="list-style-type: none"> <li>4.1 Specular Microscopy</li> </ol> </li> </ol>	<p>S.NO 1 to 4.33 - Reorganized into specific topics and subtopics</p> <ol style="list-style-type: none"> <li>1. Lids and adnexa <ul style="list-style-type: none"> <li>• Applied anatomy</li> <li>• Congenital anomalies: Ptosis, coloboma, Epicanthus, Distichiasis, Cryptophthalmos</li> <li>• Odema of the eyelids</li> <li>• Inflammatory disorders:</li> </ul> </li> </ol>



		<p>4.2 Topography  4.3 Corneal Hysteresis  4.4 Orbscan, Pentacam  4.5 Pachymetry  4.6 Abberometry  4.7 AS OCT  4.8 HRT  4.9 GDx  4.10 ONH evaluation  4.11 Gonioscopy  4.12 Fluorescein angiography  4.13 Refractive surgery  4.14 Cataract evaluation  4.15 History taking  4.16 Visual acuity estimation  4.17 Extraocular motility, Cover test, Alternating cover test  4.18 Hirschberg test, Modified Krimsky  4.19 Pupils Examination  4.20 Maddox Rod  4.21 Van Herrick  4.22 External examination of the eye, Lid eversion  4.23 Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer),  4.24 Color Vision  4.25 Stereopsis  4.26 Confrontation test  4.27 Photostress test  4.28 Slit lamp bio-microscopy  4.29 Ophthalmoscopy  4.30 Tonometry  4.31 ROPLAS  4.32 Amsler test  4.33 Contrast sensitivity function test  4.34 Saccades and pursuit test</p>	<p>Blepharitis, external hordeolum and internal hordeolum, chalazion</p> <ul style="list-style-type: none"> <li>• Anomalies in the position of the lashes and lid margin: Trichiasis, ectropion, entropion, symblepharon, blepharophimosis, lagophthalmos, blepharospasm &amp; ptosis.</li> <li>• Tumors: Papillomas, Xanthelasma, Haemangioma, basal cell carcinoma, squamous cell carcinoma, sebaceous gland melanoma</li> </ul> <p>2. Lacrimal system</p> <ul style="list-style-type: none"> <li>• Applied anatomy and physiology</li> <li>• Tear film</li> <li>• Dry eye</li> <li>• Watery eye (etiology, clinical evaluation)</li> <li>• Dacryocystitis</li> <li>• Dacryoadenitis</li> </ul> <p>3. Conjunctiva</p> <ul style="list-style-type: none"> <li>• Applied anatomy &amp; Physiology</li> <li>• Inflammations of conjunctiva: infective conjunctivitis, Bacterial, chlamydial, Viral, Allergic conjunctivitis</li> <li>• Degenerative conditions: Pinguecula, Pterygium, Concretions</li> <li>• Symptomatic conditions: Hyperaemia, chemosis, Ecthymosis, Xerosis, Discoloration</li> <li>• Cysts and tumours.</li> </ul> <p>4. Lens</p> <ul style="list-style-type: none"> <li>• Applied anatomy &amp; physiology</li> <li>• Classification of cataract</li> <li>• Congenital and developmental cataract</li> <li>• Acquired (Senile, traumatic, complicated, metabolic, electric, radiational &amp; Toxic)</li> <li>• Morphological: Capsular, subcapsular, cortical, supranuclear, nuclear and polar.</li> <li>• Management of cataract (Non-surgical and surgical measures, preoperative evaluation, types of surgeries)</li> <li>• Complications of cataract surgery</li> <li>• Subluxation &amp; Dislocation, coloboma, lenticonus,</li> <li>• microspherophakia.</li> </ul> <p>5. Cornea &amp; Sclera</p> <ul style="list-style-type: none"> <li>• Applied anatomy and physiology</li> <li>• Episcleritis &amp; scleritis</li> <li>• Congenital anomalies: Megalocornea, cornea</li> </ul>
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			<p>plana, congenital cloudy cornea</p> <ul style="list-style-type: none"> <li>• Inflammations of the cornea: Topographical classifications: ulcerative keratitis and non-ulcerative. Etiological classifications: Infective, allergic, traumatic, idiopathic</li> <li>• 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</li> <li>• 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</li> <li>• Keratoconus, Keratoglobus</li> <li>• Corneal edema, Corneal opacity, corneal vascularisation</li> <li>• Keratoplasty</li> </ul> <p>6. Uveal tract</p> <ul style="list-style-type: none"> <li>• Applied anatomy</li> <li>• Classification of Uveitis, Etiology &amp; pathology</li> <li>• Anterior Uveitis, Posterior uveitis, Intermediate uveitis, Endophthalmitis, panophthalmitis</li> <li>• Tumour of uveal tract (melanoma)</li> <li>• Clinical examination of uveitis</li> </ul>
Third semester	Clinical Optometry II	NO topics were given.	<p>Topics;</p> <ul style="list-style-type: none"> <li>• History taking</li> <li>• Visual Acuity Assessment (Distance and near)</li> <li>• Extra ocular motility, Cover test, Modified Krimsky &amp; Hirschberg test</li> <li>• HVID, Pupillary distance and corneal sensitivity</li> <li>• Pupil Evaluation</li> <li>• Color vision Assessment-Ishihara</li> <li>• Confrontation field</li> <li>• Binocular vision status- Stereopsis, Worth for dot test, Amplitude of accommodation, NPC, NRA/PRA, Maddox Rod Phoria</li> <li>• Slit Lamp Biomicroscopy- Illumination Technique, Corneal and Conjunctival staining, Van Herick Method, Eversion of upper eyelids</li> <li>• Drugs used in routine clinical</li> </ul>

			<p>practice; Topical Anaesthetic, Cycloplegic and Mydriatics, Dyes and Lubricating drops, Installation of eye drops</p> <ul style="list-style-type: none"> <li>• Schirmer test, TBUT, Tear Meniscus height, NIBUT</li> <li>• Amsler test</li> <li>• Digital pressure and GAT</li> <li>• Direct Ophthalmoscopy</li> </ul>
Third semester	Optometric optics	<ol style="list-style-type: none"> <li>1. Introduction–Light, Mirror, Reflection, Refraction and Absorption</li> <li>2. Prisms Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel’s prisms, rotary prisms</li> <li>3. Lenses–Definition, units, terminology used to describe, form of lenses</li> <li>4. Vertex distance and vertex power, Effectivity calculations</li> <li>5. Lens shape, size and types i.e. Spherical, cylindrical and Sphero-cylindrical</li> <li>6. Transpositions –Simple, Toric and Spherical equivalent</li> <li>7. Prismatic effect, centration, decentration and Prentice rule, Prismatic effect of Plano-cylinder and Sphero-cylinder lenses</li> <li>8. Spherometer &amp; Sag formula, Edge thickness calculations</li> <li>9. Magnification in high plus lenses, Minification in high minus lenses</li> <li>10. Tilt induced power in spectacles</li> <li>11. Aberration in Ophthalmic Lenses.</li> <li>12. To select the tool power for grinding process</li> <li>13. Different types of materials used to make lenses and its characteristics</li> <li>14. Lens designs–Bifocals, progressive lens</li> <li>15. Tinted, Protective &amp; Special lenses</li> <li>16. Spectacle frames–manufacture process &amp; materials</li> <li>17. Art and science of dispensing spectacle lens and frames based</li> </ol>	<p>S. No 1 to 11 of the existing syllabus retained.</p> <p>S. N 12 to 45 of existing topics deleted and added to 4<sup>th</sup> Semester, subject – Dispensing Optics.</p> <p>Additional 13 topics were added as given below</p> <ol style="list-style-type: none"> <li>1. Raw materials- history and general outline, Manufacturing of ophthalmic blanks- glass and plastics, Terminology used in lens workshop, surfacing process from blanks to lenses.</li> <li>2. Definition and materials (glass, plastic, poly carbonate, triology) Types and characteristics</li> <li>3. Properties (Refractive index, Specific gravity, UV cut off, Impact resistance- include drop ball test, Abbe value, Central thickness)</li> <li>4. Best form of Lenses and safety standards for ophthalmic lenses (FDA, ANSI, ISI, Others)</li> <li>5. Design of high power lenses- High index lenses, calculation of refractive index</li> <li>6. Bifocal design, their manufacturing and uses (KRYPTOP, UNIVIS D, EXECUTIVE, INVISIBLE, OCCUPATIONAL)</li> <li>7. Progressive additional lenses, Modified near vision lenses (Designs, advantages, Limitation)</li> <li>8. Lens defects- Description and detection</li> <li>9. Glazing and Edging (Manual and automatic)</li> <li>10. Special lenses (Iseikonic lenses, Recumbent prism, Fresnel prism and lenses, Lenticular &amp; Aspherical lenses, Photochromic and polaroids, Tinted lens, Tints and filters)</li> <li>11. History of spectacles, Manufacturing overview, definition, parts and measurement</li> </ol>

		<p>on the glass prescription.</p> <ol style="list-style-type: none"> <li>18. Reading of spectacle prescription. Counselling the patient</li> <li>19. Lens edge thickness calculation</li> <li>20. Frame &amp; lens measurements and selection</li> <li>21. Writing spectacle lens order</li> <li>22. Facial measurements-Inter-pupillary distance measurement and measuring heights (single vision, multifocal, progressives)</li> <li>23. Lens verification and axis marking and fitting of all lens types</li> <li>24. Final checking of finished spectacle with frame adjustments</li> <li>25. Delivery and follow-up</li> <li>26. Troubleshooting complaints and handling patient's questions</li> <li>27. Spectacle Lenses -II:             <ol style="list-style-type: none"> <li>1. Manufacture of glass</li> <li>2. Lens materials</li> <li>3. Lens surfacing</li> <li>4. Principle of surface generation and glass cementations</li> <li>5. Terminology used in Lens workshop</li> <li>6. Lens properties</li> <li>7. Lens quality</li> <li>8. Faults in lens material</li> <li>9. Faults on lens surface</li> </ol> </li> <li>28. Methods of inspecting the quality of lenses</li> <li>29. Safety standards for ophthalmic lenses (FDA, ANSI, ISI, Others)</li> <li>30. Spectacle Frames:             <ol style="list-style-type: none"> <li>1. Types and parts</li> <li>2. • Classification of spectacle frames-material, weight, temple position, Coloration</li> <li>3. • Frame construction</li> <li>4. • Frame selection</li> <li>5. • Size, shape, mounting and field of view of ophthalmic</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>12. Classification of frames- materials (cover in detail), colours and temple position, advantage and disadvantage, where to use)</li> <li>13. Special purpose frames (sports, kids, reading)</li> </ol>
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- enses 5
- 6. Tinted & Protective Lenses
- 7. • Characteristics of tinted lenses Absorptive Glasses
- 8. • Polarizing Filters, Photochromic & Reflecting filters
- 9. • Safety lenses- Toughened lenses, Laminated Lenses, CR39, Polycarbonate lenses 5

31. Multifocal Lenses:

- 1. Introduction, history and development, types
- 2. • Bifocal lenses, Trifocal & Progressive addition lenses 3

32. Reflection from spectacle lens surface & lens coatings:

Reflection from spectacle lenses- ghost images- Reflections in bifocals at the dividing line 3

• Antireflection coating, Mirror coating, Hard Multi Coating [HMC], Hydrophobic coating 2

33. Miscellaneous Spectacle:

- 1. • Iseikonic lenses
- 2. • Spectacle magnifiers
- 3. • Recumbent prisms
- 4. • Fresnel prism and lenses
- 5. • Lenticular & Aspherical lenses
- 6. • High Refractive index glasses 5

34. Components of spectacle prescription & interpretation, transposition, Add and near power relation 1

35. Frame selection— based on spectacle prescription, professional requirements, age group, face shape Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height 1

36. Lens & Frame markings, Pupillary centres, bifocal heights, Progressive markings & adjustments— facial wrap, pantoscopic tilt 1

37. Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements) 1

		<p>38. Neutralization–Hand &amp; lensometer, axis marking, prism marking 3</p> <p>39. Faults in spectacles (lens fitting, frame fitting, patients complaints, description, detection and correction) 2</p> <p>40. Final checking &amp; dispensing of spectacles to customers, counselling on wearing &amp; maintaining of spectacles, Accessories – Bands, chains, boxes, sleeves, cleaners, screw driver etc</p> <p>41. Spectacle repairs – tools, methods, soldering, riveting, frame adjustments</p> <p>42. Special types of spectacle frames</p> <ol style="list-style-type: none"> <li>➤ Monocles</li> <li>➤ Ptois crutches</li> <li>➤ Industrial safety glasses</li> <li>➤ Welding glasses</li> </ol> <p>43. Frame availability in Indian market</p> <p>44. FAQ's by customers and their ideal answers</p>	
Third semester	Environmental studies	No topics were given	<p><b>Unit 1: Multidisciplinary nature of Environmental Studies</b></p> <ul style="list-style-type: none"> <li>• Multidisciplinary nature of Environmental Studies</li> <li>• Concept of sustainability and sustainable development</li> </ul> <p><b>Unit 2: Ecosystems</b></p> <ul style="list-style-type: none"> <li>• What is an ecosystem? Structure and function of an ecosystem; Energy flow in the ecosystem; Food chains, food webs and ecological succession. Case studies of the following ecosystems: <ol style="list-style-type: none"> <li>Forest ecosystem</li> <li>Grassland ecosystem</li> <li>Desert ecosystem</li> <li>Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)</li> </ol> </li> <li>• History of ecosystem ecology</li> <li>• Ecosystem services</li> </ul> <p><b>Unit 3: Natural Resources: Renewable and Non renewable resources</b></p> <ul style="list-style-type: none"> <li>• Land resources and land use change; Land degradation, soil</li> </ul>

			<p>erosion and desertification.</p> <ul style="list-style-type: none"> <li>• Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.</li> <li>• Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international &amp; inter-state).</li> </ul> <p>Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.</p> <p><b>Unit 4: Biodiversity and its conservation</b></p> <ul style="list-style-type: none"> <li>• Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hotspots</li> <li>• India as a mega-biodiversity nation; Endangered and endemic species of India</li> <li>• Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.</li> <li>• Ecosystem and biodiversity services: ecological, economic, social, ethical, aesthetic and informational value.</li> <li>• Nature Reserves, tribal populations and rights, Human wildlife conflicts in Indian context</li> </ul> <p><b>Unit 5: Environmental Pollution</b> Definition</p> <ul style="list-style-type: none"> <li>• Cause, effects and control measures of:- <ul style="list-style-type: none"> <li>a. Air pollution</li> <li>b. Water pollution</li> <li>c. Soil pollution</li> <li>d. Light pollution</li> <li>e. Noise pollution</li> <li>f. Thermal pollution</li> <li>g. Nuclear hazards</li> </ul> </li> <li>• Climate change, Green house effect, Global warming, Acid rain, Ozone layer depletion.</li> <li>• Solid waste Management: control measures of urban and industrial wastes.</li> <li>• Pollution case studies.</li> </ul>
Third semester	Medical records	No topics were given	<ul style="list-style-type: none"> <li>• Introduction to medical records</li> <li>Types of medical records</li> </ul>

			<p>Components medical records Uses of medical records</p> <ul style="list-style-type: none"> <li>• Medico legal aspects of medical records What is MLC Types of MLC Records and documentation related to MLC Medical Record in court Preparation of Medical Record for court</li> <li>• Confidential communication Professional secrecy Privileged communication Release of patient information and types Unauthorized disclosure</li> <li>• Other Legal aspects Consents, Types Patient leaving against medical advice Patient absconding from wards Consumer protection – Medical negligence Medical malpractice Instances in which medical records is used as legalevidence Procedure for release of medical info in legal case</li> </ul>
Fourth semester	Ocular disease II	<ol style="list-style-type: none"> <li>1. Refresher of posterior segment ocular diseases, diagnosis and therapeutics</li> <li>2. Surgical treatment of posterior segment diseases <ol style="list-style-type: none"> <li>2.1 Posterior segment Diagnostics</li> <li>2.2 ERG</li> <li>2.3 EOG</li> <li>2.4 VEP</li> <li>2.5 OCT</li> <li>2.6 Fundus photography</li> <li>2.7 Neuro optometric diseases and disorders</li> </ol> </li> </ol>	<p>Segment 2.1 : Deleted Segment 1&amp;2 : Modified as below</p> <p>1.Retina and vitreous:</p> <ul style="list-style-type: none"> <li>• Applied anatomy</li> <li>• Congenital and developmental disorders (optic disc: coloboma, drusen, hypoplasia, medullated nerve fibres, persistent hyaloid artery)</li> <li>• Inflammatory disordersretinitis: Acute purulent, Bacterial, viral, mycotic)</li> <li>• Retinal vasculitis(Eales’s Disease)</li> <li>• Retinal artery occlusion(CRAO)</li> <li>• Retinal vein occlusion(ischaemic, non-ischaemic, branch retinal vein occlusion)</li> <li>• Retinal degenerations: Retinitis pigmentosa, Lattice degenerations.</li> <li>• Macular Disorders: Solar retinopathy, central serous retinopathy, cystoid macular oedema, Age related macular degeneration.</li> <li>• Diabetic retinopathy</li> <li>• Retinal detachment: Rhegmatogenous, tractional, exudative</li> <li>• Retinoblastoma</li> </ul>



## 2.ocular injuries

- Terminology: closed globe injury(contusion, lamellar laceration),open globe injury (rupture, laceration, penetrating injury & perforating injury)
- Mechanical injuries(extraocular foreign bodies, blunt trauma, perforating injury, sympathetic ophthalmitis)
- Non-mechanical injuries(chemical, thermal, electrical, radiational)
- Clinical approach towards ocular injury patients

## 3. Clinical neuro-ophthalmology

- Anatomy and lesions of the visual pathway
- Pupillary reflexes and abnormalities(amaurotic light reflex, efferent pathway defect, wernicke'shemianopic pupil, Marcus gunn pupil, Argyll Roberson pupil, adie's tonic pupil)
- Optic neuritis, anterior ischemic optic neuropathy,papilledema
- Cortical blindness
- Nystagmus
- Malingering

## 4.Glaucoma

- Applied anatomy and physiology of anterior segment
- Clinical examination
- Definitions and classifications of glaucoma
- Pathogenesis f glaucomatous ocular damage
- Congenital glaucoma
- Primary open angle glaucoma
- Ocular hypertension
- Normal tension glaucoma
- Primary angle closure glaucoma
- Secondary glaucoma
- Management: common medications, laser interventions and surgical techniques.

## 5.Orbit

- Applied anatomy
- Proptosis
- Enophthalmos
- Developmental anomalies: craniosynostosis, craniofacial dysostosis, hypertelorism, median facial cleft syndrome
- Orbital inflammations (preseptal cellulites, orbital cellulitis, orbital periorbitis, cavernous sinus

			thrombosis <ul style="list-style-type: none"> <li>• Grave's ophthalmopathy</li> <li>• Orbital tumors (dermoids, capillary haemangiomas, optic nerve glioma)</li> <li>• Orbital blow out fractures</li> <li>• Orbital trauma</li> <li>• Approach to a patient with proptosis</li> </ul>
Fourth semester	Dispensing optics	No topics were given	Topics: <ul style="list-style-type: none"> <li>• Components of spectacle prescription &amp; interpretation, Transposition, Add and Near power relation.</li> <li>• Frame Selection- based on spectacle prescription, professional requirements, age group, face shape</li> <li>• Measuring inter-pupillary distance for distance and near, bifocal height</li> <li>• Lens &amp; Frame markings, Pupillary centres, bifocal heights, progressive markings and adjustments-facial wrap, Pantoscopic tilt</li> <li>• Recording and ordering of lens (power, add, diameter, base, material, type, lens enhancements)</li> <li>• Neutralization – Hand &amp; Lensometer, Axis marking, Prism marking</li> <li>• Faults in spectacles (Lens fitting, Frame fitting, patient complaints, description, detection and correction.</li> <li>• Final checking &amp; Dispensing of spectacles to customers, Counselling on wearing &amp; Maintenance of spectacles, Accessories-Bands, Chains, Boxes, Selvets, cleaners, screw driver kit</li> <li>• Spectacle repairs- tools, methods, soldering, riveting, frame adjustments</li> <li>• Special types of spectacle frames: Monocles, Ptosis Crutches, Industrial safety glasses, welding glass</li> <li>• Frame availability in indian market</li> <li>• Common FAQ's by customers</li> </ul>
Fourth semester	Clinical optometry III	No topics were given	Topics: <ul style="list-style-type: none"> <li>• Colour vision charts- Ishihara Chart and Frans-worth D15 test, clinical procedure and Interpretation</li> <li>• Exophthalmometry</li> <li>• Gonioscope-Instrumentation and</li> </ul>

			<p>clinical significance</p> <ul style="list-style-type: none"> <li>• Assessment of Visual Field: Perimeters, HFA</li> <li>• Fundus Biomicroscopy(+78D &amp;+90D) Optical principle, clinical procedure and documentation</li> <li>• Ophthalmoscopes- Direct and Indirect: Clinical procedure and documentation</li> <li>• Electrophysiology(ERG, VEP and EOG)</li> <li>• FFA, B-Scan, OCT</li> </ul>
Fourth semester	Medical psychology	No topics were given	<p>Topics:</p> <ul style="list-style-type: none"> <li>• Introduction to psychology</li> <li>• Intelligence, Learning, Memory, Personality, Motivation</li> <li>• Body integrity- one's body image</li> <li>• Self-concept of the therapist, Therapist patient relationship- some guidelines</li> <li>• Illness and its impact on the patients</li> <li>• Maladies of the age and their impact on the patient's own and others concept of his body image</li> <li>• Adapting changes in vision</li> <li>• Why medical psychology needs/ demands commitment</li> </ul>
Fifth semester	Low vision	No topics were given	<p>Topics:</p> <ul style="list-style-type: none"> <li>• Definition and classifications</li> <li>• Common causes of Low vision- corneal, Refractive media and Retina</li> <li>• Epidemiology of Low vision and Model of low vision service</li> <li>• Pre- clinical evaluation of Low vision clinic- Psychological impact of Low vision</li> <li>• History taking in Low vision 6. Clinical evaluation of Low vision patient</li> <li>• Optics of Low vision Aids- Methods of Magnification</li> <li>• Types of Low vision Aids, Optical aid, Non-optical aid and electronic Device</li> <li>• Selection of Low vision aids, Instruction and training, dispensing and prescribing aspects</li> <li>• Choice of test and aids in various pathological condition</li> <li>• Pediatric low vision care</li> <li>• Visual rehabilitation and counselling</li> <li>• Legal aspects of Low vision in India</li> <li>• Case analysis</li> </ul>

			<p><b>LOW VISION PRACTICAL TOPICS:</b></p> <p>1. Attending low vision care clinic and history taking.</p> <p>2: 2.1 Determining the type of telescope and its magnification (Direct comparison method &amp; calculated method)</p> <p>2.2 Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers.</p> <p>3. 3.1 Inducing visual impairment and prescribing magnification.</p> <p>3.3.2 Determining reading speed with a low vision aid of different magnifications.</p>
Fifth semester	Occupational optometry	No topics were given	<ul style="list-style-type: none"> <li>• Introduction to occupational health, hygiene and safety, international bodies like ILO,WHO,National bodies etc.</li> <li>• Light- Definition and units,Source and standard</li> <li>• Colour- Definition, Colourtheories,Colourcoding,colour defects,colour vision test</li> <li>• Electromagnetic radiation and its effects on eye</li> <li>• Occupational hazards and preventive/Protective methods</li> <li>• Vision standards- Railways,Roadways,Airlines</li> <li>• Visual display units-CVS</li> <li>• Contact lens and work</li> </ul>
Fifth semester	Nursing procedures	No topics were given	<ol style="list-style-type: none"> <li>1. Philosophy of nursing service</li> <li>2. Universal Precautions</li> <li>3. Infection Control measures in the hospital <ol style="list-style-type: none"> <li>a. Hand Washing</li> <li>b. Gown technique</li> <li>c. Face mask</li> <li>d. Gloves</li> <li>e. Environmental cleaning</li> <li>f. Nosocomial infection</li> </ol> </li> <li>4. Admission Procedures <ol style="list-style-type: none"> <li>a. Type of admission</li> <li>b. Medico Legal Cases (MLC)</li> <li>c. Brought dead to emergency</li> <li>d. Admission of the patient</li> </ol> </li> <li>5. Monitor vital signs <ol style="list-style-type: none"> <li>a. Temperature</li> <li>b. Pulse</li> <li>c. Respiration</li> <li>d. Bp</li> </ol> </li> <li>6. Injection <ol style="list-style-type: none"> <li>a. Intra-dermal</li> <li>b. Hypodermic(subcutaneous) injection</li> <li>c. Intramuscular injection</li> </ol> </li> </ol>

			<ul style="list-style-type: none"> <li>d. Intravenous injection (cannulation technique)</li> <li>7. Topical medications <ul style="list-style-type: none"> <li>a. Instillation of drops/ointment</li> <li>b. Nasal Instillation</li> <li>c. Nebulizers</li> </ul> </li> <li>8. First aid- Principles of first aid</li> <li>9. Shock and its management</li> <li>10. CPR</li> <li>11. Managing an unconscious patient</li> <li>12. Suffocation <ul style="list-style-type: none"> <li>a. Chocking</li> <li>b. Asthma</li> <li>c. Suffocation by smoke and poisonous gas.</li> </ul> </li> </ul>
Fifth Semester	Research Projects	No content was given	Team of students will be doing a research project under the guidance of a supervisor (who could be optometrists/vision scientists/ophthalmologist). Student will get the experience of doing a research in systematic approach – identifying the primary question, literature search, identifying the gaps in the literature, identifying the research question, writing up the research proposal, data collection, data analysis, thesis writing and presentation.
Sixth semester	Binocular vision II	No Topics were given	<ul style="list-style-type: none"> <li>1. Classification of neuromuscular Anomalies of the eyes</li> <li>2. Qualitative and quantitative diagnosis of strabismus <ul style="list-style-type: none"> <li>a. History</li> <li>b. Examination and Test</li> <li>c. Diagnosis and management</li> <li>d. Pseudo strabismus</li> </ul> </li> <li>3. Classification and etiology, clinical characteristics, tests and management of <ul style="list-style-type: none"> <li>a. Comitant deviation and exodeviation</li> <li>b. A-V Phenomenon</li> <li>c. Cyclo vertical squint, DVD, DHD and Cyclo deviation</li> </ul> </li> <li>4. Paralytic strabismus <ul style="list-style-type: none"> <li>a. Paralysis of individual extra ocular muscles</li> <li>b. Clinical characteristics, diagnostic test and management</li> </ul> </li> <li>5. Special forms of strabismus <ul style="list-style-type: none"> <li>a. Duane's retraction syndrome</li> <li>b. Brown's syndrome</li> <li>c. Strabismus fixus</li> <li>d. Fibrosis of extra ocular muscles</li> <li>e. Grave's endocrine Ophthalmopathy</li> <li>f. Cyclic Heterotropia</li> <li>g. Fractures of orbital wall</li> <li>h. Myasthenia Gravis</li> <li>i. Chronic progressive external</li> </ul> </li> </ul>

			<p>Ophthalmoplegia</p> <p>6.Nystagmus</p> <p>a. Types, etiology, clinical characteristics and treatment</p> <p>7.Management of Strabismus</p> <p>a.Nonsurgical - Optical, Pharmacological and Orthoptics</p> <p>b.Surgical Management</p>
Sixth semester	Geriatric and Pediatric Optometry	No Topics were given	<ul style="list-style-type: none"> <li>• History taking in pediatric subjects</li> <li>• Assessment of visual acuity</li> <li>• Normal appearance, Pathology and structural anomalies (orbit, eyelids, lacrimal system, conjunctiva, cornea, sclera, anterior chamber, uveal tract, pupil, lens, vitreous, fundus)</li> <li>• Refractive examination</li> <li>• Determination of binocular status and sensory motor adaptation.</li> <li>• Compensatory treatment and remedial therapy for myopia, pseudo-myopia, hyperopia, astigmatism, anisometropia, amblyopia</li> <li>• Remedial and compensatory treatment of strabismus and nystagmus</li> <li>• Pediatric eye disorders: Cataract, ROP, Retinoblastoma, Neuromuscular conditions (Myotonic dystrophy, Mitochondrial cytopathy and genetics)</li> <li>• Spectacle dispensing for children</li> <li>• Pediatric contact lens Introduction to geriatric medicine-epidemiology, Need for optometric care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, Congestive heart failure, cerebro-vascular disease, diabetic)</li> <li>• Optometric examination of older adults</li> <li>• Ocular diseases common in old eye with special reference to cataract, glaucoma, macular disorder, vascular diseases of the eye.</li> <li>• Contact lens in elderly</li> <li>• Spectacle dispensing in elderly- Consideration of spectacle lenses and frame.</li> </ul>
Sixth semester	Operation theatre procedures	No topics were given	<ol style="list-style-type: none"> <li>1. Patient unit</li> <li>2. Universal Precautions</li> <li>3. Infection Control measures in the hospital <ul style="list-style-type: none"> <li>• Hand Washing</li> </ul> </li> </ol>

			<ul style="list-style-type: none"> <li>• Gown technique</li> <li>• Face mask</li> <li>• Gloves</li> <li>• Environmental cleaning</li> <li>• Nosocomial infection</li> </ul> <ol style="list-style-type: none"> <li>4. Disinfection <ul style="list-style-type: none"> <li>• Concurrent disinfection</li> <li>• Terminal disinfection</li> <li>• Solutions used for disinfection</li> </ul> </li> <li>5. Fumigation</li> <li>6. Bio-medical waste Management <ul style="list-style-type: none"> <li>• Steps of bio-medical waste management according to KSPCB</li> <li>• Preparing disinfection solution-hypochlorite solution</li> <li>• Liquid biomedical waste</li> <li>• Management of solid waste</li> <li>• Cleaning of spills</li> <li>• Accidental exposure</li> <li>• Do's and Don'ts of waste management</li> </ul> </li> <li>7. Preparation of patient for anaesthesia <ul style="list-style-type: none"> <li>• General Anaesthesia</li> <li>• Spinal Anaesthesia</li> </ul> </li> <li>8. Operation room/ Theatre</li> <li>9. Hazards in the surgical suite</li> <li>10. Pre-operative care <span style="float: right;">Date</span> of surgery: immediate preparation Pre-operative Checklist</li> <li>11. Post-Operative Care</li> <li>12. Eye donation</li> </ol>
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The above amendment will be applicable from the academic year 2019 admission batch

*Keerthi*

**REGISTRAR**

mj 20/3

To:

The Principal, Yenepoya ~~Medical~~ College

Copy to:

Controller of Examinations/File copy

# CONTENTS

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**YENEPOYA MEDICAL COLLEGE  
DEPARTMENT OF OPHTHALMOLOGY  
B.Sc IN OPTOMETRY**

**COURSE TITLE & SUMMARY:**

BSc optometry is undergraduate program in the field of health care concerned with the examination, diagnosis and management of the disorders of the optical system of the eye. Optometrists play an important multidimensional role in the functioning of eye clinics and hospitals. The program is envisaged to develop a multipurpose paramedical ophthalmic manpower competent in providing service as an Optician, Optometrist, Refractionist and Ophthalmic Assistant to the community in urban, semi-urban and rural settings in private, semi-Governmental and Governmental sectors.

- They test for refractive errors, prescribe and dispense optical corrections and low vision aids;
- They assist in the diagnosis and management of disorders of binocular vision;
- They assist the ophthalmologist in managing various ocular disease in the out-patient, in-patient departments;
- They play an important role in managing operation theatre procedures; and
- They assist in conduct of community eye health programs.

The importance of optometrists has been increasing steadily owing to the rapid advances in instrumentation in the diagnosis and management of ophthalmological conditions. In India, the high prevalence of ocular conditions like cataract, glaucoma, refractive errors and diabetic retinopathy require a pro-active community approach in alignment with the National Program for Control of Blindness.

Several institutes in India, conduct certificate courses, diploma, graduate and post-graduate courses in optometry. These courses are regulated by Universities and paramedical boards. Whereas, the certificate and diploma courses offer training at the basic level, both theoretical and practical, the graduate and post-graduate degrees have advanced training of the students in all aspects of optometry.

The Department of Ophthalmology, Yenepoya University proposes to conduct the BSc course in Optometry in order to offer a more modern and complete training to eligible students interested in the field of Optometry.

**I. Competencies required:**

The aims of the recommended curriculum are to produce Optometrist who are

- i. Clinically and technically competent
- ii. Understand and are able to apply the knowledge in practice
- iii. Independently competent in vision care as specified
- iv. Active and effective members of the multidisciplinary team

The course has been designed with focus on performance-based outcomes. Using the competency based framework, the students will learn to integrate their knowledge, skills and abilities in a hands-on manner in healthcare setting.

The student is expected to develop the competencies to perform the following activities:

1. Practice as an optometrist independently
2. Skill in diagnosis, treatment planning and management of visual defects & impairments and in supporting the managements of ocular conditions.
3. Work independently or in concurrence with eye care and other health care professionals
4. Counselling and Public education on ocular diseases, ocular hygiene, optometric and nutritional counselling.
5. Capable of efficiently managing and providing assistance in running an ophthalmic clinic, Ophthalmology and/ or optometry departments in hospitals and optical shops.
6. To effectively participate in implementation of national health programs and other public health projects.

**The learning objectives are as follows:**

- a. Be able to fit, evaluate, prescribe and dispense contact lenses for refractive correction and other ocular conditions
- b. Be able to correct refractive error and provide spectacle prescription
- c. Be able to assess low vision and provide comprehensive low vision care
- d. Be able to have adequate knowledge and develop skill in manufacturing of spectacle lenses, contact lenses and low vision devices.
- e. To acquire basic knowledge on functions and pathology of ocular structures and its applied aspects
- f. Be able to develop skills to provide comprehensive eye examination
- g. Be able to perform complete binocular vision assessment, manage binocular vision anomalies and refer condition which warrants surgical management
- h. Be able to carry out basic ophthalmic investigations
- i. Be able to counsel on treatment modalities especially optometric modalities and eye safety wear.
- j. Be able to counsel patients undergoing ophthalmic procedures
- k. Be able to maintain and perform sterilization of ophthalmic instruments and operation theatres
- l. Be able to impart knowledge with regard to common eye diseases including amblyopia
- m. Acquire knowledge and skill regarding the referral strategy for ocular conditions
- n. Have knowledge and skill for early detection of various ocular conditions and pathologies – Refractive error, Strabismus, Cataract, Diabetic retinopathy, Glaucoma etc.
- o. Have knowledge regarding organizations of eye banks and preservation of ocular tissues.
- p. Have knowledge on rehabilitation measures for visually disabled individuals

- q. Have knowledge of counselling on visual/ocular hygiene, nutritional and environmental modifications

**Objectives:**

Yenepoya University proposes to conduct BSc Optometry course with the following objective that at the end of successful completion of the course, the participant will be able to **assist the ophthalmologist** in the following areas:

1. Detailed evaluation of refractive errors
2. Prescription of optical corrections including spectacles, contact lenses and prisms
3. Diagnosis of common ocular disorders and their management
4. Participation in the national program for control of blindness
5. Application, use and maintenance of common ophthalmic equipment, instruments and lenses.
6. Diagnosis and orthoptic management of common disorders of binocular vision
7. Counselling of patients for common ophthalmic conditions
8. Counselling of patients undergoing ophthalmic procedures
9. Maintenance and sterilization of ophthalmic operation theatres
10. Functioning of the Eye Bank

**II. Duration of the course:**

The course duration is three years of training and one year of internship.

**III. Eligibility:**

Students who have completed their 10+2 schooling/ II PUC with Physics, Chemistry and Biology as their subjects with a pass percentage of no less than 50% are eligible to apply and 40% for reserved category.

**IV. Selection process:**

Advertisements will be placed on the University website. Application forms will be available for download for the applicants. A merit list will be prepared of selected candidates based on the of the 12<sup>th</sup> class marks/PUC II marks with a minimum of 50% marks preferred. Interview will be held and the original certificates will be verified. Reservation of seats for the minority will be followed as per the University Bye Laws.

**V. Total intake of students:**

Ten students will be registered per year for the Program

**VI. Course details:**

A. **Course transaction:** The three-year course comprises training in Optometry conducted in the department of Ophthalmology, Yenepoya Medical College Hospital over six semesters. The entire programme will be transacted as a credit based semester system with assessment at the end of each semester. At the end of successful completion, the student will be awarded BSc degree in Optometry followed by one year of compulsory

internship in Optometry in the department of Ophthalmology, Yenepoya medical college hospital and registration of the degree by the Yenepoya University.

**I. B. The course content, instruction hours and assessment details**

**(Section VII, B of the BSc Optometry course syllabus**

Modification and additions in the syllabus of BSc Optometry course vide 30<sup>th</sup> Academic Council meeting held on 20.10.2017, notification No. YU/REG/ACA/ACM-30/2017 dated 04.11.2017)

S.N	Course		Instruction Hours per week			Total instruction hours /Semester			Credit hours per week			Assessment		
	No	Title	T	P/C	Total	T	P/C	Total	T	P/C	Total	IA T+P	UE T+P	Total
<b>SEMESTER-I</b>														
1.	BOP 101	General Anatomy	02	02	04	30	30	60	02	01	03	20+0	80+0	100
<b>GENERAL ANATOMY - Modification and additions in the syllabus of BSc Optometry course vide Amended in the notification - - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards)</b>														
2.	BOP 102	General Physiology	03	0.5	3.5	45	15	60	03	0.5	3.5	10+10	60+20	100
3.	BOP 103	Biochemistry	02	02	04	30	30	60	02	01	03	20+0	80+0	100
4.	BOP 104	Physical Optics	06	04	10	90	60	150	06	02	08	10+10	60+20	100
5.	BOP 105	Language-I (Kannada)	<b>Section VII, E, b, ii - Modification and additions in the syllabus of BSc Optometry course vide 31<sup>st</sup> Academic Council meeting held on 06.02.2018, notification No. YU/REG/ACA/Academic Council -31/2018 dated 27.02.2018</b>											Pass / fail
6.	BOP 106	Language II (English)	01	-	01	15	-	15	01	-	01	20+0	80+0	100
7.	BOP 107	Nutrition	0.5	-	0.5	07	-	07	0.5	-	0.5	20+0	80+0	100
8.	BOP	Ethics- I	0.5	-	0.5	08	-	08	0.5	-	0.5	20+0	80+0	100

	108													
		<b>1 Semester total -</b>	15	09	<b>23.5</b>	225	135	<b>360</b>	15	4.5	<b>19.5</b>			800
<b>SEMESTER-II</b>														
	BOP 201	Ocular Anatomy	02	02	04	30	30	60	02	01	03	20+0	80+0	100
	BOP 202	Ocular Physiology	02	02	04	30	30	60	02	01	03	10+10	60+20	100
	BOP 203	Microbiology	03	0.5	3.5	45	15	60	03	0.5	3.5	10+10	60+20	100
	BOP 204	Geometrical Optics	06	06	12	90	90	180	06	03	09	10+10	60+20	100
	BOP 205	Clinical Optometry	-	01	01	-	15	15	-	0.5	0.5	0+20	0+80	100
	BOP 206	Language-I (Kannada)	<b>Section VII, E, b, ii - Modification and additions in the syllabus of BSc Optometry course vide 31<sup>st</sup> Academic Council meeting held on 06.02.2018, notification No. YU/REG/ACA/Academic Council -31/2018 dated 27.02.2018</b>											Pass / Fail
	BOP 207	English-II (English)&Communication skills	01	0	01	15	0	15	01	0	1.0	20+0	80+0	100
	BOP 208	Computers	01	01	02	15	15	30	01	0.5	1.5	10+10	40+40	100
		<b>II Semester total -</b>	15	13	<b>27.5</b>	215	195	<b>420</b>	15	6.5	<b>21.5</b>			700
<b>SEMESTER-III</b>														
	BOP 301	General & Ocular Pathology	03	0	03	45	0	45	03	0	03	20+0	80+0	100
<b>GENERAL AND OCULAR PATHOLOGY - Modification and additions in the syllabus of BSc Optometry course vide Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards)</b>														
	BOP 302	General and Ocular Pharmacology	03	0	03	45	0	45	03	0	03	20+0	80+0	100
<b>GENERAL AND OCULAR PHARMACOLOGY - Modification and additions in the syllabus of BSc Optometry course vide Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council</b>														

<b>meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards)</b>														
BOP 303	Ocular Disease-I	04	0	04	60	0	60	04	0	04	20+0	80+0	100	
<b>Ocular disease-I - Modification and additions in the syllabus of BSc Optometry course vide Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards)</b>														
BOP 304	Visual Optics-I	01	02	03	15	30	45	01	01	02	10+10	60+20	100	
BOP 305	Clinical Optometry-II	-	06	06	-	90	90	-	03	03	0+20	0+80	100	
<b>CLINICAL OPTOMETRY-II Modification and additions in the syllabus of BSc Optometry course vide Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards)</b>														
BOP 306	Optometric Optics	02	02	04	30	30	60	02	01	03	10+10	60+20	100	
<b>OPTOMETRIC OPTICS Modification and additions in the syllabus of BSc Optometry course vide Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards)</b>														
BOP 307	Optometric Instruments	02	02	04	30	30	60	02	01	03	10+10	60+20	100	
BOP 308	Environmental studies	01	-	01	15	-	15	01	-	01	20+0	80+0	100	
<b>ENVIRONMENTAL STUDIES Modification and additions in the syllabus of BSc Optometry course vide Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards)</b>														
BOP 309	Medical Records	01	-	01	15	-	15	01	-	01	20+0	80+0	100	
<b>MEDICAL RECORDS Modification and additions in the syllabus of BSc Optometry course vide Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards)</b>														
	<b>III Semester total</b>	16	12	29	255	180	435	17	06	23			900	
<b>SEMESTER-IV</b>														

BOP401	Ocular Disease -II	04	02	06	60	30	90	04	01	05	10+10	60+20	100
<p><b>OCULAR DISEASE -II Modification and additions in the syllabus of BSc Optometry course vide Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards)</b></p>													
BOP402	Systemic Disease	02	02	04	30	30	60	02	01	03	10+10	60+20	100
BOP403	Visual Optics-II	02	02	04	30	30	60	02	01	03	10+10	60+20	100
BOP404	Dispensing Optics	02	02	04	30	30	60	02	01	03	10+10	60+20	100
BOP405	Clinical Optometry-III	-	06	06	-	75	75	-	03	03	0+20	0+80	100
<p><b>CLINICAL OPTOMETRY-III modification and additions in the syllabus of BSc Optometry course vide Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards)</b></p>													
BOP406	Community Optometry	02	02	04	30	30	60	02	01	03	10+10	60+20	100
BOP407	Quality & Patient Safety	0.5	-	0.5	7.5	-	7.5	0.5	-	0.5	20+0	80+0	100
BOP408	Medical Psychology	0.5	-	0.5	7.5	-	7.5	0.5	-	0.5	20+0	80+0	100
<p><b>MEDICAL PSYCHOLOGY-Modification and additions in the syllabus of BSc Optometry course vide Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards)</b></p>													
	<b>IV Semester total</b>	13	16	29	195	225	420	13	08	21			800
<b>SEMESTER-V</b>													
BOP501	Contact Lens-I	02	02	04	30	30	60	02	01	03	10+10	60+20	100
BO502P	Binocular Vision-I	02	02	04	30	30	60	02	01	03	10+10	60+20	100
BOP503	Low Vision care	01	02	03	15	30	45	01	01	02	10+10	60+20	100
<p><b>LOW VISION CARE- Modification and additions in the syllabus of BSc Optometry course vide Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards)</b></p>													
BO504P	Occupational Optometry	01	-	01	15	-	15	01	-	01	20+0	80+0	100

BOP505	Clinical Optometry	-	06	06	-	90	90	-	03	03	0+20	0+80	100
BO506P	Nursing procedures (Practical)	-	02	02	-	30	30	-	01	01	0+20	0+80	100
<p><b>NURSING PROCEDURES</b> Modification and additions in the syllabus of BSc Optometry course vide Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards)</p>													
BOP507	Research Methodology&Bio statistics	01	-	01	15	-	15	01	-	01	20+0	80+0	100
	<b>V Semester total -</b>	08	12	21	120	180	315	08	06	14			700
<p><b>SEMESTER-VI</b></p>													
BOP601	Contact Lens-II	02	02	04	30	30	60	02	01	03	10+10	60+20	100
BOP602	Binocular Vision-II	02	02	03	30	15	45	02	01	03	10+10	60+20	100
<p><b>BINOCULAR VISION-II</b> Modification and additions in the syllabus of BSc Optometry course vide Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards)</p>													
BOP603	Geriatric & Paediatric Optometry	02	-	02	30	-	30	02	-	02	20+0	80+0	100
<p><b>GERIATRIC &amp; PAEDIATRIC OPTOMETRY</b> Modification and additions in the syllabus of BSc Optometry course vide Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards)</p>													
BOP604	Operation theatre techniques (Practical)	01	02	03	15	30	45	01	01	02	10+10	60+20	100
BOP605	Clinical Optometry	-	06	06	-	90	90	-	03	03	0+20	0+80	100
BOP606	Practice management	01	-	01	15	-	15	01	-	01	20+0	80+0	100
BOP607	Research projects	-	04	04	-	60	60	-	02	02	0+50	0+50	100
	<b>VI Semester total</b> -	08	16	23	120	225	345	08	8	16			700



- \*T = Theory
- \*P/C = Practical/Clinics
- \*IA= Internal Assessment
- \*UE= University Examination

### University exam total marks

**Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019(applicable from the academic year 2019 admission batch onwards)**

#### THEORY SUBJECTS

40 (U.E)+ 10(I.A) = 50

#### THEORY + PRACTICAL SUBJECTS

40 (U.E)+ 10(I.A) = 50 for Theory

40 (U.E)+ 10(I.A) = 50 for Practical

#### ONLY PRACTICAL SUBJECTS

40 (U.E)+ 10(I.A) = 50

U.E= University Exam

I.A= Internal Assessment

### Question paper pattern

**Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019(applicable from the academic year 2019 admission batch onwards)**

### 40 MARK PAPER FOR INTERNAL ASSESSMENT

#### **Long essays**

1x 6 marks = 6 marks **Short Essays**

4x 4 marks = 16 marks

#### **Short Answers**

4 x2 marks = 8 marks

#### **MCQ's**

20x ½ marks = 10 marks

**60 MARK PAPER FOR UNIVERSITY EXAMINATION**

**Long essay**

1x10 marks = 10marks

**Short essays**

6x 5 marks = 30 marks

**Short answers**

5x2 marks = 10 marks

**MCQ's**

20x ½ mark = 10 marks

**80 MARKS PAPER FOR UNIVERSITY EXAMINATION**

**Long essay**

1x10 marks = 10marks

**Short essays**

8x5 marks = 40 marks

**Short answers**

10x 2 marks = 20 marks

**MCQ's**

20x ½ mark = 10 marks

**C. Special features**

- Training by phaco-refractive specialist surgeons, vitreo-retinal surgeons and experienced ophthalmologists in the field of squint and other sub-specialties of ophthalmology
- Attractive facilities for research under the guidance of the faculty and future prospects of PhD within the University
- Extensive learning resources in the library
- Active student-run programs for formal and informal social activities

**D. Teaching and learning methodology**

The Optometry timetable is a demanding one. The students are engaged in training sessions every week day for 8 hours per day.

The students are expected to spend the remaining time of the day in the library and clinics for private reading and learning.

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

**The teaching methods include:**

- **Lectures:** Delivered using teaching learning aids like PowerPoints, charts, videos, models, etc.
- **Tutorials:** Regular sessions with a faculty in small groups, develop communication skills and team work.
- **Seminars:** Seminar presentation under the guidance of a moderating faculty and a feedback on the performance will be given at the end of the presentation by the moderator.
- **Group discussions:** small group discussions especially involving topics of counselling and ethical issues
- **E-Learning:** YENGAGE is the e-learning portal of the university with a wide range of interactive teaching learning options like forum discussions, online tests, quizzes, etc.
- **Practical training:** Training in practical skills on lenses, prisms and equipment will be given in the department of ophthalmology
- **Skill lab training:** The University has simulators for retinoscopy, and training in testing ocular Practise practical skills
- **Clinics:** Practise your clinical skills on patients, who attend the Ophthalmic OPD and IPD Yenepoya Medical College.
- **Others:** The students are encouraged to participate in the workshops and conferences of relevant topics

**E. Coursework and assessment:** The details of assessment will be based on the credit based semester system. (Table 1)

**Attendance:**

**Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019- A student shall be considered to have satisfied the attendance requirements if he/she has attended not less than 75**

**percent of the class in each subject of all the semesters (separately for both theory and practical) actually conducted up to the end of the semester (applicable from the academic year 2019 admission batch onwards)**

**Section VII, E, b, ii** - Modification and additions in the syllabus of BSc Optometry course vide 31<sup>st</sup> Academic Council meeting held on 06.02.2018, notification No. YU/REG/ACA/Academic Council - 31/2018 dated 27.02.2018

- Each semester of the course will be treated as a separate unit to determine the attendance.
- A student shall be considered to have satisfied the attendance requirements if he/she has attended not less than 75 percent of the class in each subject of all the semesters (separately for both theory and practical) actually conducted up to the end of the semester.
- A student who does not satisfy the attendance requirements, mentioned as above, shall not be eligible to appear for the examination in the respective subjects.

**a. Formative assessment:**

- i. The students are expected to maintain the logbook of all the teaching learning activities and the same is assessed by the designated faculty member of the department at the end of each month. This will ensure day to day assessment.
- ii. All the seminars and other teaching learning activities will be evaluated by the faculty
- iii. The students are expected to complete their log book and get them periodically assessed by the faculty to be eligible for appearing for the internal and final examinations.

**b. Internal assessment:**

- i. At the end of each course (a total of 46 courses are spread over 6 semesters), the students will have a written and practical examination on the topics covered during the respective semester.
- ii. The students should score a minimum of 35% in each internal assessment exam (theory and practical separately) to qualify for the final examination of that semester.

(Section VII, E, b, ii - Modification and additions in the syllabus of BSc Optometry course vide 31<sup>st</sup> Academic Council meeting held on 06.02.2018, notification No. YU/REG/ACA/Academic Council -31/2018 dated 27.02.2018)

**c. Summative examinations:**

**i. Semester examination:** The Final examinations will be conducted at the end of each semester for each of the courses completed in that semester and the marks awarded will be converted to a letter grade based on the absolute grading system. For each semester the semester grade point average (SGPA) will be calculated. It is the ratio of the sum of the product of the number of credits with the grade points (credit point) scored by the student in all the courses taken by the student and the sum of the number of credits of all the courses undergone by the student, I.e

$$\text{SGPA (Si)} = \frac{\sum(C_i \times G_i)}{\sum C_i}$$

$C_i$  = number of credits of the course

$G_i$  = grade point secured by the student

It is expressed up to two decimal places.

**ii.** On successful completion of the course (six semesters) the student will be awarded a cumulative grade point average (CGPA) which is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

$$\text{CGPA} = \frac{\sum(C_i \times S_i)}{\sum C_i}$$

$S_i$  is the SGPA of each semester

$C_i$  is the total number of credits in that semester.

**Eligibility for university examination:**

**Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards) - A candidate should secure 35% in internal assessment in each subject in order to appear for the university examination in that subject.**

A candidate shall register for all the subjects of the semester when he/she appears for the examination of that semester for the first time.

A candidate should secure a minimum attendance of 75% and 35% in internal assessment in each subject in order to appear for the university examination of that subject.

**d. Criteria for pass in subjects:**

**Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards) It is mandatory to pass in all the non-credit subjects.**

**e. Number of attempts:**

**Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards) -** A maximum of 6 years will be allowed for the candidate to clear all the subjects of 6 semesters during the course. A fail in any subject will mean the student reappears for the exam in that subject only.  
 Odd semester exams will be conducted only in ODD semester (Jan –Feb) and EVEN semester exams will be conducted only in EVEN semester(August-September)

**f. Examiners:**

**i. Internal assessment:**

1. All internal assessments will be conducted by the in house faculty
2. To qualify for examinership for internal assessment, the in-house faculty must have at least 5 years of teaching experience

**ii. Final examinations:**

1. The final examinations will be conducted by two internal examiners and two external examiners.
2. Faculty who has qualified as MS Ophthalmology, MSc Optometry, DNB Ophthalmology,are eligible to be examiners.
3. To qualify for internal examinership–The faculty must be affiliated to Yenepoya University and have at least 5 years of teaching experience after Post graduation
4. To qualify for the external examinership – The faculty affiliated to any University other than Yenepoya University, with an experience of at least 5 years of teaching optometry students

Table 2 Grades and Grade Points

Letter Grade	Grade Point
O (Outstanding)	10
A+(Excellent)	9
A(Very Good)	8
B+(Good)	7
B(Above Average)	6

C(Average)	5
P (Pass)	4
F(Fail)	0
Ab (Absent)	0

Conversion of marks into letter grade(Absolute grading system)

Letter Grade	Marks (%)
O	90 &>
A+	80-89.9
A	70-79.9
B+	65-69.9
B	60-64.9
C	55-59.9
P	50-54.9
F	<50

List of Special Clinic for Internship

1. Contact Lens Clinic and Low Vision Aid Clinic
2. General Ophthalmology Clinic and Squint and Oculoplastic Clinic
3. Retina Clinic
4. Glaucoma Clinic

**Carry over benefit:**

**Amended in the notification- - 34-ACM/2019 dtd 20.03.2019 Agenda 28 of the 34<sup>th</sup> Academic Council meeting held on 08.02.2019 (applicable from the academic year 2019 admission batch onwards) If a candidate fails in any subject in any of the six semesters, he/she shall be permitted to carry over the subjects, but has to clear all subjects in order to be eligible for the final one year of clinical internship**

**Internship:**

- A student after the successful completion of all six semester examinations, shall be eligible to join the compulsory internship in the final year.
- Students are expected to spend their training duration in primary eye care (50%), dispensing optics (20%), Contact lens and Low vision speciality optometry (30%).
- After receiving a prior approval from the department, national centres can be opted for the training. The internship coordinator should ensure that the centres are sufficient enough for the above training exposure.

- A minimum of 25% of the internship duration must be spent in any of the eye care centres under Yenepoya deemed to be university.

**Eligibility for the award of Degree:**

A candidate shall have passed in all the subjects of all six semesters and should successfully complete the clinical internship of one year with a CGPA of minimum 5 shall be eligible for award of degree.

**BOP 101 GENERAL ANATOMY**

**INSTRUCTOR INCHARGE:** Anatomist with appropriate qualification.

**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 this semester, the student should be able to:

1. Comprehend the gross, functional and applied anatomy of various structures in the human body along with their inter-relationships.
2. Correlate the structure with the functions.
3. Comprehend the basic structure and connections of the various parts of the central nervous system and their regulation of various systems.

**TEXTBOOKS:-**

1. MARIANO S.H. DIFIORE: Atlas of Human Histology, 5th Ed. 1981, Lea and Febiger.
2. G.J. TORTORA & N.P. ANAGNOSTAKOS: Principles of Anatomy and Physiology. (recent edition)
3. B.D. CHAURASIA: Handbook of General Anatomy, 2nd Ed., CBS Publishers and Distributors, New Delhi-110 032.

**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. INDER BIR 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:**

Sl. No.	Topics	No.of hrs.
1	<b>Introduction</b> to human Anatomy , anatomical terminologies, its relevance in optometry	1
2	<b>Skeletal system-</b> structure& classification of bones and examples bones of head & neck, Orbit	3
3	<b>Tissues of the body</b> – classification, epithelial tissue, glands, connective tissues, fibrous tissues, adipose tissue, cartilages	3
4	<b>Muscular system</b> – classification of muscles and their structure, major muscles of face, head & neck region, muscles of the orbit	3
5	<b>Joints:</b> classification with examples. Different joints of head & neck	3
6	<b>Blood Vessels</b> – classification of blood vessels, major vessels of head and neck of the orbit	3
7	<b>Skin and its appendages</b> – structure of skin	
8	<b>Lymphatic system</b> – lymphoid tissues classification –lymph nodes and lymphatics of head & neck, structure of lymph node	1
9	<b>Glands:</b> classification (Exocrine & Endocrine) salivary glands in brief. Endocrine glands- thyroid, pituitary, adrenal gland and pancreas in brief	2
10	<b>Nervous system</b> - parts of nervous system, nervous and neurones cells. Peripheral nerves Peripheral nerves and plexuses of head neck  Brian – parts, meninges, ventricles, CSF, Cranial nerves- All Autonomic nervous system	5
<b>TotalNumber ofHours</b>		<b>30</b>

**PRACTICAL(30 Hours):** Practical demonstration of each organs, muscles of head and neck, structures of orbit and endocrine glands. Histology of epithelium, cartilages, bones, vessels, lymph node, muscle, nerves

**BOP 102 GENERALPHYSIOLOGY**

**INSTRUCTOR INCHARGE:** Physiologist with MasterDegree

**COURSE DESCRIPTION:** General physiology deals with the entire human body with emphasis on physiology of different organ systems.

**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.
- Describe the physiological response and adaptation to environmental stress.

**TEXTBOOKS:-**

1. L Prakasam Reddy, Fundamentals of Medical Physiology, 4<sup>th</sup> Edition, Paras Medical Publisher, Hyderabad, 2008
2. Sujit K. Chaudhuri, Concise Medical Physiology, 6<sup>th</sup> Edition, New Central Book Agency, Kolkata, 2008

**REFERENCE BOOKS:-**

1. AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006
2. A C Guyton: Text book of Medical Physiology, 8<sup>th</sup> edition, Saunders Company, Japan,
3. G J Tortora, B Derrickson: Principles of anatomy & physiology, 11<sup>th</sup> edition, Harper & Row Publishers, New York
4. John Wiley & Sons Inc, New Jersey, 2007

**PREREQUISITES:** Higher secondary level biology or remedial biology

**COURSE PLAN:**

**THEORY (Total: 30 hours)**

Sl.No.	Topics	No. of hrs.
1.	CELL STRUCTURE & ORGANIZATION General principles of cell physiology Muscle- Structure, function, muscle contraction applied aspects.	2  3
2.	BLOOD: Composition Plasma proteins – classification & function Red blood cells - functions & dysfunctions. White blood cells – development, classification, morphology, function & Dysfunction	6

	<p>Platelets–morphology –development, function&amp; dysfunction</p> <p>Clotting –factors - mechanism, anti-coagulantsdysfunction</p> <p>Blood grouping –classification, importance in transfusion, Rh factor&amp; Incompatibility, immunity</p>	
3.	<p>DIGESTION:</p> <p>Salivary digestion–functionsGastric digestion functions ,Pancreatic digestion–functions, Intestinal digestion–functions of liver, pancreas, bile.</p>	5
4.	<p>EXCRETION:</p> <p>Kidney–structureofnephron</p> <p>urine formation –composition of the urine and abnormal constituents</p>	3
5.	<p>ENDOCRINES:</p> <p>Classifications of hormones, functions of thyroid, pituitary, adrenal gland and pancreas.</p>	5
6.	<p>REPRODUCTION:</p> <p>Male reproductive system -Functions of testis, spermatogenesis,</p> <p>Female reproductive system - ovulation, menstrual cycle.</p>	4
7.	<p>RESPIRATION:</p> <p>Mechanicsofrespiration, pulmonary surfactant, pulmonaryfunction testsTransportofrespiratorygases, hypoxia, cyanosis.</p>	4
8.	<p>CIRCULATION:</p> <p>Cardiac cycle, blood pressure, cardiac output</p>	5
9.	<p>ENVIRONMENTALPHYSIOLOGY</p> <p>Bodytemperatureregulation (includingskinPhysiology).</p>	2
10.	<p>NERVOUSSYSTEM:</p> <p>Neuron–Conductionofimpulse–synapse –receptor. Sensory organization– pathwaysandperception.Reflexes–cerebralcortex–function, T halamus– Basalganglia,Cerebellum. Hypothalamus.Autonomicnervoussystem, cranial nerve</p>	8

11.	SPECIAL SENSES–(Elementary) Olfaction–Taste –Hearing, vision, accommodation reflex, visual pathway, field of vision, test for vision.	3
	<b>Total Number of Hours</b>	<b>30</b>

**PRACTICAL (Total: 30 hours)**

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- Practical demonstration
2. Respiratory System: Clinical examination of respiratory system, Spirometry,
3. Cardio Vascular System: blood pressure and pulse rate, Effect of exercise on blood pressure
4. Central Nervous System: Cranial nerves

**BOP 103 GENERAL BIOCHEMISTRY**

**INSTRUCTOR IN CHARGE:** Apost-graduate, a Ph.D. or M.D. in biochemistry, with adequate exposure to the profession of optometry and ophthalmology

**COURSE DESCRIPTION:** General Biochemistry deals with the biochemical nature of carbohydrates, proteins, minerals, vitamins, lipids etc. A detailed study of these, emphasizing on their chemical composition and their role in metabolism is the 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 given data.

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

**REFERENCE BOOKS:**

1. S. Ramakrishnan, K. G. Prasanna and R. Rajan: Textbook of Medical Biochemistry, Orient Longman, Madras, 1990
2. D. R. Whikehart: Biochemistry of the Eye, 2<sup>nd</sup> edition, Butterworth Heinemann, Pennsylvania, 2003

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

**COURSE PLAN**

Sl.No.	Topics	No of hrs
1	Carbohydrates: Glucose;fructose;galactose;lactose;sucrose;starchandglycogenpropertiesand tests,Structureandfunction)	6
2	Proteins: Aminoacids,peptidesandproteins(generalproperties&testswithafewexamples likeglycine, tryptophan, glutathione, albumin, haemoglobin,collagen)	6
3	Lipids: Fattyacids,saturatedandunsaturated,cholesterolandtriacylglycerol,phospholipidsand plasma membrane	6
4	Vitamins: GeneralwithemphasisonA,B2,C,Eandinositol(requirements,assimilationand properties)	6
5	Minerals: Na, K, Ca,P, Fe, Cu and Se.(requirements,availability and properties)	6
	<b>TotalNumberofHours</b>	<b>30</b>

**PRACTICAL(Total 30hours)**

1. Reactionsof monosaccharide, disaccharide andstarch: Glucose,Fructose, Galactose Maltose,lactose, Sucrose,Starch and AnalysisofUnknownSugars.
2. Estimation:Photometry, Biofluid ofchoice– blood, plasma,serumStandard graphs Glucose, Proteins, Urea, Creatinine, Bilirubin

**BOP 104 PHYSICAL -OPTICS**

**INSTRUCTOR INCHARGE:** Apost-graduate,preferablyPhD, in physics, with adequate exposure to the profession ofoptometryasevidencedbypreviousteaching experience or publications I n optometry journals/magazinesORan optometrist with apost-graduate degree, preferably PhD OR anoptometrist with an undergraduate degree

**COURSE DESCRIPTION:** Thiscoursewill be taught in onesemester. Physical Optics isthestudy of light, itsproperties and itsinteractionwith matter. Specifically, the phenomenaofinterference,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.

**TEXTBOOK:** Subrahmanyam N, Brij Lal A text book of Optics, S. Chand Co Ltd, New Delhi, India, 2003.

**REFERENCE BOOKS:**

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

**PREREQUISITES:** Higher secondary level mathematics and physics.

**COURSE PLAN**

No.	Topics	No of hrs.
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.	8
2.	Sources of light; Electromagnetic Spectrum.	4
3.	Polarized light; linearly polarized light; and circularly polarized light.	4
4.	Intensity of polarized light; Malus' Law; polarizers and analysers; Methods of Producing polarized light; Brewster's angle.	4
5.	Bi-refringence; ordinary and extraordinary rays.	3
6.	Relationship between amplitude and intensity.	1
7.	Coherence; interference; constructive interference, destructive interference; fringes;	4
8.	Double slits, multiple slits, gratings.	2
9.	Diffraction; diffraction by a circular aperture; Airy's disc	3
10.	Resolution of an instrument (telescope, for example); Rayleigh's criterion	3
11.	Scattering; Rayleigh's scattering; Tyndall effect.	3
12.	Fluorescence and Phosphorescence	3
13.	Basics of Lasers – coherence; population inversion; spontaneous emission; Einstein's Theory of lasers.	6

14.	Radiometry;solidangle;radiometricunits;photopicandscotopicluminousefficiency and efficacycurves; photometric units	6
15.	Inverse square law ofphotometry; Lambert'slaw.	3
16.	Otherunitsoflightmeasurement; retinal illumination;Trolands	3
	<b>TotalnumberofLectures</b>	<b>90</b>

**PRACTICAL: Total: 60 hours**

The practical's to be done includethe following:

1. Gratings–  
determinationofgratingconstantusingSodiumvapourlamp;determinationofwavelengthsoflightfromMercuryvapour lamp
2. Circular Apertures– measurementsofAiry's disc for apertures ofvariousizes
3. Verification ofMalus' Law using apolarizer– analyser combination
4. Demonstration ofbirefringenceusingCalcitecrystals
5. Measurement oftheresolvingpowerof telescopes.
6. Newton's rings
7. Demonstration offluorescenceand phosphorescence using crystalsand paints

## **BOP105KANNADA AND COMMUNICATION**

**INSTRUCTOR INCHARGE:**Mastersin Kannada preferable.

**COURSE DESCRIPTION:** Thiscoursedealswithknowledge of essential functional Kannada and nuances ofcommunication,skills which are essential forthe health care professional.

**OBJECTIVES:**

1. Thiscoursetrains the studentsinoralpresentations,expositorywriting,logicalorganizationand structural support.
2. Byacquiringskillsintheuseofcommunicationtechniquesthestudentswillbeableto express better, grow personally and professionally, develop poise and confidence and achieve success.

**TEXTBOOK:**

1. To be decided by the faculty

**REFERENCE BOOKS:**Facultymaydecide.

**PREREQUISITES:** Basic Kannada equivalent to 10<sup>th</sup> standard ofthestudy.

**COURSE PLAN**

Functional Kannada	Topics	Hours
Unit 1 BasicsofGrammar	Vocabulary Synonyms, Antonyms, Prefix and Suffix, Homonyms, AnalogiesandPortmanteau words	2
Unit II BasicsofGrammar– Part II	Active,Passive,DirectandIndirectspeech,Preposition s, Conjunctionsand Euphemisms	1
Unit III Writing	Letter writing,Essay,Articles,Memos,onewordsubstitutes,	2
Unit IV Writing andReading	Summary writing, Creativewriting,newspaper reading	1
Unit V Practical Exercise	Formalspeech, Phonetics,semantics and pronunciation	1
<b>Total number of hours</b>		<b>07</b>

**BOP106 ENGLISHAND COMMUNICATION**

**INSTRUCTOR INCHARGE:** Masters in English preferable.

**COURSE DESCRIPTION:** This course deals with aspects of essential functional English and nuances of communication, skills of which are 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.

**TEXTBOOK:**

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

**REFERENCE BOOKS:** Faculty may decide.

**PREREQUISITES:** Basic English equivalent to 10<sup>th</sup> standard of the study.

**COURSE PLAN**

Functional English	Topics	Hours
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Unit I BasicsofGrammar	Vocabulary Synonyms, Antonyms, Prefix and Suffix, Homonyms, AnalogiesandPortmanteauwords	2
Unit II BasicsofGrammar– Part II	Active,PassiveDirectandIndirectspeech,Prepositions , Conjunctionsand Euphemisms	2
Unit III Writing Skills	Letterwriting,Email,Essay,Articles,Memos,oneor dsubstitutes, note makingandComprehension	1
Unit IV Writing andReading	Summary writing, Creativewriting,newspaper reading	1
Unit V Practical Exercise	Formalspeech, Phonetics,semantics and pronunciation	1
Communication in Optometry Practice		1
<b>Total</b>		<b>15</b>

## BOP107NUTRITION

**INSTRUCTOR INCHARGE:** Nutritionist with Masters/ Doctorate

**COURSE DESCRIPTION:** Thiscoursecoversthe basicaspectsofNutritionforgood health. It also includesnutrientsand nutrient derivatives relevant to ocular health, nutrition deficiency andocular disease,Nutritionand ocular aging,contraindications, adverse reactionsand ocular nutritional supplements.

**OBJECTIVES:**Attheendofthecourse

studentwouldhavegainedtheknowledgeofthefollowing: • Balanced dietand eye• Protein, carbohydrates, vitamins, Minerals, carotenoids• Nutrition and Ocular aging • Adverse effectsofocular nutritional supplements.

**TEXTBOOK:**

1. MSwaminathan:HandbookofFoodandNutrition,5<sup>th</sup>ED,Bangaloreprinting& PublishingCo.Ltd, Bangalore, 2004
2. C Gopalan, BV Rama Sastri, SC Balasubramanian: Nutritive Value of Indian Foods, National Institute of Nutrition, ICMR, Hyderabad,2004
3. FrankEperjesi&StephenBeatty:NutritionandtheEye a practicalApproachElsevier Butterworth- Heinemann, USA, 2006

**REFERENCE BOOKS:**Norecommendation. It isleftto the faculty.

**PREREQUISITES:** Nil

## **COURSE PLAN (Total: 7 hours)**

1. Introduction.
  - 1.1 History of Nutrition
  - 1.2 Nutrition as a science
  - 1.3 Food groups, RDA
  - 1.4 Balanced diet, diet planning.
  - 1.5 Assessment of nutritional status
2. Energy
  - 2.1 Units of energy.
  - 2.2 Measurements of energy and value of food
  - 2.3 Energy expenditure.
  - 2.4 Total energy/calorie requirement for different age groups and diseases.
  - 2.5 Satiety value
  - 2.6 Energy imbalance-obesity, starvation.
  - 2.7 Limitations of the daily food guide.
3. Proteins
  - 3.1 Sources and functions
  - 3.2 Essential and non-essential amino-acids.
  - 3.3 Incomplete and complete proteins
  - 3.4 Supplementary foods.
  - 3.5 PEM and the eye
  - 3.6 Nitrogen balance
  - 3.7 Changes in protein requirement.
4. Fats
  - 4.1 Sources and functions
  - 4.2 Essential fatty acids
  - 4.3 Excess and deficiency
  - 4.4 Lipids and the eye.
  - 4.5 Hyperlipidaemia, heart diseases, atherosclerosis.
5. Minerals
  - 5.1 General functions and sources
  - 5.2 Macro and micro minerals associated with the eye.
  - 5.3 Deficiencies and excess – ophthalmic complications (e.g. iron, calcium, iodine etc.)
6. Vitamins
  - 6.1 General functions, and food sources
  - 6.2 Vitamin deficiencies and associated eye disorders with particular emphasis to Vitamin A
  - 6.3 Promoting sound habits in pregnancy, lactation and infancy.
  - 6.4 Nutrient with antioxidant.
  - 6.5 Properties
  - 6.6 Digestion of Proteins, carbohydrates & lipids
7. Essential amino acids.
8. Miscellaneous
  - 8.1 Measles and associated eye disorders, low birth weight

## **BOP108ETHICS 1**

**INSTRUCTOR INCHARGE:** Ethicist with training in Bioethics

**COURSE DESCRIPTION:** This course covers the basic principles of ethics. It also includes the application of the principles of ethics in health care.

**OBJECTIVES:** At the end of the course student would have gained the knowledge of the following: • Ethical principles and theories. • Informed consent • Common ethical issues in health care

**TEXTBOOK:**  
No recommendation. It is left to the faculty

**REFERENCE BOOKS:** No recommendation. It is left to the faculty.

**PREREQUISITES:** Nil

### **COURSE PLAN (Total: 8 hours)**

1. Introduction
  - 1.1 History of Bioethics
  - 1.2 Branches of Bioethics
  
2. Bioethical principles
  - 2.1 Autonomy
  - 2.2 Beneficence
  - 2.3 Non-maleficence
  - 2.4 Justice
  - 2.5 Privacy
  - 2.6 Confidentiality
  - 2.7 Veracity
  
3. Applied aspects
  - 3.1 Informed consent
  - 3.2 Communications with patient
  - 3.3 Introduction to common ethical issues

## **Second semester**

### **BOP 201 OCULAR ANATOMY**

**INSTRUCTOR INCHARGE:** Ophthalmologist

**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 structures of 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 to understand the neural connections and distribution.
4. To understand the basic principles of ocular embryology.

**TEXTBOOK:**

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

**REFERENCE BOOKS:**

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

**PREREQUISITES:** General anatomy.

**COURSE PLAN (Total: 30 hours)**

1. Central nervous system:
  - 1.1 Spinal cord and brain stem
  - 1.2 Cerebellum
  - 1.3 Cerebrum.
2. Orbit
  - 2.1 Eye
  - 2.2 Sclera
  - 2.3 Cornea
  - 2.4 Choroid
  - 2.5 Ciliary body
  - 2.6 Iris
  - 2.7 Retina
3. Refractory media-
  - 3.1 Aqueous humor
  - 3.2 Anterior chamber
  - 3.3 Posterior chamber
  - 3.4 Lens
  - 3.5 Vitreous body
4. Eyelids
5. Conjunctiva
6. Embryology

**PRACTICAL (Total: 30 hours)**

1. Eye: Practical dissection of bull's eye

2. Orbit: Practical demonstration of orbital structures.

## **BOP 202 OCULAR PHYSIOLOGY**

**INSTRUCTOR INCHARGE:** Physiologist, Optometrist or Ophthalmologist with experience in teaching ocular physiology.

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

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

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

**TEXTBOOK:**

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

**REFERENCE BOOKS:**

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

**PREREQUISITES:** General Physiology

**COURSE PLAN: (Total: 30 hours)**

1. Protective mechanisms in the eye: Eyelids and lacrimation, description of the globe
2. Extrinsic eye muscles, their actions and control of their movements
3. Coat of the eyeball
4. Cornea
5. Aqueous humor and vitreous: Intraocular pressure
6. Iris and pupil
7. Crystalline lens and accommodation – presbyopia
8. Retina – structure and functions
9. Vision – general aspects of sensation
10. Pigments of the eye and photochemistry
11. The visual stimulus, refractive errors
12. Visual acuity, Vernier acuity and principle of measurement
13. Visual perception – Binocular vision, stereoscopic vision, optical illusions
14. Visual pathway, central and cerebral connections
15. Colour vision and colour defects. Theories and diagnostic tests
16. Introduction to electro physiology
17. Scotopic and Photopic vision

18. Color vision, Color mixing
19. Mechanism of accommodation
20. Retinal sensitivity and Visibility
21. Receptive stimulation and flicker
22. Ocular, movements and saccades
23. Visual perception and adaptation
24. Introduction to visual psychology (Psychophysics)

**PRACTICAL: Total: 30 hours.**

1. Eye Lid movements and lacrimation, Lacrimal syringing
2. Extra ocular movements
3. Saccades and Pursuits
4. Pupillary reflexes
5. Light and dark adaptation.
6. Binocular vision- Three grades of Binocular vision
7. Colour vision testing charts- Identification of test charts

## **BOP 203 MICROBIOLOGY**

**INSTRUCTOR INCHARGE:** Microbiologist with Masters or PhD 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 student to gain essential knowledge about the characteristics of bacteria, viruses, fungi and parasites;
2. To acquire knowledge of the principles of sterilisation 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.

**TEXTBOOK:**

1. BURTON G.R.W: Microbiology for the Health Sciences, third edition, J.P. Lippincott Co., St. Louis, 1988.
2. MJPelczar (Jr), EC Chan, NR Krieg: Microbiology, fifth edition, TATA Mc GRAW-HILL Publisher, New Delhi, 1993

**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. SYDNEYM. FINEGOLD&ELLEN JO BARON: DiagnosticMicrobiology(DM)

**PREREQUISITES:** Higher secondary Biology

**COURSE PLAN: (Total: 45 hours)**

1. Morphology and principlesofcultivating bacteria
2. Sterilization and disinfectionsused in laboratory and hospital practice
3. Common bacterial infectionsofthe eye.
4. Common fungal infectionsofthe eye
5. Common viral infectionsofthe eye.
6. Common parasiticinfectionsofthe eye.

**Practical (Total: 15 hours)**

1. Preparation of smears and gram staining
2. Preparation of smears for KOH staining
3. Preparation of smears for Giemsa staining
4. Culture media and plating
5. Collection of samples

## **BOP 204 GEOMETRICAL OPTICS**

**INSTRUCTOR INCHARGE:** A post-graduate,preferablyaPhD, in physics, with adequate exposure to the profession of optometryasevidencedbypreviousteaching experience or publicationsin optometry journals/magazines ORan optometrist with apost-graduate degree, preferablyaPhDORanoptometrist with an undergraduate degree

**COURSE DESCRIPTION:** Geometric Opticsisthestudy of light and itsbehaviourasitpropagatesinavariety of media. Specifically, the phenomenaof reflection and refraction oflight at boundariesbetweenmediaandsubsequent image formation will be dealt with in detail. Reflections atplaneand spherical surfaces and refractionsat plane, spherical,cylindricalandtoricsurfaceswillbestudied in this course.Attentionwill be giventothese system of surfacesand/orlenses and their imaging properties. The effect ofaperturestopson the quality of images, such asblur and aberrations, depth of field and depth of focus, will also be studied.

**OBJECTIVES:** The objective of thiscourseisto equip the studentswith a thorough knowledgeofmirrorsand lenses. At the end ofthiscourse,studentswill be ableto predict the basicproperties of the images formed on the retinabytheopticsoftheeye.

1. TunnacliffeA.H,HirstJ.G,Optics,TheassociationofBritishDispensingOpticians, London, U.K.,1990.
2. Pedrotti L. S, PedrottiSr.F. L, Opticsand Vision, PrenticeHall, 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 and physics.

**COURSE PLAN**

No.	Topics	No of hrs.
1.	Nature of light – light as electromagnetic oscillation; ideas of sinusoidal oscillations; Amplitude and phase; speed of light in vacuum and other media; refractive index.	2
2.	Wavefronts – spherical, elliptical and plane; Curvature and vergence; rays; convergence and divergence in terms of rays and vergence; vergence at a distance	2
3.	Refractive index; its dependence on wavelength	1
4.	Fermat's and Huygen's Principle – Derivation of laws of reflection and refraction (Snell's law) from these principles	3
5.	Plane mirrors – height of the mirror; rotation of the mirror	1
6.	Reflection by a spherical mirror – paraxial approximation; sign convention; derivation of vergence equation	1
7.	Imaging by concave mirror, convex mirror	2
8.	Reflectivity; transmissivity; Snell's Law, Refraction at a plane surface	2
9.	Glass slab; displacement without deviation; displacement without dispersion	2
10.	Thick prisms; angle of prism; deviation produced by a prism; refractive index of the Prism	2
11.	Prisms; angular dispersion; dispersive power; Abbe's number.	1
12.	Definition of crown and flint glasses; materials of high refractive index	1
13.	Thin prism – definition; definition of Prism diopter; deviation produced by a thin prism; its dependence on refractive index	2
14.	Refraction by a spherical surface; sign convention; introduction to spherical aberration using image formed by a spherical surface of a distance object; sag formula	3
15.	Paraxial approximation; derivation of vergence equation	1
16.	Imaging by a positive powered surface and negative powered surface	2
17.	Vergence at a distance formula; effectivity of a refracting surface	2
18.	Definition of a lens as a combination of two surfaces; different types of lens shapes.	2



19.	Imageformation by a lens by application of vergenceat a distance formula; Definitionsoffrontandbackvertexpowers; equivalentpower; firstandsecond principal planes/points;primaryand secondary focal planes/points;primaryand secondary focallengths	4
20.	Newton'sformula;linearmagnification;angularmagnification	2
21.	NodalPlanes	2
22.	Thin lensasaspecialcase ofthicklens;reviewofsignconvention	2
23.	Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified)forvariousobjectpositions	3
24.	Imaging by a thin concave lens; image properties (real/virtual; erect/inverted;magnified/minified)forvariousobjectpositions	3
25.	Prentice'sRule	1
26.	Systemoftwothinlenses;reviewoffrontandbackvertexpowersandequivalentpower, review ofsixcardinalpoints.	3
27.	System of more than two thin lenses; calculation of equivalent power using magnificationformula	3
28.	Vergenceand vergence techniques revised.	2
29.	Gullstrand'sschematiceyes, visual acuity, Stile Crawford	3
30.	Emmetropia and Ametropia	3
31.	Blur retinal Imaginary	3
32.	Correction of sphericalametropia,vertexdistanceandeffectivepower, dioptricpower of the spectacle, to calculate the dioptricpower,angular magnification of spectacles in aphakic	3
33.	Thin lens model of the eye –angular magnification –spectacle and relative spectacle	3
34.	Aperture stops-entranceand exit pupils.	3
35.	Astigmatism.- To calculate the position ofthelineimageinasphero-cylindrical lens.	3
36.	Accommodation–Accommodation formulae and calculations	3
37.	Presbyopia- Spectaclemagnification,angularmagnificationofspectaclelens,nearpoint, calculation ofadd, depthof field.	3

38.	Spatial distribution of optical information-modulation transfer functions- Spatial filtering- applications.	3
39.	Visual optics of aphakia and pseudophakia.	3
	<b>Total number of Lectures</b>	<b>90</b>

**PRACTICAL (Total: 90 hours)**

1. Thick Prism determination of prism angle and dispersive power; calculation of the refractive index
2. Thin Prism- measurement of deviation; calculation of the prism dioptre
3. Image formation by spherical mirrors
4. Convex lens- power determination using lens gauge, power determination using distant object method; power determination using the vergence formula
5. Concave lens- in combination with a convex lens- power determination.
6. Construction of a table top telescope- all three types of telescopes.
7. Construction of a table top microscope
8. Imaging by a cylindrical lens- relationship between cylinder axis and image orientation
9. Imaging by two cylinders in contact- determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinders' powers and orientations
10. Imaging by a spherocylindrical lens sphere and cylinder in contact- determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinder's power and orientation

**BOP205 CLINICAL OPTOMETRY 1**

**(CLINICAL OPTOMETRY STUDENTSHIP): Total: 15 hours**

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.

1. Trial Set
2. Spherical, Cylindrical Lenses- identification
3. Visual acuity charts- Identification (geriatric and paediatric charts)
4. Visual acuity testing -distance and Near (Snellen)
5. Colour vision- Ishihara
6. Extra ocular motility
7. Digital IOP Assessment
8. Photostress Recovery test
9. Cover test
10. Prisms- identification and uses
11. Stereopsis evaluation- Titmus Fly
12. Torch Light evaluation of eye

### **BOP206 KANNADA (07 hours)**

**INSTRUCTOR INCHARGE:** Master in Kannada preferable.

**COURSE DESCRIPTION:** This course deals with knowledge of essential functional Kannada and nuances of communication, skills which are essential for the health care professional.

**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.

**TEXTBOOK:**

1. To be decided by the faculty

**REFERENCE BOOKS:** Faculty may decide.

**PREREQUISITES:** Basic Kannada equivalent to 10<sup>th</sup> standard of the study.

**COURSE PLAN:** Faculty may decide (Non university)

### **BOP207 LANGUAGE II- ENGLISH & COMMUNICATION SKILLS (15 hours)**

The student will learn how to communicate with patients/clients, care-givers, other health professionals and other members of the community effectively and appropriately. Communication is a fundamental requirement in the provision of health care services. Program objectives should enable the students to:

- Provide sufficient information to ensure that the patient/client can participate as actively as possible and respond appropriately to the information
- Clearly discuss the diagnosis and options with the patient, and negotiate appropriate treatment plans in a sensitive manner that is in the patient's and society's best interests
- Explain the proposed healthcare service—its nature, purpose, possible positive and adverse consequences, its limitations, and reasonable alternatives wherever they exist
- Use effective communication skills to gather data and share information

including attentive listening, open-ended inquiry, empathy and clarification to ensure understanding

- Appropriately communicate with, and provide relevant information to, other stakeholders including members of the healthcare team
- Use communication effectively and flexibly in a manner that is appropriate for the reader or listener

Explore and consider the influence that the patient's ideas, beliefs and expectations have during interactions with them, along with varying factors such as age, ethnicity, culture and socioeconomic background

- Develop efficient techniques for all forms of written and verbal communication including accurate and timely record keeping
- Assess their own communication skills, develop self-awareness and be able to improve their relationships with others

- Possess skills to counsel for lifestyle changes and advocate health promotion

<b>Communication</b>	
Introduction	<input type="checkbox"/> Communication process. <input type="checkbox"/> Elements of communication <input type="checkbox"/> Barriers of communication and how to overcome them. <input type="checkbox"/> Nuances for communicating with patients and their attenders in hospitals
Speaking	<input type="checkbox"/> Importance of speaking efficiently <input type="checkbox"/> Voice culture. <input type="checkbox"/> Preparation of speech. Secrets of good delivery <input type="checkbox"/> Audience psychology, handling <input type="checkbox"/> Presentation skills. <input type="checkbox"/> Individual feedback for each student <input type="checkbox"/> Conference/Interview technique
Listening	<input type="checkbox"/> Importance of listening <input type="checkbox"/> Self-assessment <input type="checkbox"/> Action plan execution. <input type="checkbox"/> Barriers in listening. <input type="checkbox"/> Good and persuasive listening
Reading	<input type="checkbox"/> What is efficient and fast reading <input type="checkbox"/> Awareness of existing reading habits <input type="checkbox"/> Tested techniques for improving speed <input type="checkbox"/> Improving concentration and comprehension through systematic study.
Non Verbal Communication	<input type="checkbox"/> Basics of non-verbal communication <input type="checkbox"/> Rapport building skills using neuro-linguistic programming (NLP)

Communication in Optometry Practice	
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## BOP209COMPUTERS

**INSTRUCTOR INCHARGE:** Graduate in Information and technology or optometrist /administrative staff with adequate computer knowledge and with teaching experience

**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.

**COURSE PLAN:** (Total: 15T+ 15 P hours) – students will be given hand-on practical sessions and reading materials (softcopy). Some of the topics will be demonstration.

1. Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
2. Input output devices: Input devices (keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices (monitors, pointers, plotters, screen image projector, voice response systems).
3. Processor and memory: The Central Processing Unit (CPU), main memory.
4. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.
5. Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).
6. Introduction to MS Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.
7. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
8. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
9. Introduction of Operating System: introduction, operating system concepts, types of operating system.
10. Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network. Internet and its applications: definition, brief history, basic services (E-Mail, File Transfer
11. Protocol, telnet, the World Wide Web (WWW), www browsers, use of the internet.

12. Application of Computers in clinical settings.

## Third semester

### BOP 301 GENERAL AND OCULAR 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 parts of the eye and adnexa.

**TEXTBOOK:** KS Ratnagar: Pathology of the eye & orbit, Jaypee Brothers Medical Publishers, 1997

**REFERENCE BOOKS:**

1. CORTON KUMAR AND ROBINS: Pathological Basis of the Disease, 7th Edition, Elsevier, New Delhi, 2004.
2. SR 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 (Theory: 45 hours)**

1. Inflammation and repair
2. Infection in general
3. Specific infections
  - 3.1 Tuberculosis
  - 3.2 Leprosy
  - 3.3 Syphilis
  - 3.4 Fungal infection
  - 3.5 Viral chlamydial infection
4. Neoplasia
5. Haematology
  - 5.1 Anemia
  - 5.2 Leukemia

- 5.3 Bleeding disorders
- 6. Circulatory disturbances
  - 6.1 Thrombosis
  - 6.2 Infarction
  - 6.3 Embolism
- 7. Clinical pathology
  - 7.1 Interpretation of urine report
  - 7.2 Interpretation of blood smears.
- 8. Immune system
- 9. Shock, Anaphylaxis.
- 10. Allergy
- 11. Pathology of the diseases in eyelids & Adnexa
- 12. Pathology of the diseases of Conjunctival diseases
- 13. Pathology of the diseases of Cornea
- 14. Pathology of Crystalline lens disorders
- 15. Pathology of Uveitis
- 16. Pathology of Glaucoma
- 17. Pathology of Optic nerve disorders

## **BOP 302 GENERAL AND OCULAR PHARMACOLOGY**

**INSTRUCTOR INCHARGE:** Pharmacologist/Ophthalmologist

**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.

**TEXTBOOK/REFERENCE BOOKS:**

1. K D Tripathi: Essentials of Medical Pharmacology. 5th edition, Jaypee, New Delhi, 2004
2. Optometric Pharmacology
3. Ocular drug consult
4. Anterior eye diseases and therapeutics
5. Ashok Garg: Manual of Ocular Therapeutics, Jaypee, New Delhi, 1996
6. T J Zimmerman, K S Kooner: Text Book of Ocular Pharmacology, Lippincott-Raven, 1997
7. Clinical ocular pharmacology

**PREREQUISITES:** General Physiology & Biochemistry

**COURSE PLAN: (Theory: 45 HOURS)**

Sl. No	Topics	No of hrs
1.	<p><b>General Pharmacology:</b>                      Introduction to sources of drugs, drug administration, and routes of drug administration, Pharmacokinetics                      Pharmacodynamics, adverse drug reactions- special emphasis on ocular toxicity of drugs &amp; factors modifying drug actions.</p>	
2.	<p><b>Systemic Pharmacology:</b></p> <p>2.1 Autonomic nervous system: introduction, Neurotransmitters, their mechanism of action.</p> <p>2.2 Drugs affecting                      -pupillary size                      and light reflex, intraocular tension, Accommodation                      Skeletal muscle relaxants</p> <p>2.3 Cardiovascular system: Anti- hypertensive                      and drugs useful in Angina</p> <p>2.4 Diuretics- in ocular disorders</p> <p>2.5 Central Nervous System:                      Alcohol, sedative hypnotics, General &amp; local anaesthetics, Opioids &amp; non-opioids</p> <p>2.6 Chemotherapy-                      Introduction on general chemotherapy,                      Specific chemotherapy- Antiviral,                      antifungal, antitubercular, antileprotic</p> <p>2.7 Hormones: Corticosteroids, Antidiabetics</p> <p>2.8 Blood-                      Coagulants</p>	



3.	<b>Ocular Pharmacology:</b> 3.1 Ocular preparations, formulations and requirements of an ideal Agent 3.2 Ocular Pharmacokinetics, methods of drug administration & Special drug delivery system 3.3 Ocular Toxicology	
4.	<b>Diagnostic &amp; Therapeutic applications of drugs used in Ophthalmology:</b> 4.1 Diagnostic agents used in aid diagnosis 4.2 Drugs & biological agents used in ocular surgery 4.3 Anaesthetics used in ophthalmic procedures 4.4 Drug treatment of glaucoma, accommodative esotropia and ocular myasthenia 4.5 Pharmacotherapy of ocular infections – Bacterial, viral, fungal & chlamydial 4.6 Drugs used in allergic conditions of the eye 4.7 Drugs used in inflammatory disorders of the eye 4.8 Drug treatment of degenerative disorders of the eye 4.9 Immunomodulators in Ophthalmic practice 4.10 use of other agents in ophthalmic practice, Enzymes, Vitamins, Trace elements, antioxidants Wetting agents & tears substitutes, Antioxidants	15
	<b>Total number of hours</b>	<b>45</b>

## BOP 303 OCULAR DISEASE-1

**INSTRUCTOR IN CHARGE:** Ophthalmologist or Optometrist with teaching experience (B Optom/ M Optom/ Ph D)

**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
7. 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, Pharmacology

**COURSE PLAN: (Theory: 60 Hours)**

1. Lids and adnexa
  - Applied anatomy
  - Congenital anomalies: Ptosis, coloboma, Epicanthus, Distichiasis, Cryptophthalmos
  - Oedema of the eyelids
  - Inflammatory disorders: Blepharitis, external hordeolum and internal hordeolum, chalazion
  - Anomalies in the position of the lashes and lid margin: Trichiasis, ectropion, entropion, symblepharon, blepharophimosis, lagophthalmos, blepharospasm & ptosis.
  - Tumours: Papillomas, Xanthelasma, Haemangioma, basal cell carcinoma, squamous cell carcinoma, sebaceous gland melanoma
2. Lacrimal system
  - Applied anatomy and physiology
  - Tear film
  - Dry eye
  - Watering eye (etiology, clinical evaluation)
  - Dacryocystitis
  - Dacryoadenitis
3. Conjunctiva
  - Applied anatomy & Physiology
  - Inflammations of conjunctiva: infective conjunctivitis, Bacterial, chlamydial, Viral, Allergic conjunctivitis
  - Degenerative conditions: Pinguecula, Pterygium, Concretions
  - Symptomatic conditions: Hyperaemia, chemosis, Ecchymosis, Xerosis, Discoloration
  - Cysts and tumours.
4. Lens
  - Applied anatomy & physiology
  - Classification of cataract
  - Congenital and developmental cataract
  - Acquired (Senile, traumatic, complicated, metabolic, electric, radiational & Toxic)
  - Morphological: Capsular, subcapsular, cortical, supranuclear, nuclear and polar.
  - Management of cataract (Non-surgical and surgical measures, preoperative evaluation, types of surgeries)
  - Complications of cataract surgery

- Subluxation & Dislocation, coloboma, lenticonus,
  - Microspherophakia.
5. Cornea & Sclera
- Applied anatomy and physiology
  - Episcleritis & scleritis
  - Congenital anomalies: Megalocornea, cornea plana, congenital cloudy cornea
  - Inflammations of the cornea: Topographical classifications: ulcerative keratitis and non-ulcerative. Etiological classifications: Infective, allergic, 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 vascularisation
  - Keratoplasty
6. Uveal tract
- Applied anatomy
  - Classification of Uveitis, Etiology & pathology
  - Anterior Uveitis, Posterior uveitis, Intermediate uveitis, Endophthalmitis, panophthalmitis
  - Tumour of uveal tract (melanoma)
  - Clinical examination of uveitis

## **BOP 304 VISUAL OPTICS- I**

**INSTRUCTOR INCHARGE:** Optometrist with optics teaching experience. Preferably postgraduate or undergraduate with more than 2 years of teaching experience.

**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 students 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.

**TEXTBOOK:**

1. A H Tunnacliffe: Visual optics, The Association of British Optician, 1987
2. AG Bennett & RB Rabbets: Clinical Visual optics, 3<sup>rd</sup> edition, Butterworth Heinemann, 1998

**REFERENCE BOOKS:**

1. MPKeating:Geometric,PhysicalandVisualoptics,2<sup>nd</sup>edition,Butterworth-Heinemann, USA, 2002
2. HL Rubin: Optics forclinicians, 2nd edition, Triadpublishingcompany. Florida, 1974.
3. H.Obstfeld:OpticinVision-Foundationsofvisualoptics&associatedcomputations,2nd edition,Butterworth, UK, 1982.
4. WJBenjamin: Borish'sclinicalrefraction,2<sup>nd</sup>edition,ButterworthHeinemann, Missouri, USA,2006
5. TGrosvenor:PrimaryCare Optometry,4<sup>th</sup>edition,Butterworth–heinneman,USA,2002

**PREREQUISITES:** Geometricaloptics, Physicaloptics, Ocular Physiology

**COURSE PLAN (Theory: 15 hours&Practical: 30 hours)**

1. Review ofGeometricalOptics: Vergenceand power
  - 1.1 Conjugacy,objectspaceandimagespace
  - 1.2 Spherical mirror; catoptric power
  - 1.3 Magnification
  - 1.4 Light and visual function
  - 1.5 Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Bi-refringence,Dichroism
  - 1.6 Aberration and application Spherical andChromatic
2. OpticsofOcular Structure
  - 2.1 Cornea and aqueous
  - 2.2 Crystallinelens
  - 2.3 Vitreous
  - 2.4 Schematicand reducedeye
3. MeasurementsofOpticalConstantsoftheEye
  - 3.1 Corneal curvatureand thickness
  - 3.2 Keratometry
  - 3.3 Curvature of the lensandophthlmo-phakometry
  - 3.4 Axial andaxisoftheeye
  - 3.5 BasicAspectsofVision.
    - 3.5.1 Visual Acuity
    - 3.5.2 Light and Dark Adaptation
    - 3.5.3 Colour Vision
    - 3.5.4 SpatialandTemporalResolution
    - 3.5.5 Science of Measuring visual performanceandapplicationto ClinicalOptometry
4. Refractiveanomaliesandtheir causes
  - 4.1 Etiologyof refractive anomalies
  - 4.2 Contributing variabilityand their ranges
  - 4.3 Populating distributionsofanomalies.
  - 4.4 Optical component measurements
  - 4.5 Growth of the eyein relation to refractive errors

### **Practical Topics**

1. Visual Acuity assessment- Different charts
2. Colour Vision assessment – Different types
3. Corneal curvature Measurement- Keratometry and corneal topography
4. Corneal thickness Measurement- Pachymetry
5. Lens thickness measurement- A-scan
6. Objective Retinoscopy- Spherical, Cylindrical and spherocylinder Refractive errors.

### **BOP 305 CLINICAL OPTOMETRY-II (Studentship: 90 hours)**

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

#### **Topics;**

1. History taking
2. Visual Acuity Assessment (Distance and near)
3. Hirschberg test
4. Cover test
5. HVID, Pupillary distance and corneal sensitivity
6. Pupil Evaluation
7. Colour vision Assessment-Ishihara
8. Confrontation field
9. Binocular vision status- Stereopsis, Worth for dot test, Amplitude of accommodation, NPC, NRA/PRA, Maddox Rod Phoria
10. Slit Lamp Biomicroscopy- Illumination Technique, Corneal and Conjunctival staining, Van Herick Method, Eversion of upper eyelids
11. Drugs used in routine clinical practice; Topical Anesthetic, Cycloplegic and Mydriatics, Dyes and Lubricating drops, Installation of eye drops
12. Schirmer test, TBUT, Tear Meniscus height, NIBUT
13. Amsler test
14. Tonometry, Digital pressure and GAT
15. Direct Ophthalmoscopy

### **BOP 306 OPTOMETRIC OPTICS**

## **OPTOMETRIC OPTICS**

**INSTRUCTOR INCHARGE:** Optometrist – Boptom/ MOptom/ PhD / FBDO

**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 the course:-

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

### **TEXTBOOK: REFERENCE BOOKS:**

1. Jalie M: The principles of Ophthalmic Lenses, The Association of Dispensing Opticians, London, 1994.
2. Jalie MO: Ophthalmic lens and Dispensing, 3rd edition, Butterworth–Heinemann, 2008
3. Troy E. Fannin, Theodore Grosvenor: Clinical Optics, 2nd edition, Butterworth – Heinemann, 1996
4. CW Brooks, IM Borish: System for Ophthalmic Dispensing, 3<sup>rd</sup> edition Butterworth- Heinemann, 2007
5. Michael P Keating: Geometric, Physical & Visual Optics, 2nd edition, Butterworth – Heinemann, 20021.
6. David Wilson: Practical Optical Dispensing, OTEN-DE, NSW TAFE Commission, 1999
7. CV Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth- Heinemann, USA, 1996

**PREREQUISITES:** Physical Optics, Geometrical Optics

### **COURSE PLAN (THEORY: 30 hours, Practical :30 hours)**

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

2. Prisms–Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel’s prisms, rotary prisms
3. Lenses–Definition, units, terminology used to describe, form of lenses
4. Vertex distance and vertex power, Effectivity calculations
5. Lens shape, size and types i.e. Spherical, cylindrical and Sphero-cylindrical
6. Transpositions –Simple, Toric and Spherical equivalent
7. Prismatic effect, centration, decentration and Prentice rule, Prismatic effect of Plano-cylinder and Sphero-cylinder lenses
8. Spherometer & Sag formula, Edge thickness calculations
9. Magnification in high plus lenses, Minification in high minus lenses
10. Tilt induced power in spectacles
11. Aberration in Ophthalmic Lenses.
12. Raw materials- history and general outline, Manufacturing of ophthalmic blanks- glass and plastics, Terminology used in lens workshop, surfacing process from blanks to lenses.
13. Definition and materials (glass, plastic, poly carbonate, triology) Types and characteristics
14. Properties (Refractive index, Specific gravity, UV cut off, Impact resistance- include drop ball test, Abbe value, Central thickness)
15. Best form of Lenses and safety standards for ophthalmic lenses (FDA, ANSI, ISI, Others)
16. Design of high power lenses- High index lenses, calculation of refractive index
17. Bifocal design, their manufacturing and uses (KRYPTOP, UNIVIS D, EXECUTIVE, INVISIBLE, OCCUPATIONAL)
18. Progressive additional lenses, Modified near vision lenses (Designs, advantages, Limitation)
19. Lens defects- Description and detection
20. Glazing and Edging (Manual and automatic)
21. Special lenses (•Iseikonic lenses, Recumbent prism, Fresnel prism and lenses, Lenticular & Aspherical lenses, Photochromic and polaroids, Tinted lens, Tints and filters)
22. History of spectacles, Manufacturing overview, definition, parts and measurement
23. Classification of frames- materials (cover in detail), colours and temple position, advantage and disadvantage, where to use)
24. Special purpose frames (sports, kids, reading)

**Practical Topics:**

1. Prism- Different types and uses
2. Lens power calculation- Lensometer and Hand Neutralization
3. Transpositions- Simple & Toric
4. Spherical Equivalent calculations
5. Vertex distance evaluation using stenopaic slit
6. Parts of spectacle frame
7. Bifocal Designs- Identification, Near Add power Calculation
8. Progressive lenses- Identification and Markings
9. Special purpose frames- Identification

**BOP 307 OPTOMETRIC INSTRUMENTS**

**INSTRUCTOR IN CHARGE:** Optometrist with experience in teaching instrument course (B.Optom/M.Optom/PhD) 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 students should be able to gain theoretical knowledge and basic practical skill in handling the following instruments

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

**TEXTBOOK:** David Henson: Optometric Instrumentations, Butterworth-Heinemann, UK, 1991

**REFERENCE BOOKS:**

1. P. 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 (Theory: 30)**

1. Refractive instruments
  - 1.1 Optotypes and MTF, Spatial Frequency
  - 1.2 Test chart standards.
  - 1.3 Choice of test charts
  - 1.4 Trial case lenses
  - 1.5 Refractor (phoropter) head units
  - 1.7 Trial frame design
  - 1.8 Near vision difficulties with units and trial frames



- 1.9 Retinoscope– typesavailable
- 1.10 Adjustment of Retinoscopes- special features
- 1.11 Objectiveoptometers.
- 1.12 Infraredoptometer devices.
- 1.13 Projection charts
- 1.14 Illumination oftheconsulting room.
- 1.15 Brightnessacuity test
- 1.16 Visionanalyser
- 1.17 Pupilometer
- 1.18 PotentialAcuity Meter
- 1.19 Abberometer
2. Ophthalmoscopesand related devices
  - 2.1 Design ofophthalmoscopes – illumination
  - 2.2 Design ofophthalmoscopes- viewing
  - 2.3 Ophthalmoscopedisc
  - 2.4Filtersforophthalmoscop  
y
  - 2.5 Indirect  
ophthalmoscope
3. Lensometer, Lens gaugesor clock
4. Slit lamp
5. Tonometers
6. Keratometer and corneal topography
7. Refractometer
8. OrthopticInstruments(Synaptophore Only)
9. Color Vision Testing Devices
- 10.FieldsofVisionAnd Screening Devices
- 11.Scans
- 12.ERG
- 13.NewInstruments

Practical: 30 hours.

**Practical Topics:**

1. Trail Box and its components
2. Visual Acuitycharts/drum- Identification
3. Visual acuity assessment using different charts- both distance and near
4. Choice of test charts- geriatric and paediatric
5. Objective Retinoscopy
6. Direct ophthalmoscopy
7. Slit lamp Biomicroscopy
8. Lensometry
9. GAT
10. Colour Vision devices and test procedure

## **BOP 308 ENVIRONMENTAL STUDIES**

### **Course Plan: (Theory: 15 hours)**

#### **Unit 1: Multidisciplinary nature of Environmental Studies**

- Multidisciplinary nature of Environmental Studies
- Concept of sustainability and sustainable development

#### **Unit 2: Ecosystems**

- What is an ecosystem? Structure and function of an ecosystem; Energy flow in the ecosystem; Food chains, food webs and ecological succession. Case studies of the following ecosystems:
  - a. Forest ecosystem
  - b. Grassland ecosystem
  - c. Desert ecosystem
  - d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
- History of ecosystem ecology
- Ecosystem services

#### **Unit 3: Natural Resources:**

##### **Renewable and Non renewable resources**

- Land resources and land use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).
- Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

#### **Unit 4: Biodiversity and its conservation**

- Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hotspots
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Pollution case studies.
- Nature Reserves, tribal populations and rights, Human wildlife conflicts in Indian context

#### **Unit 5: Environmental Pollution**

##### **Definition**

Cause, effects and control measures of:-

- a. Air pollution
- b. Water pollution
- c. Soil pollution
- d. Light pollution
- e. Noise pollution
- f. Thermal pollution

- Climate change, Green house effect, Global warming, Acid rain, Ozone layer depletion.  
Solid waste Management: control measures of urban and industrial wastes.
  - g. Nuclear hazards
- Pollution case studies

## **BOP 309 MEDICAL RECORDS**

### **INSTRUCTOR INCHARGE:**

Hospitaladministrative professional

**COURSE DESCRIPTION:** Students will gain knowledge in Medico legal aspects of medical records and Confidentiality regarding medical information.

**TEXTBOOK:** Faculty to recommend

**REFERENCE BOOKS:**Faculty to recommend

### **COURSE PLAN (Total: 15 hours)**

- **Introduction to medical records**
  - Types of medical records
  - Components medical records
  - Uses of medical records
- **Medico legal aspects of medical records**
  - What is MLC
  - Types of MLC
  - Records and documentation related to MLC
  - Medical Record in count
  - Preparation of Medical Record for count
- **Confidential communication**
  - Professional secrecy Privileged communication
  - Release of patient information and types
  - Unauthorized disclosure
- **Other Legal aspects**
  - Consents, Types
  - Patient leaving against medical advice
  - Patient absconding from wards
  - Consumer protection – Medical negligence
  - Instances in which medical records is used as legalevidence
  - Procedure for release of medical info in legal case

## **Fourth Semester**

## **BOP 401 OCULAR DISEASE-II**

INSTRUCTOR INCHARGE: Ophthalmologist

CO-INSTRUCTORS: Optometrist (Minimum UG in Optometry)

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

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

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

**COURSE PLAN:** (Theory: 60 Hours)

1.Retina and vitreous:

- Applied anatomy
- Congenital and developmental disorders (optic disc: coloboma, drusen, hypoplasia, medullated nerve fibres, persistent hyaloid artery)
- Inflammatory disordersretinitis: Acute purulent, Bacterial, viral, mycotic)
- Retinal vasculitis(Eales's Disease)
- Retinal artery occlusion(CRAO)
- 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 oedema, Age related macular degeneration.
- Diabetic retinopathy
- 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(extraocular foreign bodies, blunt trauma, perforating injury, sympathetic ophthalmitis)

- Non-mechanical injuries(chemical, thermal, electrical, radiational)
- Clinical approach towards ocular injury patients

### 3.clinical neuro-ophthalmology

- Anatomy and 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
- Cortical blindness
- Nystagmus
- Malingering

### 4.Glaucoma

- Applied anatomy and physiology of anterior segment
- Clinical examination
- Definitions and classifications of glaucoma
- Pathogenesis of glaucomatous ocular damage
- Congenital glaucoma
- Primary open angle glaucoma
- Ocular hypertension
- Normal tension glaucoma
- Primary angle closure glaucoma
- Secondary glaucoma
- Management: common medications, laser interventions and surgical techniques.

### 5.Orbit

- Applied anatomy
- Proptosis
- 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 tumours (dermoid, capillary haemangiomas, optic nerve glioma)
- Orbital blow out fractures
- Orbital trauma
- Approach to a patient with proptosis.

Practical : 30 hours

#### **Practical topics:**

1. Pupillary reflexes
2. IOP measurement- GAT

3. Amsler's test
4. Pachymetry- Corneal thickness relation with IOP
5. Slit lamp- All techniques in detail, Van Herick Methods
6. Fundus evaluation using 90D
7. Fundus evaluation using Direct ophthalmoscope
8. Exophthalmometry- Proptosis evaluation
9. Antiglaucoma drugs

## **BOP 402 SYSTEMIC DISEASE**

**INSTRUCTOR INCHARGE:** General Medicine professional

**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

### **TEXTBOOKS:**

1. CHaslett, ERChilvers, NAboon, NRColeedge, JAAHunter: Davidson's Principles and Practice of Medicine Ed. John Macleod, 19<sup>th</sup> 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 (Theory :30 hours)**

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, Hypothyroidism, Thyroiditis, Thyroid tumours
  - 3.2 Grave's Ophthalmopathy
4. Acquired Heart Disease

- 4.1 Ischemic HeartDisease,Congestiveheartfailure,Disordersofcardiacrhythm
- 4.2 Ophthalmic considerations
5. Cancer:
  - 5.1 Incidence
  - 5.2 Etiology
  - 5.3 Therapy
  - 5.4 Ophthalmologic considerations
6. Connective TissueDisease
  - 6.1 Rheumaticarthritis
  - 6.2 Systemiclupuserythematosus
  - 6.3 Scleroderma
  - 6.4 Polymyositisand dermatomyositis
  - 6.5 Sjogrensyndrome
  - 6.6 Behcet's syndrome
  - 6.7 Eyeandconnectivetissuedisease
7. Tuberculosis
  - 7.1 Aetiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complications, treatment tuberculosisand the eye.
8. Herpesvirus(Herepessimplex, VaricellaZoster, Cytomegalovirus, Epstein BarrVirus)
  - 8.1 Herpesand the eye
9. Hepatitis (HepatitisA, B, C)
- 10.AcquiredImmunodeficiencySyndrome
- 11.Anemia(Diagnosis, clinical evaluation, consequences, Sickle cell disease, treatment, Ophthalmologic considerations)
- 12.CommonTropical Medical Ailments
  - 12.1 Malaria
  - 12.2 Typhoid
  - 12.3 Dengue
  - 12.4 Filariases
  - 12.5 Onchocerciasis
  - 12.6 Cysticercosis
  - 12.7 Leprosy
- 13.NutritionalandMetabolicdisorders:
  - 13.1 Obesity
  - 13.2 Hyperlipidaemias
  - 13.3 Kwashiorkor
  - 13.4 Vitamin A Deficiency
  - 13.5 Vitamin D Deficiency
  - 13.6 Vitamin EDeficiency
  - 13.7 Vitamin K Deficiency
  - 13.8 VitaminB1,B2, Deficiency
  - 13.9 Vitamin CDeficiency
- 14.MyastheniaGravis
- 15.First Aid General Medical EmergenciesPreoperativeprecautionsin ocular surgeries

16. Psychiatry

16.1 Basic knowledge of psychiatric condition and Patient Management

17. Genetics

17.1 Introduction to genetics

17.2 Organisation of the cell

17.3 Chromosome structure and cell division

17.4 Gene structure and basic principles of Genetics.

17.5 Genetic disorders and their diagnosis.

17.6 Genes and the eye

**Practical : 30 hours**

1. Height and weight measurement, BMI Calculation
2. Blood pressure Assessment
3. Sugar level Assessment
4. Pulse rate Assessment
5. ECG Report interpretation
6. First Aid General Medical Emergencies
7. Preoperative precautions in ocular surgeries.
8. Hypertensive retinopathy fundus Evaluation
9. Diabetic Retinopathy Fundus Evaluation
10. Graves Ophthalmopathy ocular examination.

## **BOP 403 VISUAL OPTICS - II**

**INSTRUCTOR INCHARGE:** Optometrist (M. Optom/PhD)

**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 and practical skill on visual acuity measurement, objective and subjective clinical refraction. knowledge

**TEXTBOOK/REFERENCE BOOKS:**

1. Theodore Grosvenor: Primary Care Optometry, 5th edition, Butterworth –Heinemann, 2007
2. Duke–Elder's practice of Refraction
3. Allens: Optics, Retinoscopy, and Refractometry: 2<sup>nd</sup> edition, SLACK Incorporated (p) Ltd, 2006
4. George K. Hans, Kenneth Cuiffreda: Model 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**

Sl. No	Topics	No. of Hrs
1.	Accommodation & Presbyopia <input type="checkbox"/> Far and near point of accommodation <input type="checkbox"/> Range and amplitude of accommodation <input type="checkbox"/> Mechanism of accommodation <input type="checkbox"/> Variation of accommodation with age	6
2.	<input type="checkbox"/> Anomalies of accommodation <input type="checkbox"/> Presbyopia <input type="checkbox"/> Hypermetropia and accommodation	
3.	Convergence: <input type="checkbox"/> Type, Measurement and Anomalies <input type="checkbox"/> Relationship between accommodation and convergence-AC/A ratio	3
4.	Objective Refraction (Static & Dynamic) <input type="checkbox"/> Streak retinoscopy <input type="checkbox"/> Principle, Procedure, Difficulties and interpretation of findings <input type="checkbox"/> Transposition and spherical equivalent <input type="checkbox"/> Dynamic retinoscopy various methods <input type="checkbox"/> Radical retinoscopy and near retinoscopy <input type="checkbox"/> Cycloplegic refraction	8
5.	Subjective Refraction: <input type="checkbox"/> Principle and fogging <input type="checkbox"/> Fixed astigmatic dial (Clock dial) Combination of fixed and rotator dial (Fan and block test), J.C.C <input type="checkbox"/> Duochrome test Binocular balancing - alternate occlusion, prism dissociation, dissociate Duochrome balance, Borish dissociate fogging Binocular refraction - Various techniques	8

6.	<b>Effective Power &amp; Magnification:</b> <input type="checkbox"/> Ocular refraction vs. Spectacle refraction <input type="checkbox"/> Spectacle magnification vs. Relative spectacle magnification <input type="checkbox"/> Axial vs. Refractive ametropia, Knapp's law <input type="checkbox"/> Ocular accommodation vs. Spectacle accommodation <input type="checkbox"/> Retinal image blur-Depth of focus and depth of field	<b>5</b>
	<b>Total number of hours</b>	30 hours

Practical : 30 hours

**Practical Topics:**

1. Convergence and its measurements- NPC different methods
2. Accommodation- NPA
3. Amplitude of Accommodation
4. Objective refraction static- Review
5. Dynamic Retinoscopy- Different Methods
6. Subjective refraction in detail- Procedure, JCC
7. Fogging
8. Duochrome test
9. Binocular balancing
10. Cycloplegic Retinoscopy

**BOP 404 DISPENSING OPTICS**

**Instructor Incharge:** Optometrist(PhD/M.Opom/B.Optom) with experience in dispensing optics.

**Course description:** This course will deal with the dispensing aspects of spectacle lenses and frames needed to manage the customer in an optical set up, from counselling of delivering the spectacles.

**Objectives:** Skills to be acquired at the end of the course

- Reading of Spectacle prescription
- Counselling the patient
- Lens edge thickness calculation
- Frame and lens measurements and selection
- Writing spectacle lens order
- Facial Measurements- Inter pupillary distance measurements and measuring heights (single vision, multifocal, progressive)
- Lens verification and axis marking and fitting of all lens types
- Final checking of finished spectacle with frame adjustments

- Delivery and follow-ups
- Trouble shooting and handling patient's questions

**Text book/Reference books:**

- C V Brooks,IMBorish: system for ophthalmic dispensing, second edition, Butterworth-Heinemann, USA, 1996
- Jalie MO: Ophthalmic lens and dispensing,3<sup>rd</sup> edition, Butterworth-Heinmann,2008

**Prerequisites:** Optometric optics

**COURSE PLAN: (Theory: 30)**

- Components of spectacle prescription & interpretation, Transposition, Add and Near power relation.
- Frame Selection- based on spectacle prescription, professional requirements, age group, face shape
- Measuring inter-pupillary distance for distance and near, bifocal height
- Lens & Frame markings, Pupillary centers, bifocal heights, progressive markings and adjustments-facial wrap, Pantoscopic tilt
- Recording and ordering of lens (power, add, diameter, base, material, type, lens enhancements
- Neutralization – Hand & Lensometer, Axis marking, Prism marking
- Faults in spectacles (Lens fitting, Frame fitting, patient complaints, description, detection and correction.
- Final checking & Dispensing of spectacles to customers, Counselling on wearing & Maintenance of spectacles, Accessories-Bands, Chains, Boxes, Slevets, cleaners, screw driver kit
- Spectacle repairs- tools, methods, soldering, riveting, frame adjustments
- Special types of spectacle frames: Monocles, Ptois Crutches, Industrial safety glasses, welding glass
- Frame availability in indian market
- Common FAQ's by customers

**PRACTICAL: 30 HOURS**

**Practical Topics:**

1. Components of spectacle prescription & interpretation
2. Transpositions- Simple and Toric.
3. Measuring inter-Pupillary distance for distance and near, bifocal height
4. Progressive Lens- Markings
5. Neutralization – Hand & Lensometer, Axis marking, Prism marking.
6. Final checking & Dispensing of spectacles to customers, Counselling on wearing & Maintenance of spectacles, Accessories-Bands, Chains, Boxes, Slevets, cleaners, screw driver kit

7. Spectacle repairs- tools, methods, soldering, riveting, frame adjustments

### **BP 405 CLINICAL OPTOMETRY-III (75 HOURS)**

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

#### **Topics**

1. Objective and subjective refraction with spectacle prescription
2. Colour vision charts- Ishihara Chart and Fransworth D15 test, clinical procedure and Interpretation
3. GAT
4. Gonioscopy-Instrumentation and clinical significance
5. Assessment of Visual Field: Perimeters, HFA report interpretation
6. Fundus Biomicroscopy(+78D or +90D) Optical principle, clinical procedure and documentation
7. Ophthalmoscopes- Direct and Indirect: Clinical procedure and documentation
8. Electrophysiology(ERG, VEP and EOG)
9. FFA, A-Scan, Pachymetry
10. OCT

### **BOP 406 COMMUNITY OPTOMETRY**

**INSTRUCTOR INCHARGE:** Public Health professional or optometrist with public health and community optometry experience

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

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

1. Community based eye care in India.
2. Prevalence of various eye diseases
3. Developing Information Education Communication material 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

**TEXTBOOKS:**

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:** MCGupta, Mahajan BK, Murthy GVS, 3<sup>rd</sup> 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 (Theory:30 hours)**

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

**Practical topics:**

1. Geriatric and paediatric history taking in detail.
2. Screening for eye diseases in camps
3. Optometrists role in school eye health programmes- Paediatric- visual acuity testing using different charts, Refractive error assessment, EOM, Assessment of Colour vision and stereopsis

4. Role of an optometrist in Public Health- Geriatric-Visual acuity testing using different charts, Refractive error assessment, spectacle prescription, Counselling and referral to Hospitals.
5. Subjective Retinoscopy- Trial and error Method
6. Near correction prescription according to the age.
7. Identification of common ocular diseases or abnormalities during community works.

## **BOP 407 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.

### **COURSE PLAN: (Total: 7.5 hours)**

1. Quality assurance and management
  - What is quality?
  - Methods of Quality improvement.
  - What is Quality in health care.
2. Basics of emergency care and life support skills
  - BLS for Adults
  - BLS for paediatrics
  - BLS for Infants
  - Foreign body Management
  - Airway Block Management
3. Biomedical waste management
  - Definition of Biomedical waste
  - Classification of Health care waste: Infectious, pathological, sharps, pharmaceutical, genotoxic, chemical waste, waste with high content of heavy metal, Pressurized containers, radioactive waste.
  - Common Health hazards and needs of biomedical waste management in health care.
  - Biomedical waste management process
  - Colour coding of waste containers.
4. Infection and prevention control
  - Definition & Types of Infection
  - Prevention control Methods: Disinfection, Sterilization, usage of Gas/ UV rays for removal of infections
5. Antibiotic resistance
6. Disaster preparedness and management

- Electrical & Fire Hazards preparedness
- General safety concerns

## **BOP 408 MEDICAL PSYCHOLOGY**

**INSTRUCTOR INCHARGE:** Clinical psychologist (PhD / M.phil / Post Graduate)

### **Course Plan:**

1. Introduction to psychology
2. Intelligence-Definition, Theories, meaning and classification.
3. Learning- Definition, Theories, nature, types & factors influencing.
4. Memory-Definition, Theories, meaning, types & factors influencing.
5. Self-concept of the therapist, Therapist patient relationship- some guidelines
6. Illness and its impact on the patients
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-5 psychological stages in Low vision Patients.
9. Why medical psychology needs/ demands commitment

**Total number of lectures: 7.5 hours**

## **FIFTH SEMESTER**

### **BOP 501 CONTACT LENS-I**

**INSTRUCTOR INCHARGE:** B.Optomeroptometrists with higher qualification.

**COURSE DESCRIPTION:** This 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 of patients
4. Recognize various types of fitting
5. Explain all the procedures to patient
6. Identify and manage the adverse effects of contact lens

### **TEXTBOOKS:**

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, VA 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 (Theory: 30)**

1. Introduction to Contact lenses
  - 1.1 Definition
  - 1.2 Classification / Types
2. History of Contact Lenses
3. Optics of Contact Lenses
  - 3.1 Magnification & Visual field
  - 3.2 Accommodation & Convergence
  - 3.3 Back & Front Vertex Power / Vertex distance calculation
4. Review of Anatomy & Physiology of
  - 4.1 Tear film
  - 4.2 Cornea
  - 4.3 Lids & Conjunctiva
5. Introduction to CL materials
  - 5.1 Monomers, Polymers
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 – steps, significance, recording of results
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 Rigid Contact Lenses – writing a prescription to the Laboratory
17. Checking and verifying Contact lenses from Laboratory
18. Modifications possible with Rigid lenses
19. Common Handling Instructions
  - 19.1 Insertion & Removal Techniques
  - 19.2 Do's and Don't's
20. Care and Maintenance of Rigid lenses



- 20.1 Cleaning agents& Importance
- 20.2 Rinsing agents& Importance
- 20.3 Disinfecting agents& importance
- 20.4 Lubricating &Enzymaticcleaners
- 21.Followup visit examination
- 22.ComplicationsofRGPlenses

**PRACTICAL(Total:30hours)**

- 1. Measurement ofOcular dimensions
- 2. Pupillary diameter and lidcharacteristics
- 3. Blink rate and TBUT
- 4. Schimerstest, Slit lamp examination oftear layer
- 5. Keratometry
- 6. Placido'sdisc
- 7. SoftContact Lens fitting– Aspherical
- 8. SoftContactLensfitting– Lathecut lenses
- 9. SoftContact 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 Assessmentand fluorescein pattern
- 15.SpecialRGP fitting (Aphakia, pseudo phakia&Keratoconus)
- 16.RGPoverrefraction andLens flexure
- 17.Examination ofold RGPLens
- 18.RGP Lens parameters
- 19.Slit lamp examination ofContact Lenswearers

**BOP 502BINOCULAR VISION-I**

**INSTRUCTOR INCHARGE:** OptometristswithB. Optomand experience in Binocular vision course teaching. Or M. Optomorspecialisedfellowship in Binocular vision optometry.

**COURSE DESCRIPTION:**ThiscourseprovidestheoreticalaspectsofBinocularVisionand its clinicalapplication. It dealswithbasisofnormalbinocular vision and spaceperception, Gross anatomy and physiology ofextraocularmuscles, variousbinocular vision anomalies, itsdiagnosticapproachesand management.

**COURSE OBJECTIVES:**Onsuccessfulcompletionofthismodule,astudent will be expected to be ableto:-

- 1.Demonstrateanin-depthknowledgeofthegrossanatomyandphysiologyrelatingtothe extra-ocular muscles.

2. Provide a detailed explanation of, and differentiate between the etiology, investigation and management of binocular vision anomalies.
3. Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely.

**TEXTBOOKS:**

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

**PREREQUISITES:** Ocular anatomy, Physiology

**COURSE PLAN (Theory: 30 hours)**

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

- 6.1 Definition and mechanism (process).
- 6.2 Methodsofmeasurement.
- 6.3 Stimulusandinnervation.
- 6.4 Typesofaccommodation.
- 6.5 Anomaliesofaccommodation– aetiologyand management.
7. Convergence
  - 7.1 Definition and mechanism.
  - 7.2 Methodsofmeasurement.
  - 7.3 Typesandcomponentsofconvergence- Tonic, accommodative, fusional, proximal.
  - 7.4 AnomaliesofConvergence– aetiology and management.
8. Sensory adaptations
  - 8.1 Confusion
9. Suppression
  - 9.1 Investigations
  - 9.2 Management
  - 9.3 Blind spot syndrome
- 10.AbnormalRetinalCorrespondence
  - 10.1 Investigation and management
  - 10.2 Blindspot syndrome
- 11.Eccentric Fixation
  - 11.1 Investigation and management
- 12.Amblyopia
  - 12.1 Classification
  - 12.2 Aetiology
  - 12.3 Investigation
  - 12.4 Management

**Practical: 30 hours**

**Practical Topics:**

1. Extra ocular Motility
2. Stereopsis- Different Methods
3. Fusion &Supression- Worth 4 Dot test
4. Saccades and Pursuits
5. Measurements of Convergence and Accommodation, AC/A ratio, Amplitude of accommodation
6. Cover test- PBCT

## **BOP 503LOW VISION CARE**

**COURSE COMPETENCIES:**

1. Ability to diagnose and managepatientswith vision impairment

2. Ability to perform specialized diagnostics
  - 2.1 Rudimentary vision
  - 2.2 Berkeley visual field test
  - 2.3 Hand disc perimetry
3. Ability to train forecentric viewing and steady eye techniques
4. Ability to rehabilitate patients with vocational counselling and activities of daily living

**Course plan: Theory: 15 hours**

1. Definition and classifications
2. Common causes of Low vision- corneal, Refractive media and Retina
3. Epidemiology of Low vision and Model of low vision service
4. Pre- clinical evaluation of Low vision clinic- Psychological impact of Low vision
5. History taking in Low vision
6. Clinical evaluation of Low vision patient
7. Optics of Low vision Aids-Methods of Magnification
8. Types of Low vision Aids, Optical aid, Non-optical aid and electronic Device
9. Selection of Low vision aids, Instruction and training, dispensing and prescribing aspects
10. Choice of test and aids in various pathological condition
11. Paediatric low vision care
12. Visual rehabilitation and counselling
13. Legal aspects of Low vision in India
14. Case analysis

**Practical: 30 hours**

PRACTICALS (Total: 15 hours)

- 1: Attending in low vision care clinic and history taking in Low vision patients.
- 2: 2.1 Determining the type of telescope and its magnification  
2.2 Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers.  
3. 3.1 Inducing visual impairment and prescribing magnification, Identifying different Optical and Non optical Devices.  
3.2 Determining reading speed with different types of low vision aids with same magnification.  
3.3 Determining reading speed with a low vision aid of different magnifications.

**BOP 504 OCCUPATIONAL OPTOMETRY**

**Instructor Incharge:** Optometrist(Phd/M.optom/B.optom)

Course description: This course deals with general aspects of occupational health, Visual

demand in various Job, Task analysing method, visual standards for various job, occupational hazards and remedial aspects through class room sections and field visit to the factories.

**Objectives:** At the end of the course student should be knowledgeable in the following aspects,

- Visual requirements of job
- Effect of physical, chemical and other hazards on eye and vision
- Identifying occupational causes of visual and eye problems
- Able to prescribe suitable corrective lenses and eye protective wear
- To set visual requirements, standard for different jobs.

**Textbook/ Reference books:**

Rachel V North: Work and the Eye, second Edition, Butterworth-Heinemann, 2001

Gordon H Carson: Environmental and occupational optometry, Butterworth-Heinemann, 2009

**Topics:**

1. Introduction to occupational health, Hygiene and safety, international bodies like ILO, WHO, National bodies etc.
2. Light- Definition and units, Source and standards.
3. Colour- Definition, Colour theories, Colour coding, colour defects, colour vision test
4. Electromagnetic radiation and its effects on eye.
5. Occupational hazards and preventive/Protective methods.
6. Vision standards- Railways, Road ways, Airlines.
7. Visual display units-CVS
8. Contact lens and work

**Total number of hours: 15 hours**

### **BOP 505 CLINICAL OPTOMETRY (90 hours)**

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 procedure in those areas. Students will participate in advanced and specialized diagnostic and management procedure. Students will get practical experience of the knowledge acquired from geriatric and paediatric optometry courses. Hands-on experience under supervision will be provided in various outreach programmes namely school vision screening, glaucoma and diabetic retinopathy screening etc., Students also get hand-on practical sessions on the following courses namely, **contact lens, Binocular vision, low vision care, occupational optometry.**

### **BOP 506 NURSING PROCEDURES**

**INSTRUCTOR IN CHARGE:** Nursing Professional

**COURSE OBJECTIVES:**The objective of this course is to help the students understand the basic principles regarding admission, pre-operative, post-operative and important infection control nursing procedures.

**TEXTBOOKS:** Faculty to recommend

**COURSE PLAN (Total: 30 Practical hours)**

1. Philosophy of nursing service
2. Universal Precautions
3. Infection Control measures in the hospital
  - a. Hand Washing
  - b. Gown technique
  - c. Face mask
  - d. Gloves
  - e. Environmental cleaning
  - f. Nosocomial infection
4. Admission Procedures
  - a. Type of admission
  - b. Medico Legal Cases (MLC)
  - c. Brought dead to emergency
  - d. Admission of the patient
5. Monitor vital signs
  - a. Temperature
  - b. Pulse
  - c. Respiration
  - d. Bp
6. Injection
  - a. Intra-dermal
  - b. Hypodermic(subcutaneous) injection
  - c. Intramuscular injection
  - d. Intravenous injection (cannulation technique)
7. Topical medications
  - a. Instillation of drops/ointment
  - b. Nasal Instillation
  - c. Nebulizers
8. First aid- Principles of first aid
9. Shock and its management
10. CPR
11. Managing an unconscious patient
12. Suffocation
  - a. Chocking
  - b. Asthma
  - c. Suffocation by smoke and poisonous gas.

## **BOP 507 RESEARCH METHODOLOGY AND BIOSTATISTICS**

**INSTRUCTOR IN CHARGE:** Biostatistician/Epidemiologist or Higher optometry holder with experience in biostatistics and research methodology

**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.

### **TEXTBOOKS:**

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, 2<sup>nd</sup> Ed., University Park Press, Baltimore.
3. Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4<sup>th</sup> edition, Springs, 2015

### **Course Plan:**

#### **Research Methodology**

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

#### **Biostatistics**

1. Basics of Bio-statistics
  - 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

## **RESEARCH PROJECTS**

Team of students will be doing a research project under the guidance of a supervisor (who could be optometrists/vision scientists/ ophthalmologist).

Student will get the experience of doing a research in systematic approach –

Topics to be covered under fifth semester,

1. Identifying the primary question,
2. Literature search,
3. Identifying the gaps in the literature,
4. Identifying the research question,
5. Writing up the research proposal
6. Ethical clearance.

Followed by Ethical clearance the data collection and thesis writing will be continued in Sixth semester.

## **Sixth semester**

### **BOP 601 CONTACT LENS-II**

**INSTRUCTOR INCHARGE:**B.Sc.Optometristsor with higher qualification

**COURSE DESCRIPTION:**This 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 of patients
4. Recognize various types of fitting
5. Explain all the procedures to patient
6. Identify and manage the adverse effects of contact lens

#### **TEXTBOOKS:**

1. IACLE modules 1-10
2. CLAO Volumes 1, 2, 3
3. Anthony J. Phillips: Contact Lenses, 5<sup>th</sup> 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, 3<sup>rd</sup> edition, Lippincott Williams and Wilkins, 2008

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



**COURSE PLAN: Total: 30 hours**

1. SCL Materials & Review of manufacturing techniques
2. Comparison of RGP vs. SCL
3. Pre-fitting considerations for SCL
4. Fitting philosophies for SCL
5. Fit assessment in Soft Contact Lenses: Types of fit – Steep, Flat, Optimum
6. Calculation and finalising SCL parameters
  - 6.1 Disposable lenses
  - 6.2 Advantages and availability
7. Soft Toric CL
  - 7.1 Stabilization techniques
  - 7.2 Parameter selection
  - 7.3 Fitting assessment
8. Common Handling Instructions
  - 8.1 Insertion & Removal Techniques
  - 8.2 Do's and Don't's
9. Care and Maintenance of Soft lenses
  - 9.1 Cleaning agents & Importance
  - 9.2 Rinsing agents & Importance
  - 9.3 Disinfecting agents & importance
  - 9.4 Lubricating & Enzymatic cleaners
10. Follow up visit examination
11. Complications of Soft lenses
12. Therapeutic contact lenses
  - 12.1 Indications
  - 12.2 Fitting consideration
13. Specialty fitting
  - 13.1 Aphakia
  - 13.2 Paediatric
  - 13.3 Postrefractive surgery
14. Management of Presbyopia with Contact lenses

**PRACTICAL (Total: 30 hours)**

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

12. Ortho K contact Lens

**BOP 602 BINOCULAR VISION II**

**INSTRUCTOR INCHARGE:** Optometrists with B. Optom and experience in Binocular vision course teaching. Or M. Optom or specialised fellowship in Binocular vision optometry.

**COURSE DESCRIPTION:** This course provides the theoretical aspects of Binocular Vision and its clinical application. It deals with the 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 extra-ocular muscles.
2. Provide a detailed explanation of, and differentiate between the aetiology, investigation and management of binocular vision anomalies.
3. Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely.

**TEXTBOOKS:**

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: Binocular vision and ocular motility, 4<sup>th</sup> Ed. Mosby Company
4. Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincott Williams & Wilkins publishers

**Course Plan**

Theory – 30 hours

1. Classification of neuromuscular Anomalies of the eyes
2. Qualitative and quantitative diagnosis of strabismus
  - a. History
  - b. Examination and Test
  - c. Diagnosis and management
  - d. Pseudo strabismus
3. Classification and aetiology, clinical characteristics, tests and management of
  - a. Comitant esodeviation and exodeviation
  - b. A-V Phenomenon
  - c. Cyclo vertical squint, DVD, DHD and Cyclo deviation
4. Paralytic strabismus

- a. Paralysis of individual extra ocular muscles
- b. Clinical characteristics, diagnostic test and management
5. Special forms of strabismus
  - a. Duane's retraction syndrome
  - b. Brown's syndrome
  - c. Strabismus fixus
  - d. Fibrosis of extra ocular muscles
  - e. Grave's endocrine Ophthalmopathy
  - f. Cyclic Heterotropia
  - g. Fractures of orbital wall
  - h. Myasthenia Gravis
  - i. Chronic progressive external Ophthalmoplegia
6. Nystagmus
  - a. Types, aetiology, clinical characteristics and treatment
7. Management of Strabismus
  - a. Nonsurgical - Optical, Pharmacological and Orthoptics
  - b. Surgical Management

**Practical Topics:**

1. Strabismus History taking and evaluation tests
2. Modified Thorington card, Maddox rod Phoria , Double Maddox Rod
3. Krimsky and Modified Krimsky
4. Diplopia Charting
5. Extra ocular motility
6. Prism correction for strabismus
7. Parks three step test
8. Nystagmus- Clinical evaluation.

**BOP 603 GERIATRIC AND PEDIATRIC OPTOMETRY**

**INSTRUCTOR INCHARGE:**B.Sc.Optometrists or with higher qualification

**COURSE DESCRIPTION:**the subject provides the student with suitable knowledge both in theoretical and practical aspects of ocular health in geriatric and paediatric populations.

**Course plan (Total number of hours: 30)**

1. History taking in paediatric subjects
2. Assessment of visual acuity
3. Normal appearance, Pathology and structural anomalies (orbit, eyelids, lacrimal system, conjunctiva, cornea, sclera, anterior chamber, uveal tract, pupil, lens, vitreous, fundus)
4. Refractive examination
5. Determination of binocular status and sensory motor adaptation.
6. Compensatory treatment and remedial therapy for myopia, pseudo-myopia, hyperopia, astigmatism, anisometropia, amblyopia
7. Remedial and compensatory treatment of strabismus and nystagmus
8. Paediatric eye disorders: Cataract, ROP, Retinoblastoma, Neuromuscular conditions (Myotonic dystrophy, Mitochondrial cytopathy and genetics)

9. Spectacle dispensing for children
10. Paediatric contact lens
11. Introduction to geriatric medicine- epidemiology, Need for optometric care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, Congestive heart failure, cerebrovascular disease, diabetic)
12. Optometric examination of older adults
13. Ocular diseases common in old eye with special reference to cataract, glaucoma, macular disorder, vascular diseases of the eye.
14. Contact lens in elderly
15. Spectacle dispensing in elderly- Consideration of spectacle lenses and frame.

## **BOP 604 OPERATION THEATRE TECHNIQUES**

**INSTRUCTOR INCHARGE:** Nursing Professional

**COURSE OBJECTIVES:** The objective of this course is to help the students understand the basic principles regarding admission, pre-operative, post-operative and important infection control as well as Operation theatre procedures.

**TEXTBOOKS:** Faculty to recommend

### **COURSE PLAN (15 Theory hours)**

7. Patient unit
8. Universal Precautions
9. Infection Control measures in the hospital
  - Hand Washing
  - Gown technique
  - Face mask
  - Gloves
  - Environmental cleaning
  - Nosocomial infection
10. Disinfection
  - Concurrent disinfection
  - Terminal disinfection
  - Solutions used for disinfection
11. Fumigation
12. Bio-medical waste Management
  - Steps of bio-medical waste management according to KSPCB
  - Preparing disinfection solution-hypochlorite solution
  - Liquid biomedical waste

- Management of solid waste
  - Cleaning of spills
  - Accidental exposure
  - Do's and Don'ts of waste management
13. Preparation of patient for anaesthesia
    - General Anaesthesia
    - Spinal Anaesthesia
  14. Operation room/ Theatre
  15. Hazards in the surgical suite
  16. Pre-operative care
- Date of surgery: immediate preparation  
Pre-operative Checklist
17. Post-Operative Care
  18. Eye donation

**PRACTICAL: 30 HOURS**

### **BOP 605 CLINICAL OPTOMETRY V (90 hours)**

The course is the final series of five directed clinical courses. The student will complete the clinical training by practicing all these skills learned in classroom and clinical instruction. Practical aspects of **contact lens II, Binocular vision II** will be covered under the studentship.

### **BOP 606 PRACTICE MANAGEMENT**

**INSTRUCTOR IN CHARGE:** Management professional with masters' qualification in Management or Optometrist with experience of running private clinical services

**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.

**TEXTBOOKS:** Faculty to recommend

**REFERENCE BOOKS:**

Faculty to recommend

**PREREQUISITES:**

Basic Clinical experience

**COURSE PLAN (Total: 15hours)**

1. BusinessManagement:
  - 1.1 Practice establishment anddevelopment
  - 1.2 Stock control and costing
  - 1.3 Staffing and staff relations
  - 1.4 Businesscomputerization
2. Accounting Principles
  - 2.1 Sourcesof finance
  - 2.2 Bookkeeping and cash flow
3. Taxation and taxation planning
4. Professionalism and Values
  - 4.1 Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality
  - 4.2 Personal values-ethical or moral values
  - 4.3 Attitude andbehaviour-professionalbehaviour, treating peopleequally
  - 4.4 Code ofconduct, professional accountability and responsibility, misconduct
  - 4.5 Differences between professionsand importance ofteam efforts
  - 4.6 Cultural issuesin the healthcare environment

**BOP 607 RESEARCH PROJECTS (TOTAL 60 HOURS)**

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

**Clinical Internship**

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 6 hours per day and this may be more depending on the need and the healthcare setting.

**CONTACT DETAILS**

BSc in Optometry course  
Department of Ophthalmology  
Yenepoya Medical college  
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Deralakatte, Mangalore