



**SYLLABUS**

**Bachelor of Optometry (B. Optom)**

**First Semester (0-6 months)**

Subject code	Course Titles	Hours Per Week		Theory Marks		Practical Marks		Total	CR
		L	T/P	Internal	External	Internal	External		
BOP-101	General Anatomy	4	1	40	60	-	-	100	5
BOP-102	General Physiology	4	1	40	60	40	60	200	5
BOP-103	General Biochemistry	4	1	40	60	-	-	100	5
BOP-104	Geometrical Optics-1	5	1	40	60	40	60	200	6
BOP-105	Nutrition	4	-	40	60	-	-	100	4
BOP-106	English and Communication	3	-	40	60	-	-	100	3
Total		24	4	240	360	80	120	800	28
Total Hours in Semester		550							

**NOTE:**

Abbreviations: L - Lecture, T - Tutorials and P - Practical

Considering four months per semester as working months, total contact hours per semester shall be 550 (Five hundred and Fifty)



# T.S. MISHRA UNIVERSITY LUCKNOW

**SUBJECT NAME: GENERAL ANATOMY**

**SUBJECT CODE: BOP-101**

**Instructor in Charge:** Anatomist with at least Master's Degree

**Course Description:** General anatomy deals with the entire human anatomy with emphasis on different tissues, blood vessels, glands, nerves and the entire central nervous systems in Particular.

**Objectives:**

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

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the human body
2. Identify the microscopic structures of various tissues, and organs in the human body and correlate the structure with the functions
3. Comprehend the basic structure and connections between the various parts of the central nervous system to as to analyze the integrative and regulative functions on the systems organ and system.

**Text Books:**

MARIANOIORE: Atlas of Human Histology, 5<sup>th</sup> Ed. 1981, Les and Feliger.

GJ TORTORA & NP ANAGNOSTAKOS: Principles of Anatomy and Physiology (recent edition)

BD CHAURASIA: Handbook of General Anatomy, 2<sup>nd</sup> Ed, CBS Publishers and Distributors, New Delhi

**Reference Books:**

PETERL WILLIAMS AND ROGER WARWICK: Gray's Anatomy-Descend Spin, With Fl., 1999, Churchill Livingstone

TS RANGANATLAN: Text book of Human Anatomy, 1982, 5 Chand & co. & New Delhi 10-055

INDERIE SINGLE Human embryology, Jed Ed, Macmillan India, 1981

PREREQUISITES Higher secondary level biology or remedial biology

**Course Plan**

**Unit 1**

- Introduction to Human
- Anatomy Definition and its relevance in medicine and optometry
- Planes of the body, relationship of structures, organ system
- Skeleton System
- Tissues of the Body
- Epithelium, connective tissue, bone and cartilage,
- Embryology, histology, different types of each of them
- Types of cells, cellular differentiation and arrangements in different tissues.



**Unit 2**

- Muscles
- Different types of muscles, their functional differentiation, their relationship with different structures, their neural supply
- Blood vessels
- Differentiation between arteries and veins, embryology histology of both arteries and veins
- Functional differences between the two anatomical differences at different locations

**Unit 3**

- Skin and appendages
- Embryology, anatomical differences in different areas, functional and protective variations, innervation, relationship with muscles and nerves
- Lymphatic system:
- Embryology, functions, relationship with blood vessels and organs

**Unit 4**

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

**Unit 5**

- Nervous system
- Parts of Nervous system, cell types of nervous system, Blood-brain barrier, Reflex arc, peripheral Nerves, Spinal nerve, Nerve fibers, Autonomic Nervous system
- Brain and Cranial nerves
- Major parts of Brain, Protective coverings of the Brain, Cerebrospinal Fluid, Brain stem, Cerebellum, Diencephalon, Cerebrum, Cranial nerves.

Total Number of Hours = 60 Hours.

**PRACTICAL (15 Hours):**

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

*N. Upadhyay*

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*Imran*

*Chaiti*

*Shivan*





**SUBJECT NAME: GENERAL PHYSIOLOGY**  
**SUBJECT CODE: BOP-102**

**Instructor in Charge:** Physiologist with at least Master's Degree

**Course Description:** General physiology deals with the entire human anatomy with emphasis on different organ systems, their physiological functions with special emphasis on blood and neuro physiology.

**Objectives:**

At the end of the course the student will be able to:

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

**Text Books:**

Prakasam reddy, Fundamentals of Medical Physiology, 4<sup>th</sup> Edition, Paras medical Publisher, Hyderabad, 2008  
Sujit K. Chaudhuri, Concise Medical Physiology, 6<sup>th</sup> edition, New Central Book Agency, Kolkata, 2008  
AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006  
AC Guyton: Text book of Medical Physiology, 8<sup>th</sup> edition, Saunders Company, Japan,  
GJ Tortora, B Derrickson: Principles of anatomy & physiology, 11<sup>th</sup> edition, Harper & Row Publishers, New York

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

**Course Plan**

**Unit 1**

**CELL STRUCTURE & ORGANIZATION**

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

**BLOOD:**

- Composition
- Volume measurement & variations
- Plasma proteins classification and functions
- Red blood cells – development, morphology & measurements -functions & dysfunctions
- White blood cells-development-classification, morphology -functions and dysfunctions

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- Platelets-morphology-development, functions & dysfunctions
- Clotting-factors-mechanism-anti-coagulants dysfunctions.
- Blood grouping-classification-importance in transfusion, Rh factor & Incompatibility,
- Suspension stability,
- Osmotic stability
- Reticulo endothelial system
- Spleen
- Lymphatic tissue
- Thymus
- Bone marrow
- Immune system
- Cellular
- Humoral
- Autoimmune

#### Unit 2

##### DIGESTION:

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

##### EXCRETION:

- Body fluids-distribution, measurement & exchange, Kidney- of nephron -mechanism of urine formation – of the urine and abnormal
- Constituents-urinary bladder & micturition

#### Unit 3

##### ENDOCRINES:

- Hormone mechanism- negative feedback tropic action -permissive action, Cellular action, hypothalamic regulation
- Thyroid – hormones, actions, regulations
- Adrenal cortex- hormones, actions, regulations
- Adrenal medulla-hormones, actions, regulations





- Parathyroid -hormones, actions, regulations
- Islets of pancreas-hormones, actions, regulations.
- Miscellaneous hormones, actions, regulations
- Common clinical disorders

#### REPRODUCTION:

- Male reproductive system -control & regulation
- Female reproductive system -uterus -ovaries-menstrual cycle-regulation pregnancy & delivery-breast-family planning

#### Unit 4

#### RESPIRATION:

- Mechanics of respiration-pulmonary function tests-transport of respiratory gases- neural and chemical regulation of respiration -hypoxia, cyanosis, dyspnoea- asphyxia.

#### CIRCULATION:

- General principles
- Heart: myocardium innervation -transmission of cardiac impulse- Events during cardiac cycle-cardiac output.
- Peripheral circulation: peripheral resistances -arterial blood pressure-measurements-factors regulation variations-capillary circulation venous circulation. Special circulation: coronary cerebral-miscellaneous

#### Unit 5

#### ENVIRONMENTAL PHYSIOLOGY:

- Body temperature regulation (including skin Physiology). Exposure to low and high atmospheric pressure.

#### NERVOUS SYSTEM:

- Neuron-Conduction of impulse synapse-receptor.
- Sensory organization-pathways and perception
- Reflexes-cerebral cortex-functions Thalamus-Basal ganglia
- Cerebellum
- Hypothalamus
- Autonomic nervous system-motor control of movements, posture and equilibrium -conditioned reflex, eye hand co-ordination

**SPECIAL SENSES (Elementary) Olfaction-Taste-Hearing**

Total Number of Hours – 60 Hours.



**PRACTICAL: (Total: 15 hours)**

Blood test Microscope, Haemocytometer, Blood, RBC count, Hb, WBC count, Differential Count, Hematocrit demonstration, ESK, Blood group & Rh. Type, Bleeding time and clotting time

Digestion Test salivary digestion

Excretion: Examination of Urine, Specific gravity, Albumin, Sugar, Microscopic examination for cell and cysts.

Endocrinology and Reproduction Dry experiments in the form of cases showing different endocrine disorders.

Respiratory System: Clinical examination of respiratory system, Spirometry, Breath holding

Cardio Vascular System: Clinical examination of circulatory system, Measurement of blood pressure and pulse rate, Effect of exercise on blood pressure and pulse rate

Central Nervous System: Sensory system, Motor system, cranial system, Superficial and deep reflexes



**SUBJECT NAME: GENERAL BIOCHEMISTRY**

**SUBJECT CODE: BOP-103**

**Instructor in Charge:** Biochemist with at least Master's Degree.

**Course Description:**

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

**Objectives:**

At the end of the course, the student should be able to demonstrate his knowledge and understanding on Structure, function and interrelationship of biomolecules and consequences of deviation from normal Integration of the various aspects of metabolism, and their regulatory pathways.

Principles of various conventional and specialized laboratory investigation and instrumentation, analysis and interpretation of a given data.

**Text Book:**

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

**Reference Books:**

1. S. Ramakrishnan, KG Prasanna and R. Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990
2. DR. Whitehart 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**

**Unit 1: Carbohydrates**

- Glucose, fructose, galactose, lactose, sucrose, starch and glycogen (properties and tests, Structure and function)

**Unit 2: Protein**

- Amino acids, peptides, and proteins (general properties & tests with a few examples like glycine, tryptophan, glutathione, albumin, hemoglobin, collagen)

**Unit 3: Lipids**

- Fatty acids, saturated and unsaturated, cholesterol and triacylglycerol, phospholipids and plasma membrane.

**Unit 4: Vitamins**

- General with emphasis on A, B2, C, E and inositol (requirements, assimilation and properties)

**Unit 5: Minerals**

- Na, K, Ca, P, Fe, Cu and Se (requirements, availability and properties)

Total Number of Hours— 60 Hours

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**PRACTICAL (Total: 15 hours)**

1. Reactions of monosaccharides, disaccharides and starch:

- Glucose              Fructose
- Galactose          Maltose, Lactose
- Sucrose             Starch

2. Analysis of Unknown Sugars Estimation:

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

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SUBJECT NAME: GEOMETRICAL OPTICS-I

SUBJECT CODE: BOP-104

**Instructor in Charge:** A post-graduate, preferably a PhD, in physics OR an Optometrist with a post-graduate degree, preferably a PhD.

**Course Description:**

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

**Objectives:**

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

**Text Book:**

Tunnacliffe A. H. Hint J. G. Optics, The association of British Dispensing Opticians, London, UK. 1990  
Pedrotti L. S. Pedro Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998

**Reference Books:**

Loshin D. 5. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.  
Schwartz S. H. Geometrical and Visual Optics. A Clinical Introduction, McGraw-Hill, New York, USA, 2002.

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

**COURSE PLAN**

**Unit 1**

- Nature of light-light as electromagnetic, oscillation, ideas of sinusoidal oscillation, amplitude and phase, speed of light in vacuum and other media, refractive index.
- Wavefronts-spherical, elliptical and plane, Curvature and verge, and divergence in terms of rays and vergence, vergence at a distance.
- Refractive index, its dependence on wavelength
- Fermat's and Huygen's Principle -Derivation of laws of reflection and refraction (Snell's law) from these principles
- Plane mirror-height of the mirror, rotation of the mirror
- Reflection by a spherical mirror-paraxial approximation, sign convention, derivation of vergence equation



## Unit 2

- Imaging by concave mirror, convex mirror
- Reflectivity, transmissivity, Snell's Law, Refraction at a plane surface
- Glass slab; displacement without deviation, displacement without dispersion
- Thick prisms; angle of prism, deviation produced by a prism, refractive index of the prism
- Prisms; angular dispersion, dispersive power, Abbe's number.

## Unit 3

- Definition of crown and flint glasses; materials of high refractive index
- Thin prism-definition, definition of Prism diopter, deviation produced by a thin prism, its dependence on refractive index
- Refraction by a spherical surface, sign convention, introduction to spherical 3 aberration using image formed by a spherical surface of a distance object, sag Formula
- Paraxial approximation; derivation of vergence equation
- Imaging by a positive powered surface and negative powered surface
- Vergence at a distance formula; effectivity of a refracting surface
- Definition of a lens as a combination of two surfaces; different types of lens shapes.

## Unit 4

- Image formation by a lens by application of vergence at a distance formula; definitions of front and back vertex powers, equivalent power, first and second principal planes/points, primary and secondary focal planes/points, primary and secondary focal lengths
- Newton's formula, linear magnification, angular magnification
- Nodal Planes
- Thin lens as a special case of thick lens, review of sign convention
- Imaging by a thin convex lens, image properties (real/virtual, erect/inverted, magnified/minified) for various object positions

## Unit 5

- Imaging by a thin concave lens, image properties (real/virtual; erect/inverted, magnified/minified) for various object positions
- Prentice's Rule
- System of two thin lenses, review of front and back vertex powers and equivalent power, review of six cardinal points.
- System of more than two thin lenses, calculation of equivalent power using magnification formula.

**Total no. of Hours = 75 Hours.**





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**PRACTICAL (Total: 15 hours)**

Thick Prism determination of prism angle and dispersive power, calculation of the refractive index

Thin Prism-measurement of deviation, calculation of the prism diopter

Image formation by spherical mirror

Convex lens-power determination using lens gauge, power determination using distant object method, power determination using the vergence formula

Concave lens-in combination with a convex lens-power determination.

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# T.S. MISHRA UNIVERSITY LUCKNOW

SUBJECT NAME: NUTRITION

SUBJECT CODE: BOP-105

**Instructor in charge:** Nutritionist with Masters/Doctorate

**Course Description:**

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

**Objectives:**

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

**Text Book:**

- M Swaminathan. Hand book of Food and Nutrition, fifth edition, Bangalore printing & publishing Co. Ltd, Bangalore, 2004
- C Gopalan, BV Rama Sastri, St. Balasubramanian: Nutritive Value of Indian Foods, National Institute of Nutrition, IGMR, Hyderabad, 2004
- Frank Eperjesi & Stephen Beatty Nutrition and the Eye a Practical Approach, Elsevier Butterworth-Heinemann, USA, 2006

**Reference Books:** No recommendation. It is left to the faculty.

**Prerequisites:** NIL

**COURSE PLAN**

**Unit-1**

1. Introduction.

- History of Nutrition
- Nutrition as a science
- Food groups, RDA
- Balanced diet, diet planning
- Assessment of Nutritional status

2. Energy

- Units of energy.
- Measurements of energy and value of food
- Energy expenditure.
- Total energy/calorie requirement for different age
- Groups and diseases.
- Satiety value
- Energy imbalance-obesity, starvation.
- Limitations of the daily food guide.



**Unit-2**

**3. Proteins**

- Sources and functions
- Essential and non-essential amino-acids.
- Incomplete and complete proteins
- Supplementary foods.
- PEM and the eye
- Nitrogen balance
- Changes in protein requirement

**Unit-3**

**4. Fats**

- Sources and functions
- Essential fatty acids
- Excess and deficiency
- Lipids and the eye
- Hyperlipidemia, heart diseases, atherosclerosis.

**Unit-4**

**5. Minerals**

- General functions and sources
- Macro and micro minerals associated with the eye
- Deficiencies and excess ophthalmic complications. (E.g. Iron, calcium, iodine etc.)

**6. Vitamins**

- General functions, and food sources
- Vitamin deficiency of associated with eye disorders with particular emphasis to Vitamin A
- Promoting sound habits in pregnancy, lactation and infancy
- Nutrient with antioxidant
- Properties
- Digestion of Proteins, carbohydrates and lipid

**Unit-5**

- Essential amino acid
- Miscellaneous
- Meals and associated eye disorders, low birth weight.

Total no. of hours- 60

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**SUBJECT NAME: ENGLISH AND COMMUNICATION**

**SUBJECT CODE: BOP-106**

**Instructor In Charge:** Masters in English preferable.

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

**Objectives:**

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

**Text Book:**

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

**Reference Books:** Faculty may decide.

**Prerequisites:** Basic English equivalent to 10th standard of the study.

**Course Plan**

**Functional English**

**Unit 1**

**1. Basics of Grammar-Part I:**

- Vocabulary
- Synonyms, Antonyms,
- Prefix and Suffix, Homonyms,
- Analogies and Portmanteau words

**Unit 2**

**2. Basics of Grammar-Part II:**

- Active, Passive, Direct and Indirect speech
- Prepositions, Conjunctions and Euphemism

**Unit 3**

**Writing Skills**



- Lerner Writing, Email, Essay, Articles, Memos, one word substitutes, note making and comprehension

#### Unit 4

- Writing and Reading
- Summary writing, Creative writing, newspaper reading.

#### Unit 5

##### Practical Exercise

- Formal speech, Phonetics, semantics and pronunciation
- Communication

##### Introduction:

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

##### Speaking:

- Importance of speaking efficiently
- Voice culture
- Preparation of speech. Secrets of good delivery
- Audience psychology, handling
- Presentation skills
- Individual feedback for each student
- Conference/Interview technique

##### Listening:

- Importance of listening
- Self-assessment
- Action plan execution.
- Barriers in listening.
- Good and persuasive listening

##### Reading:

- What is efficient and fast reading
- Awareness of existing reading habits
- Tested techniques for improving speed
- Improving concentration and comprehension through systematic study



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Non-Verbal Communication:

- Basics of non-verbal communication
- Rapport building skills using neuro linguistic programming (NLP)

Communication in Optometry practice:

Total no. of hours – 45





**Second Semester (7-12 months)**

Subject code	Course Titles	Hours Per Week		Theory Marks		Practical Marks		Total	CR
		L	T/P	Internal	External	Internal	External		
BOP-201	Ocular Anatomy	4	1	40	60	40	60	200	5
BOP-202	Ocular Physiology	4	1	40	60	40	60	200	5
BOP-203	Ocular Biochemistry	3	1	40	60	40	60	200	4
BOP-204	Physical Optics	4	1	40	60	40	60	200	5
BOP-205	Geometrical Optics-II	4	1	40	60	40	60	200	5
BOP-206	Basics of Computer	2	1	40	60	-	-	100	3
BOP-207	Clinical Optometry -I	-	3	-	-	40	60	100	3
Total		21	9	240	360	240	360	1200	30
Total Hours in Semester		550							

**NOTE:**

Abbreviations: L - Lecture, T - Tutorials and P - Practical

Considering four months per semester as working months, total contact hours per semester shall be 550 (Five hundred and Fifty)



**SUBJECT NAME: OCULAR ANATOMY**

**SUBJECT CODE: BOP-201**

**Instructor in Charge:** Anatomist, Optometrist or Ophthalmologist with PG qualification.

**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:

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

Identify the microscopic structures of various tissues in the eye and correlate the structure with the functions.

Comprehend the basic structure and connections between the various parts of the central nervous system and the eye so as to understand the neural connections and distribution

To understand the basic principles of ocular embryology.

**Text Book:**

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

**Reference Books:** AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Latest edition.

**Prerequisites:** General anatomy.

**Course Plan**

**Unit-1**

- Central nervous system:
- Spinal cord and brain stem
- Cerebellum
- Cerebrum

**Unit-2**

- Orbit
- Eye
- Sclera
- Cornea
- Choroid
- Ciliary body
- Iris
- Retina

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**Unit-3**

- Refractory media-
- Aqueous humor
- Anterior chamber
- Posterior chamber
- Lens
- Vitreous body

**Unit-4**

- Eyelids
- Conjunctiva

**Unit-5**

- Embryology

Total no. of hours- 60

**PRACTICAL (Total: 15 hours)**

Eye: Practical simulation and video based

Orbit: Practical demonstration of orbital structures.





**SUBJECT NAME: OCULAR PHYSIOLOGY**

**SUBJECT CODE: BOP-202**

**Instructor in Charge:** Physiologist, Optometrist or Ophthalmologist with PG qualification.

**Course Description:** Ocular physiology deals with the physiological functions of each part of the eye.

**Objectives:**

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

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

**Text Book:** AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Latest edition, CBS Publishers, New Delhi

**Reference Books:**

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

**PREREQUISITES:** General Physiology course plan.

**COURSE PLAN:**

**Unit-1**

- Protective mechanisms in the eye: Eye lids and lacrimation, description of the globe
- Extrinsic eye muscles, their actions and control of their movements
- Coats of the eye ball
- Cornea
- Aqueous humor and vitreous: Intra ocular pressure

**Unit-2**

- Iris and pupil
- Crystalline lens and accommodation - presbyopia
- Retina-structure and functions
- Vision-general aspects of sensation
- Pigments of the eye and photochemistry

**Unit-3**

- The visual stimulus, refractive errors
- Visual acuity, Vernier acuity and principle of measurement
- Visual perception - Binocular vision, stereoscopic vision, optical illusions



- Visual pathway, central and cerebral connections
- Colour vision and colour defects. Theories and diagnostic tests

**Unit-4**

- Introduction to electro physiology
- Scotopic and Photopic vision
- Color vision, Color mixing
- Mechanism of accommodation

**Unit-5**

- Retinal sensitivity and Visibility
- Receptive stimulation and flicker
- Ocular, movements and saccades
- Visual perception and adaptation
- Introduction to visual psychology (Psychophysics)

Total no. of hours - 60

**PRACTICAL:** Total: 15 hours.

- Lid movements
- Tests for lacrimation tests
- Extra ocular movements
- Break up time
- Pupillary reflexes
- Applanation tonometry
- Schiotz tonometry.
- Measurement of accommodation and convergence
- Visual acuity measurement.
- Direct ophthalmoscopy
- Indirect ophthalmoscopy
- Retinoscopy
- Light and dark adaptation.
- Binocular vision (Stereopsis)

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**SUBJECT NAME: OCULAR BIOCHEMISTRY**

**SUBJECT CODE-203**

**Instructor in Charge:** Masters or PhD in Biochemistry

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

**Objectives:**

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

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

**Text Book:**

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

**Reference Books:**

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

DR Whitehart Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003

**Prerequisites:** Higher secondary level chemistry with good knowledge of organic chemistry and knowledge of Biochemistry I

**COURSE PLAN:**

**Unit-1**

Hormones basic concepts in metabolic regulation with examples say insulin.

**Unit-2**

Metabolism: General whole-body metabolism (carbohydrates, proteins, lipids)

**Unit-3**

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





**Unit-4**

Technique: Colloidal state, sol. Gel. Emulsion, dialysis, electrophoresis. pH buffers mode of action, molar and percentage solutions, photometer, colorimeter and spectrometry. Radio isotopes: application in medicine and basic research.

**Unit-5**

Clinical Biochemistry: Blood sugar, urea, creatinine and bilirubin significance of their estimation.

Total no. of hours - 45

**PRACTICAL (Total: 15 hours)**

- Quantitative analysis
- Abnormal constituents in urine, sugar proteins, ketones, blood and bile salts.
- Techniques of detection of abnormal constituents of urine:
- Electrophoresis, Chromatography, Preparation of normal, molar and percentage solutions. Preparation of buffers, pH determination
- Demonstration
- Estimation of blood cholesterol
- Estimation of alkaline phosphatase.
- Salivary amylase (effect of pH, etc.)
- Milk analysis.



**SUBJECT NAME: PHYSICAL OPTICS**

**SUBJECT CODE: BOP-204**

**Instructor in Charge:** A post-graduate, preferably a Ph.D., in physics OR an optometrist with a post-graduate degree, preferably a PhD

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

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

**Text Book:** Subrahmanyam N, Brijlal, A text book of Optics, S. Chand Co Ltd, New Delhi, India, 2003.

**Reference Books:**

Pedrotti I. S, Pedrotti St. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998

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

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

**Course Plan**

**Unit-1**

- Nature of light- light as electromagnetic oscillation wave equation, ideas of sinusoidal oscillations simple harmonic oscillation, transverse nature of oscillation, concepts of frequency, wavelength, amplitude and phase
- Sources of light; Electromagnetic Spectrum.
- Polarized light, linearly polarized light, and circularly polarized light.

**Unit-2**

- Intensity of polarized Light, Mal's Law, polarizers and analyzers, Methods of producing polarized light, Brewster's angle
- Birefringence, ordinary and extraordinary rays
- Relationship between amplitude and intensity.

**Unit-3**

- Coherence; interference, constructive interference, destructive interference, fringes, fringe width
- Double slits, multiple slits, gratings.
- Diffraction, diffraction by circular aperture, Airy's disc

**Unit-4**

- Resolution of an instrument (telescope, for example); Raleigh's criterion
- Scattering, Raleigh's scattering, Tyndall effect.
- Fluorescence and Phosphorescence

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### Unit-5

- Basics of Lasers-coherence; population inversion, spontaneous emission; Einstein's
- Theory of lasers.
- Radiometry, solid angle, radiometric units, Photopic and scotopic luminous efficiency
- And efficacy curves; photometric units
- Inverse square law of Photometry, Lambert's law
- Other units of light measurement, retinal illumination; Trolands

Total no. of hours - 60

**PRACTICAL:** Total: 15 hours

Each practical session could be evaluated for 10 mark and the total could be added to the final evaluations. These practical could be customized as per the university requirements and spaced apart conveniently. The practical to be done include the following gratings-determination of grating constant using Sodium vapour lamps, determination of wavelengths of light from mercury vapour lamp, circular Apertures-measurements of Airy's disc for apertures of verification of Malus' Law using a polarizer-analyzer combination, demonstration of birefringence using Calcite crystals. Measurement of the resolving power of telescope & Newton's rings. Demonstration of fluorescence and phosphorescence using crystals and paints.





**SUBJECT NAME: GEOMETRICAL OPTICS II**

**SUBJECT CODE: BOP-205**

**Instructor in charge:** A post-graduate, preferably a PhD, in physics OR an optometrist with a post-graduate degree, preferably a PhD OR an optometrist with an undergraduate degree.

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

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

**Text Book:**

Tunnacliffe A. H. Hunt J. G, Optics, The association of British Dispensing Opticians, London, UK, 1990.

**Reference Books:**

1. Pedrotti I. S, Pedrotti St. F. L., Optics and Vision, Prentice Hall, New Jersey, USA, 1998

Loshin, The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.

Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw-Hill, New York, USA, 2002

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

**Course Plan:**

**Unit-1**

- Vergence and vergence techniques revised.
- Gullstrand's schematics eyes, visual acuity, Stile Crawford

**Unit-2**

- Emmetropia and ametropia
- Blur retinal Imaginary



### Unit-3

- Correction of spherical ametropia, vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptric power, angular magnification of spectacles in aphakic
- Thin lens model of the eye-angular magnification – spectacle and relative spectacle magnification.

### Unit-4

- Aperture stops- entrance and exit pupils.
- Astigmatism. To calculate the position of the line image in a spherocylindrical lens
- Accommodation calculations. Accommodation formulae and calculations.

### Unit-5

- Presbyopia- Spectacle magnification, angular magnification of spectacle lens, near point, calculation of add, depth of field.
- Spatial distribution of optical information-modulation transfers functions- Spatial filtering-applications
- Visual optics of aphakia and pseudophakia

Total no. of hours - 60

**PRACTICAL:** Total: 15 hours

- Construction of a tabletop telescope all three types of telescopes
- Construction of a tabletop microscope
- Imaging by a cylindrical lens – relationship between cylinder axis and image orientation
- Imaging 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
- 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, orientation and position of the line images and their relation to the cylinder's power and orientation.

*Dr. K. Prakash*

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**SUBJECT NAME: BASIC COMPUTERS AND INFORMATION SCIENCE**

**SUBJECT CODE: BOP206**

**Instructor in Charge:** 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 sole of computer technology and some extent able to gain hand-on experience in using computers. Students will be given hand-on practical sessions and reading material (softcopy). Some of the topics will be demonstration.

#### **Course Plan**

##### **Unit-1**

- Introduction to computer, characteristics of computer, block diagram of computer, generations of computer, computer language.
- 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, painters, plotters, screen image projector, voice response systems).

##### **Unit-2**

- Processor and memory: The Central Processing Unit (CPU), main memory
- Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.
- 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.).

##### **Unit-3**

- Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge
- Introduction to Excel introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs
- Introduction to power-point introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.





## Unit-4

- Introductory System introduction, operating system concepts, types of operating system
- Computer networks introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid, components of network).

## Unit-5

- Internet and its Applications: Definition, brief history, basic services (15-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW), browsers, use of the interact.
- Application of Computers in clinical settings

Total no. of hours - 30

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**SUBJECT NAME: CLINICAL OPTOMETRY STUDENTSHIP**

**SUBJECT CODE: BOP-207**

**Total 45 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.

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## Third Semester (13-18 months)

Subject code	Course Titles	Hours Per Week		Theory Marks		Practical Marks		Total	CR
		L	T/P	Internal	External	Internal	External		
BOP301	Ocular Microbiology	3	-	40	60	-	-	100	3
BOP302	Visual optics -I	3	-	40	60	-	-	100	3
BOP303	Optometric optics -I	4	-	40	60	-	-	100	4
BOP304	Optometric instruments	4	-	40	60	-	-	100	4
BOP305	Ocular Disease -I	4	-	40	60	-	-	100	4
BOP306	Clinical Examination of Visual System	4	-	40	60	-	-	100	4
BOP307	Indian Medicine & Telemedicine	4	-	40	60	-	-	100	4
BOP308	Clinical optometry -II	-	5	-	-	40	60	100	5
Total		30	5	280	420	40	60	800	35
Total Hours in Semester		550							

### NOTE:

Abbreviations: L - Lecture, T - Tutorials and P - Practical

Considering four months per semester as working months, total contact hours per semester shall be 550 (Five hundred and Fifty)





**SUBJECT NAME: OCULAR MICROBIOLOGY**  
**SUBJECT CODE: BOP-301**

**Instructor in Charge:** Microbiologist with Masters or Ph.D. qualification.

**Course Description:** This course covers the basic biological, biochemical and pathogenic. Characteristics of pathogenic organisms

**Objectives:**

The objectives of the course are:

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

**Text Book:**

1. BURTON GRW: Microbiology for the Health Sciences, third edition, J.P. Lippincott Co. St. L, 1988.
2. MJ Pelzer (Jr) ECS Chan, NR Krieg Microbiology fifth edition, TATA MCGRAW-HILL Publisher, New Delhi, 1993

**Reference Books:**

KJ Ryan, CG Ray: Sherris Medical Microbiology an Introduction to infectious Diseases, fourth edition, McCartney HILL Publisher, New Delhi, 1994 MACKIE & McCartney Practical Medical Microbiology SYDNEY M. FINEGOLD & ELLEN JO BARON: Diagnostic Microbiology (DM) 5)

**Prerequisites:** Higher secondary Biology

**Course Plan:** Total no. of hours - 45

**Unit-1**

Morphology and principles of cultivating bacteria  
Sterilization and disinfections used in laboratory and hospital practice

**Unit-2**

Common bacterial infections of the eye.

**Unit-3**

Common fungal infections of the eye



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**Unit-4**

Common viral infections of the eye

**Unit-5**

Common parasitic infections of the eye

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**SUBJECT NAME: VISUAL OPTICS I**

**SUBJECT CODE: BOP-302**

**Instructor in Charge:** Optometrist preferably a 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 student should be able:

- To understand the fundamentals of optical components of the eye
- To gain theoretical knowledge and practical skill on visual acuity measurements, objective and subjective clinical refraction

**Text Book:**

A. H. Tunncliffe: Visual optics, The Association of British Optician, 1967

A G Bennett & RB Rabbets. Clinical Visual optics, 3rd edition, Butterworth Heinemann 1998

**Reference Books:**

MP Keating: Geometric, Physical and Visual optics, 2nd edition, Butterworth-Heinemann, USA, 2002

HL. Rubin: Optics for clinicians, 2nd edition, Triad publishing company, Florida, 1974

H Obstfeld: Optic in Vision Foundations of visual optics & associated computations, 2nd edition, Butterworth, UK, 1982.

WJ Benjamin Borish's clinical refraction 2nd edition, Butterworth Heinemann, Missouri USA, 2006

T. Grosvenor

**PREREQUISITES:** Primary Care Optometry, 4th edition, Butterworth Heinemann, USA 2002: Geometrical optics, Physical optics, Ocular Physiology

**COURSE PLAN**

**Unit-1**

- Review of Geometrical Optics: Vergence and power Conjugacy, object space and image space, Sign convention

**Unit-2**

- Spherical refracting surface





- Spherical mirror, catoptric power
- Cardinal points
- Magnification
- Light and visual function
- Clinical Relevance of Fluorescence, Interference, Diffraction, Polarization, Birefringence, Dichroism
- Aberration and application Spherical and Chromatic

#### Unit-3

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

#### Unit-4

- Measurements of Optical Constants of the Eye
- Corneal curvature and thickness
- Keratometry
- Curvature of the lens and ophthalmopneumetry
- Axial and axis of the eye
- Basic Aspects of Vision,
- Visual Acuity
- Light and Dark Adaptation
- Color Vision
- Spatial and Temporal Resolution
- Science of Measuring visual performance and application to Clinical Optometry

#### Unit-5

- Refractive anomalies and their causes
- Etiology of refractive anomalies
- Contributing variability and their ranges
- Populating distributions of anomalies
- Optical component measurements
- Growth of the eye in relation to refractive errors

Total no. of hours - 45

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**SUBJECT NAME: OPTOMETRIC OPTICS I**

**SUBJECT CODE: BOP-303**

**Instructor in Charge:** Optometrist-B.Optom/M.Optom/PhD

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

**Objectives:**

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

- Measurement of lens power, lens centration using conventional techniques
- Transposition of various types of lenses Knowledge to identify different forms of lenses (equi-convex, Plano convex, periscopic, etc.)
- Knowledge to select the tool power for grinding process.
- Measurement of surface powers using lens measure.
- Method of laying off the lens for glazing process
- Ophthalmic prism knowledge -effects, units, base apex notation, compounding and resolving prima
- Knowledge of prism and decentration in ophthalmic lenses
- Knowledge of different types of materials used to make lenses and its characteristics
- Knowledge lens designs-single vision, bifocals, progressive lens
- Knowledge on tinted and protective lenses
- Knowledge on special lenses like iseikonic, spectacle magnifiers
- Knowledge on spectacle frames -manufacture, material

**Text Book**

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

**Reference Books:**

David Wilson Practical Optical Dispensing, OTEN DE, NSW TAFE Commmm1977

CV Brooks, IM Borish System for Ophthalmic Dispensing, Second edition, Butterworth Heinemann, USA, 1996

**Prerequisites:** Physical Optics, Geometrical Optics

**Course Plan**

**Unit-1**

- Introduction - Light, mirror, Reflection, refraction and Absorption, prisms Definition, properties, Refraction through prisms Thickness difference, Base-apex notation, uses, nomenclature and units, Sign convention, Fresnel's prisms, rotary prisms



**Unit-2**

- Lenses-Definition, units, terminology used to describe, form of lenses vertex distance and vertex power, Effectivity calculations

**Unit-3**

- Lens shape, size and types Le. Spherical, cylindrical and Sphero-cylindrical transpositions- Simple, Toric and Spherical equivalent

**Unit-4**

- Prismatic effect, centration, decentration and Prentice rule, Prismatic effect of Plans cylinder and Sphero-cylinder lenses spherometer & Sag formula, Badge thickness calculation

**Unit-5**

- Magnification in high plus lenses, Minification in high minus lenses tilt induced power in spectacles aberration in Ophthalmic Lenses

Total no. of hours - 60

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**SUBJECT NAME: OPTOMETRIC INSTRUMENTS**

**SUBJECT CODE: BOP-304**

**Instructor in Charge:** Optometrist with experience in teaching instrument course (B.Optom/M.Optom/PhD)

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

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

- Visual Acuity chart/drum
- Retinoscope
- Trail Box
- Jackson Cross cylinder
- Direct ophthalmoscope
- Slit lamp Biomicroscope
- Slit lamp Ophthalmoscopy (+90, 78 D)
- Gonioscope
- Tonometer Applanation Tonometer
- Keratometer
- Perimeter
- Electrodiagnostic instrument (ERG, VEP, EOG)
- A-Scan Ultrasound
- Lensometer

**Text Book:** 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 DA. Atchison, The Eye and Visual Optical Instruments, Cambridge University Press, 1997

**Prerequisites:** Geometrical optics

**Course Plan**

**Unit-I**

- Refractive instruments
- Optotypes and MTF, Spatial Frequency
- Test charts standards.
- Choice of test charts
- Trial case lenses

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- Refractor (phoropter) head units
- Optical considerations of refractor units
- Trial frame design
- Near vision difficulties with units and trial frames
- Retinoscope-types available
- Adjustment of Retinoscopes- special features
- Objective optometers.
- Infrared optometer devices.
- Projection charts
- Illumination of the consulting room.
- Brightness acuity test
- Vision analyzer
- Pupilometer
- Potential Acuity Meter
- Aberrometer

#### Unit 2

- Ophthalmoscopes and related devices
- Design of ophthalmoscopes-illumination
- Design of ophthalmoscopes-viewing
- Ophthalmoscope disc
- Filters for ophthalmoscopy
- Indirect ophthalmoscope

#### Unit 3

- Lensometer, Lens gauges or clock
- Slit lamp
- Tonometer's
- Keratometer and corneal topography

#### Unit-4

- Refractometer
- Orthoptic Instruments (Synaptophore Only)
- Color Vision Testing Devices
- Fields of Vision and Screening Devices

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**Unit-5**

- Scans
- ERG
- New Instruments

Total no. of hours - 60

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**SUBJECT NAME: OCULAR DISEASES I**

**SUBJECT CODE: BOP-305**

**Instructor in Charge:** Ophthalmologist or Optometrist with teaching experience (B.Optom/M.Optom/PhD)

**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:

- Etiology
- Epidemiology
- Symptoms
- Signs
- Course sequelae of ocular disease
- Diagnostic approach and
- 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:**

Stephen J. Miller: Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990

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

**Prerequisites:** Ocular anatomy and Ocular Physiology, Ocular Biochemistry and Microbiology, Pharmacology

**Course Plan**

**Unit-1**

- Orbit
- Applied Anatomy
- Proptosis (Classification, Causes, Investigations)
- Enophthalmos
- Developmental Anomalies (craniosynostosis),
- Craniofacial Dysostosis, Hypertelorism, Median facial cleft syndrome)
- Orbital Inflammations (Preseptal cellulites, Orbital cellulitis Orbital Periostitis, cavernous sinus
- Thrombosis)
- Grave's Ophthalmopathy
- Orbital tumors (Dermoids, capillary haemangioma,
- Optic nerve glioma)

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- Orbital blowout fractures
- Orbital surgery (Orbitotomy)
- Orbital tumors
- Orbital trauma
- Approach to a patient with proptosis

#### Unit 2

- Lids
- Applied Anatomy
- Congenital anomalies (Ptosis, Coloboma, Epicanthus, Distichiasis, (Cryptophthalmos)
- Oedema of the eyelids (Inflammatory, Solid, Passive edema)
- Inflammatory disorders (Blepharitis, External
- Hordeolum, Chalazion, Internal hordeolum, Molluscum Contagiosum)
- Anomalies in the position of the lashes and Lid Margin (Trichiasis, Ectropion, Entropion, Symblepharon, Blepharophimosis, Lagophthalmos, Blepharospasm, Ptosis).
- Tumors (Papillomas, Xanthelasma, Haemangioma, Basal carcinoma, Squamous cell carcinoma, sebaceous gland melanoma)
- Conjunctiva
- Applied Anatomy
- Inflammations of conjunctiva (Infective conjunctivitis -Bacterial, chlamydial, viral, Allergic conjunctivitis, Granulomatous conjunctivitis)
- Degenerative conditions (Pinguecula, Pterygium, Concretions)
- Symptomatic conditions (Hyperaemia, chemosis, Ecchymosis, Xerosis, Discoloration)
- Cysts and Tumors

#### Unit-3

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

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#### Unit-4

- Cornea
- Applied Anatomy and Physiology
- Congenital Anomalies (Megalocornea, Microcornea, Cornea plana, Congenital cloudy cornea)
- Inflammations of the cornea (Topographical classifications: Ulcerative keratitis and Non ulcerative)
- Etiological classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic))
- Degenerations (classifications, 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 Penetrating Keratoplasty

#### Unit-5

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

Total no. of hours - 60





**SUBJECT NAME: CLINICAL EXAMINATION OF THE VISUAL SYSTEM**  
**SUBJECT CODE: BOP-306**

**Instructor in Charge:** Optometry professional or higher optometry degree

**Course Description:** This course covers various clinical optometry procedures involving external examination, anterior segment and posterior segment examination, neuro ophthalmic examination, pediatric optometry examination, and Glaucoma evaluation.

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

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

**Reference Books:**

AK Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007

DB. Elliott Clinical Procedures in Primary Eye Care, 3rd edition, Butterworth-Heinemann, 2007

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

J.B Eskridge, JP. Amos, JD. Bartlett: Clinical Procedures in Optometry, Lippincott Williams and Wilkins, 1991

N B. Carlson, DI Kurtz: Clinical Procedures for Ocular Examination 3rd edition, McGraw-Hill Medical, 2003

**Prerequisites:** Optometric Instruments, Pharmacology

**Course Plan**

**Unit-1**

- History taking
- Visual acuity estimation
- Extraocular motility, cover test, Alternating cover test
- Hirschberg test, Modified Krimsky

**Unit-2**

- Pupils Examination
- Maddox Rod
- Van Herrick
- External examination of the eye, Lid Eversion

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**Unit-3**

- Shirmer's, TBUT, tear meniscus level, NITBUT
- (Keratometer)
- Color Vision
- Stereopsis
- Confrontation test

**Unit-4**

- Photo stress test
- Slit lamp biomicroscopy
- Ophthalmoscopy
- Tonometry

**Unit-5**

- ROPLAS
- Amsler test
- Contrast sensitivity function test
- Saccades and pursuit test

Total no. of hours - 60

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**SUBJECT NAME: INDIAN MEDICINE AND TELEMEDICINE**  
**SUBJECT CODE: BOP-307**

**Instructor in Charge:** Public health professional or optometrist who have knowledge in National health care system.

**Course Description:** This course insight into existing healthcare system in India.

**Objectives:** At the end of the course student will be aware of the traditional and the latest healthcare system. The student also will get basic knowledge about the telemedicine practices in India especially in eye care.

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

**Reference Books:** Faculty may decide.

**Course Plan:**

**Unit-1**

- Introduction to healthcare delivery system Healthcare delivery system in India at primary, secondary and tertiary care
- Community participation in healthcare delivery system
- Health system in developed countries.
- Private Sector
- National Health Mission
- National Health Policy
- Issues in Health Care Delivery System in India
- National Health Programmes-Background objectives, action plan, targets, operations, achievements and constraints in various National Health Programme.

**Unit-2**

- Introduction to AYUSH system of medicine
- Introduction to Ayurveda.
- Unani
- Yoga and Naturopathy
- Siddha
- Homeopathy
- Need for integration of various system of medicine
- Medicine





**Unit-3**

- Health scenario of India- past, present and future

**Unit-4**

- Demography & Vital Statistics-
- Demography-its concept
- Vital events of life k its impact on demography
- Significance and recording of vital statistics
- Census de its impact on health policy

**Unit-5**

- Epidemiology
- Principles of Epidemiology
- Natural History of disease
- Methods of Epidemiological studies
- Epidemiology of communicable & non-communicable diseases, disease transmission, host defense immunizing agents, cold chain, immunization, disease monitoring and surveillance

Total no. of hours - 60

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**SUBJECT NAME: CLINICAL OPTOMETRY II (STUDENTSHIP)**

**SUBJECT CODE: BOP-308**

**Total: 75 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 of the dispensing optics (hand -on in optical) optometric instruments clinical examination of visual system hand on under supervision and ocular diseases (slides and case discussion) will be given to the students during their clinical training

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## Fourth Semester (19-24 months)

Subject code	Course Titles	Hours Per Week		Theory Marks		Practical Marks		Total	CR
		L	T/P	Internal	External	Internal	External		
BOP-401	Optometric optics -II & Dispensing Optics	4	1	40	60	40	60	200	5
BOP-402	Visual Optics -II	4	1	40	60	40	60	200	5
BOP-403	Ocular Disease -II & glaucoma	4	-	40	60	-	-	100	4
BOP-404	Pathology	4	-	40	60	-	-	100	4
BOP-405	Basic & Ocular Pharmacology	4	-	40	60	-	-	100	4
BOP-406	Introduction to Quality & Patient Safety	4	-	40	60	-	-	100	4
BOP-407	Medical Psychology	4	-	40	60	-	-	100	4
BOP-408	Clinical Optometry -III	-	4	-	-	40	60	100	4
Total		28	6	280	420	120	180	1000	34
Total Hours in Semester		550							

### NOTE:

Abbreviations: L - Lecture, T - Tutorials and P - Practical

Considering four months per semester as working months, total contact hours per semester shall be 550 (Five hundred and Fifty)





**SUBJECT NAME: OPTOMETRIC OPTICS II & DISPENSING OPTICS**

**SUBJECT CODE: BOP-401**

**Instructor in Charge:** Optometrist (M. Optom. /PhD). Practicing Optometrists with experience in Optical Dispensing & Optical Laboratory In-charge

**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 effects. In addition, deals with role of Optometrists in optical set-up.

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

- To select the tool power for grinding process
- Different types of materials used to make lenses and its characteristics
- Lens Designs-Bifocals, progressive lens
- Tinted, Protective & Special lenses
- Spectacle Frame: manufacture process & materials
- Art and science of dispensing spectacle lens and frames based on the glass prescription.
- Reading of spectacle prescription. Counselling the patient
- Lens edge thickness calculation
- Frame & lens measurements and selection
- Writing spectacle lens order
- Facial measurements Interpupillary distance Measurement and measuring height) (single vision, multifocal, progressives)
- Lens verification and axis marking and fitting of all lens types
- Final checking of finished spectacle with frame adjustments
- Delivery and follow-up
- Troubleshooting complaints and handling patient's question

**Text Book/Reference Books:**

Jalie MO Ophthalmic lense and Dispensing, and edition, Butterworth-Heinemann, 2008  
Troy E. Fannin, Theodore Grosvenor Clinical Optics, 2nd edition, Butterworth Heinemann, 1996  
CW Brooks, IM Borish: System for Ophthalmic Dispensing, 3rd edition, Butterworth Heinemann, 2007  
Michael P Keating Geometric, Physical & Visual Optics, 2nd edition, Butterworth Heinemann, 2002

**Prerequisites:** Geometrical Optics, Physical Optics & Ocular Physiology, Optometric Optics-I



**Course Plan**

**Unit-1**

**1. Spectacle Lenses-II:**

- Manufacture of glass
- Lens materials
- Lens surfacing
- Principle of surface generation and glass cements
- Terminology used in Lens workshop
- Lens properties
- Lens quality
- Faults in lens material
- Faults on lens surface
- Methods of Inspecting the quality of lenses
- Safety standards for ophthalmic lenses (FDA, ANSI, ISI, Others)

**2. Spectacle Frames:**

- Types and parts
- Classification of spectacle frames-material, weight, temple position, Coloration
- Frame construction
- Frame selection
- Frame measurements (boxing and datum system)

**Unit-2**

- Tinted & Protective Lenses
- Size, shape, mounting and field of view of ophthalmic lenses
- Characteristics of tinted lenses Absorptive Glasses
- Polarizing Filters, Photochromic & Reflecting filters
- Safety Lenses-Toughened lenses, Laminated Lenses, CR 39, Polycarbonate lenses
- Multifocal Lenses:
- Introduction, history and development, types of Bifocal lenses, Trifocal & Progressive addition lenses
- Progressive lenses: design and optics
- Reflection from spectacle lens surface & lens costings:
- Reflection from spectacle lenses ghost Images-Reflections in bifocals at the dividing line
- Antireflection costing, Mirror costing, Hard Multi Costing (HMC), Hydrophobic coating

**Unit 3**

- Miscellaneous Spectacle
- Iseikonic lenses

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- Spectacle magnifiers
- Recumbent prisms
- Fresnel prism and lenses
- Lenticular Aspherical lenses
- High Refractive index glasses

#### Unit-4

- 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 (IPD) for distance de near, bifocal height
- Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings adjustments-facial wrap, pantoscopic tilt
- Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements)
- Neutralization-Hand and Lensometer, axis marking, prisms marking

#### Unit-5

- Faults in spectacles (lens fitting, frame fitting, patient's complaints, description, detection and correction)
- Final checking & dispensing of spectacles to customers, counselling on wearing & maintaining of spectacles, Accessories -Bands, chains, boxes, selvets, cleaners, screwdriver kit
- Spectacle repairs-tools, methods, soldering, riveting, frame adjustments
- Special types of spectacle frames:
- Monocles
- Proses crutches
- Industrial safety glasses
- Welding glasses
- Sports with eyewear
- Frame availability in Indian market
- FAQ's by customers and their ideal answer (Trouble Shooting to dispensing)

Total number of Hours- 60





**SUBJECT NAME: VISUAL OPTICS II**

**SUBJECT CODE: BOP-402**

**Instructor in Charge:** 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:

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

**Text Book/Reference Books:**

Theodore Grosvenor: Primary Care Optometry, 5th edition, Butterworth-Heinemann, 2007

Duke-Elder's practice of Refraction

Al Lens: Optics, Retinoscopy, and Refractometry: 2nd edition, SLACK Incorporated (p) Ltd, 2006

George K. Hans, Kenneth Cuiffreda: Models of the visual system, Kluwer Academic, NY, 2002

Leonard Werner, Leonard J. Pres: Clinical Pearls in Refractive Care, Butterworth-Heinemann, 2002

David B. Elliot Clinical Procedures in Primary Eye care, 3rd edition, Butterworth Heinemann, 2007

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

**Course Plan**

**Unit 1**

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

**Unit-2**

- Convergence:
- Type, Measurement and Anomalies
- Relationship between accommodation and convergence-AC/A ratio



### Unit-3

- Objective Refraction (Static & Dynamic)
- Streak retinoscopy
- Principle, Procedure, Difficulties and interpretation of findings
- Transposition and spherical equivalent
- Dynamic retinoscopy various methods
- Radical retinoscopy and near retinoscopy
- Cycloplegic refraction.

### Unit-4

- Subjective Refraction
- Principle and fogging
- Fixed astigmatic dial (Clock dial), Combination of fixed and rotator dial (Fan and block test) J.C.C
- Duochrome test
- Binocular balancing alternate occlusion, prism dissociation, dissociate Duochrome balance, Borish dissociated fogging
- Binocular Refraction-Variou techniques.

### Unit-5

- Effective Power & Magnification
- Ocular refraction vs. Spectacle refraction
- Spectacle magnification vs. Relative spectacle magnification
- Axial vs. Refractive ametropia, Knapp's law
- Ocular accommodation vs. Spectacle accommodation
- Retinal image Blur-Depth of focus and depth of field

Total number of hours- 60

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**SUBJECT NAME: OCULAR DISEASE II**

**SUBJECT CODE: BOP-403**

**Instructor in Charge:** 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

- Etiology
- Epidemiology
- Symptoms
- Signs
- Course sequelae of ocular disease
- Diagnostic approach, and
- Management of the ocular diseases.

**Text Book:** AK Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007

Stephen J. Miller: Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990

**Reference Books:**

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

**Prerequisites:** Ocular anatomy and Ocular Physiology, Ocular Biochemistry and Microbiology, Ocular Disease – I

**Course Plan**

**Unit-I**

**Retina and Vitreous:**

- Applied Anatomy
- Congenital and Developmental Disorders (Optic Disc: Coloboma, Drusen, Hypoplasia, Medullated nerve fibers, Persistent Hyaloid Artery)
- Inflammatory disorders (Retinitis: Acute purulent, Bacterial, virus, mycotic)
- Retinal Vasculitis (Eales's)

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

#### Unit-2

- Ocular Injuries: Terminology: Closed globe injury (contusion, lamellar laceration) Open 3 globe injury (rupture, laceration, penetrating injury, perforating injury)
- Mechanical injuries (Extraocular foreign body, blunt trauma, perforating injury, sympathetic ophthalmitis)
- Non Mechanical Injuries (Chemical injuries, Thermal, Electrical, Radiational)
- Clinical approach towards ocular injury patients

#### Unit-3

##### Lens

- Applied Anatomy and Physiology
- Clinical examination
- Classification of cataract
- Congenital and Developmental cataract
  - Acquired (Senile, Traumatic, Complicated, Metabolic, Electric, Radiational, Toxic) Morphological Capsular, Subcapsular, Cortical, Supranuclear, Nuclear, Polar.
  - Management of cataract (Non-surgical and surgical measures, preoperative evaluation, Types of surgeries,)
  - Complications of cataract surgery
- Displacement of lens: Subluxation, Displacement
- Lens coloboma, Lenticonus, Microspherophakia.

#### Unit-4

##### Clinical Neuro-ophthalmology

- Anatomy of visual pathway
- Lesions of the visual pathway
- Pupillary reflexes and abnormalities (Amaurotic light reflex, Efferent pathway defect, Wernicke's hemianopic pupil, Marcus gunn pupil, Argyll Robertson pupil, Adie's tonic pupil)
- Optic neuritis, Anterior Ischemic optic neuropathy, Pappilloedema, optic atrophy
- Cortical blindness
- Malingering
- Nystagmus
- Clinical examination

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**Unit-5**

- Applied anatomy and physiology of anterior segment
- Glaucoma
- Clinical Examination
- Definitions and classification of glaucoma
- Pathogenesis of glaucomatous ocular damage
- Congenital glaucoma's
- Primary open angle glaucoma
- Ocular hypertension
- Normal Tension Glaucoma
- Primary angle closure glaucoma (Primary angle closure suspect, Intermittent glaucoma, acute congestive, chronic angle closure)
- Secondary Glaucoma's
- Management: common medications, laser intervention and surgical techniques

Total number of hours- 60

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**SUBJECT NAME: PATHOLOGY**

**SUBJECT CODE: BOP-404**

**Instructor in Charge:** Pathologist with at least Master degree

**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:

Inflammation and repair aspects.

Pathology of various eye parts and adnexa.

**Text Book:** K S Ratnagar: Pathology of the eye & orbit, Jaypee brothers Medical Publishers, 1997

**Reference Books:**

CORTON KUMAR AND ROBINS: Pathological Basis of the Disease, 7th Edition, Elsevier, New Delhi, 2004.

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**

**Unit-1**

- Inflammation and repair
- Infection in general
- Specific infections
- Tuberculosis
- Leprosy
- Syphilis
- Fungal infection
- Viral chlamydial infection

**Unit-2**

- Neoplasia
- Hematology
- Anemia
- Leukemia





- Bleeding disorders

**Unit-3**

- Circulatory disturbances
- Thrombosis
- Infarction
- Embolism

**Unit-4**

- Clinical pathology
- Interpretation of urine report
- Interpretation of blood smears
- Immune system

**Unit-5**

- Shock, Anaphylaxis.
- Allergy

Total no. of hours - 60

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**SUBJECT NAME: BASIC AND OCULAR PHARMACOLOGY**

**SUBJECT CODE: BOP-405**

**Instructor in Charge:** Pharmacologist/Optometrists with at least Master degree

**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-  
Basic principle of pharmacokinetics & Pharmacodynamics

Commonly used ocular drugs, mechanism, indications, contraindications, drug dosage and adverse effects.

**Text Book/Reference Books:**

KD Tripathi: Essentials of Medical Pharmacology. 5th edition, Jaypee, New Delhi, 2004

Ashok Garg: Manual of Ocular Therapeutics, Jaypee, New Delhi, 1996

TJ Zimmerman, KS Kooner: Text Book of Ocular Pharmacology, Lippincott-Raven,

**Prerequisites:** General Physiology & Biochemistry

**Course Plan**

**Unit-1**

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

**Unit-2**

- Systemic Pharmacology: Autonomic nervous system: Drugs affecting pupillary size and light reflex, Intraocular tension, Accommodation, Cardiovascular systems Anti-hypertensive and drugs useful in Angina; Diuretics: Drugs used in ocular disorders, Central Nervous System: Alcohol, sedative hypnotics,

**Unit-3**

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

**Unit-4**

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



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**Unit-5**

- Diagnostic & Therapeutic applications of drugs used in Ophthalmology Diagnostic 15 Drugs & biological agents used in ocular surgery, Anesthetics used in ophthalmic procedures, Anti-glaucoma drugs, Pharmacotherapy of ocular Infections-Bacterial, viral, Fungal & chlamydial, Drugs used in allergic, inflammatory & degenerative conditions of the eye, Immune modulators in Ophthalmic practice, Wetting agents & tear substitutes Antioxidants.

Total no. of hours - 60

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**SUBJECT NAME: INTRODUCTION TO QUALITY AND PATIENT SAFETY**

**SUBJECT CODE: BOP-406**

**Instructor in Charge:** 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**

**Unit-1**

- Quality assurance and management

**Unit-2**

- Basics of emergency care and life support skills

**Unit-3**

- Biomedical waste management and environment safety

**Unit-4**

- Infection and prevention control
- Antibiotic resistance

**Unit-5**

- Disaster preparedness and management

Total no. of hours - 60



**SUBJECT NAME: MEDICAL PSYCHOLOGY**

**SUBJECT CODE: BOP-407**

**Instructor in Charge:** Clinical Psychologist (Post Graduate/M.Phil. /PhD)

**Course Description:** This course covers various aspects of medical psychology essential for the optometrist.

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

**Text Book:** Patricia Barkway. Psychology for health professionals, 2nd edition, Elsevier, 2013

**Reference Books:** Faculty may decide.

**Prerequisites:** Basic clinical knowledge.

#### **Course Plan**

##### **Unit-1**

- Introduction to Psychology
- Intelligence Learning, Memory, Personality, Motivations

##### **Unit-2**

- Body Integrity – one's body image
- The patient in his Milan

##### **Unit-3**

- The self-concept of the therapist, Therapist-patient relationship some guidelines
- Illness, its impact on the patient

##### **Unit-4**

- Maladies of the age and their impact on the patient's own and others concept of his body image
- Adapting changes in Vision

##### **Unit-5**

- Why Medical Psychology demands commitment?

Total no. of hours - 60



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**SUBJECT NAME: CLINICAL OPTOMETRY III (STUDENTSHIP)**

**SUBJECT CODE: BOP-408**

**Total Hours: 60 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 area includes problem solving and complications of various managements will be inculcated. Students should have exposure to eye bank facilities and must be made aware of eye donation, collection of eyes, preservation, pre and post-operative instructions and latest techniques for preservation of donor cornea. The students will get clinical training on the practical aspects of the following courses namely optometric optic -II & dispensing optics, visual optics – II and ocular Disease -II.

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## Fifth Semester (25-30 months)

Subject code	Course Titles	Hours Per Week		Theory Marks		Practical Marks		Total	CR
		L	T/P	Internal	External	Internal	External		
OP-501	Contact lens -I	3	1	40	60	40	60	200	4
OP-502	Low Vision Care	3	1	40	60	40	60	200	4
OP-503	Geriatric Optometry & Pediatric Optometry	4	-	40	60	-	-	100	4
OP-504	Binocular Vision -I	4	1	40	60	40	60	200	5
OP-505	Systemic Disease	4	-	40	60	-	-	100	4
OP-506	Research Methodology & Biostatistics	4	-	40	60	-	-	100	4
OP-507	Clinical Optometry IV	-	5	40	60	-	-	100	5
Total		22	8	280	420	120	180	1000	30
Total Hours in Semester		550							

### NOTE:

Abbreviations: L - Lecture, T - Tutorials and P – Practical

Considering four months per semester as working months, total contact hours per semester shall be 550 (Five hundred and Fifty)

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**SUBJECT NAME: CONTACT LENSES I**

**SUBJECT CODE: BOP-501**

**Instructor in Charge:** B. Optom or optometrists with PG or Ph.D.

**Course Description:** The subject provides the student with suitable knowledge both in theoretical and practical aspects of Contact Lenses.

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

- Understand the basics of contact lenses
- List the important properties of contact lenses
- Finalize the CL design for various kinds patients
- Recognize various types of fitting
- Explain all the procedures to patient
- Identify and manage the adverse effects of contact lens

**Text Books:**

IACLE modules 1-10

CLAO Volumes 1, 2, 3

Anthony J. Phillips: Contact Lenses, 5th edition, Butterworth-Heinemann, 2006

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

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

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

**Course Plan**

**Unit-I**

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



#### Unit-2

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

#### Unit 3

- Manufacturing Rigid and Soft Contact Lenses – various methods
- Pre-Fitting examination-steps, significance, recording of results
- Correction of Astigmatism with RGP lens
- Types of Fit-Steep, Flat, Optimum – on spherical cornea with spherical lenses
- Types of Fit-Steep, Flat, Optimum-on Toric cornea with spherical lenses
- Calculation and finalizing Contact lens parameters

#### Unit-4

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

#### Unit-5

- Care and Maintenance of Rigid lenses
- Cleaning agents & Importance
- Rinsing agents & Importance
- Disinfecting agents & importance
- Lubricating & Enzymatic cleaners
- Follow up visit examination
- Complications of RGP lenses

Total no. of hours - 45

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actical (Total: 15 hours)

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



**SUBJECT NAME: LOW VISION CARE**

**SUBJECT CODE: BOP-502**

**Instructor in Charge:** Optometrist with Low vision clinical experience having M. Optom/PhD

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

**Course Objectives:**

At the end of the course, the student will be knowledgeable in the Following:

- Definition and epidemiology of Low Vision
- Clinical examination of Low vision subjects
- Optical, Non-Optical, Electronic, and Assistive devices.
- Training for Low Vision subjects with Low vision devices
- Referrals and follow-up

**Text Books:**

1. Chistine Dickinson: low Vision: Principles and Practice Low vision care, 4<sup>th</sup> edition,
2. Butterworth-Heinemann, 1998
3. Sarika G, Sailaja MVSI, Vaithilingam: practice of Low vision -A guide book, Medical
4. Research foundation, 2015.

**Reference Books:**

1. Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999
2. Helen Parral: optometric management of Visual Handicap, Blackwell Scientific publications, 1991
3. AJ Jackson, J SWolffsohn: Low Vision Manual, Butterworth Heinemann, 2007

**Course Plan:**

**Unit-1**

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

**Unit-2**

- Pre-clinical evaluation of low vision Patients-Prognostic & psychological factors; psychosocial impact of low vision

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- Types of low vision devices – optical devices, non- Optical devices & electronic devices
- Optics of low vision devices.

## Unit-3

- Clinical evaluation – assessment of visual acuity, Visual field, selection of low vision devices,
- Instruction & training
- Pediatric Low Vision care
- Low vision devices – dispensing & prescribing aspects.

## Unit-4

- Visual rehabilitation, Orientation & counseling
- Legal aspects of Low vision in India

## Unit-5

- Case analysis

Total no. of hours - 45

## Practical (Total: 15 hours)

### 1. Practical 1:

- Attending in low vision care clinic and history taking.

### 2. Practical 2:

- Determining the type of telescope and its magnification (Direct comparison method & Calculated method)
- Determining the change in field of view with different magnification and different eye to Lens distances with telescopes and magnifiers

### 3. Practical 3:

- Inducing visual impairment and prescribing magnification.
- Determining reading speed with different types of low vision aids with same Magnification.
- Determining reading speed with a low vision aid of different magnifications.





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**SUBJECT NAME: GERIATRIC OPTOMETRY & PAEDIATRIC OPTOMETRY**

**SUBJECT CODE: BOP-503**

### **Geriatric Optometry**

**Instructor in Charge:** B. Optom/ M. Optom/ Ph.D. with adequate Experience in handling geriatric patients.

**Course Description:** This course deals with general and ocular physiological changes of ageing, common geriatric systemic and ocular diseases, clinical approach of geriatric patients, Pharmacological aspects of aging, and spectacle dispensing aspects in aging patients.

**Course Objectives:** The student on taking this course should

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

**Text Books:** A.J. ROSSIENBLOOM Jr & M.W. MORGAN: Vision and Aging, Butterworth-Heinemann, Missouri, 2007.

### **Reference Books:**

OP Shattma: (Geriatric Care –A textbook of geriatrics and Gerontology, viva books, New Delhi, 2005

VS Natarajan: An update on Geriatrics, Sakthi Pathipagam, Chennai, 1998

DE Rosenblatt, VS Natarajan: Primer on geriatric Care A clinical approach to the older Patient, Printers Castle, Cochin, 2002

**Prerequisites:** Ocular anatomy, Physiology, Ocular Disease

### **Course Plan**

#### **Unit-I**

- Structural and morphological changes of eye in elderly
- Physiological changes in eye in the course of aging.
- Introduction to geriatric medicine – epidemiology need for Optometry Care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, cerebrovascular disease, diabetes COPD)
- Optometric Examination of the Older Adult (with special attention to refractive assessment)
- Ocular disease common in old eye, with special
- Reference to cataract, glaucoma, macular disorders,
- Vascular diseases of the ese



## Unit-2

- Contact lenses in elderly
- Pharmacological and nutritional aspects of aging
- Low vision causes, management and rehabilitation in geriatrics.
- Spectacle dispensing in elderly.
- Considerations of Spectacle lenses and frames
- Caring of elderly people and elder abuse.

### Pediatric Optometry

**Instructor in charge:** B. Optom/ M. Optom/ Ph.D. with adequate experience in handling Pediatric patients.

**Course Description:** This course is designed to provide the students adequate knowledge in theoretical and practical aspects of diagnosis, and management of eye conditions related to age 54 of 71 paediatric population. Also it will inculcate the skill of transferring/communicating the medical information to the attendant/ patient by the students. The scope of this subject is to train the optometrists to develop a systematic way of dealing with children below 12, so as to implement primary eye care and have better, specialized management of anomalies.

### Course Objectives:

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

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



**Text Books:**

Pediatric Optometry – JEROME ROSNER, Butterworth, London 1982

Paediatric Optometry-William Harvey/ Bernard Gilmartin, Butterworth-Heinemann, 2004

**Reference Books:**

Binocular Vision and Ocular Motility – VON NOORDEN G K Burian von Noorden's, 2nd Ed., C.V. Mosby Co. St. Louis, 1980.

Assessing Children's Vision. By Susan J Leat, Rosalyn H Shute, Carol A Westall. 45 Oxford: Butterworth-Heinemann, 1999.

**Prerequisites:** Ocular anatomy, Physiology, Ocular Disease

**Course Plan****Unit-1**

- The Development of Eye and Vision
- History taking Paediatric subjects
- Assessment of visual acuity
- Normal appearance, pathology and structural anomalies of
- Orbit, Eye lids, Lacrimal system,
- Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil
- Lens, vitreous, Fundus Oculomotor system

**Unit-2**

- Refractive Examination
- Determining binocular status
- Determining sensory motor adaptability
- Compensatory treatment and remedial therapy for: Myopia, Pseudomyopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia
- Remedial and Compensatory treatment of Strabismus and Nystagmus,

**Unit 3**

- Paediatric eye Disorders: Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics
- Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism
- Spectacle dispensing for children
- Paediatric contact lenses
- Low vision assessment in children

Total no. of hours - 60





**SUBJECT NAME: BINOCULAR VISION I**

**SUBJECT CODE: BOP-504**

**Instructor in charge:** Optometrists with B. Optom and experience in Binocular vision course teaching. Or M. Optom or specialized fellowship in Binocular vision optometry.

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

**Course Objectives:**

On successful completion of this module, a student will be expected to be able to

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

**Text Books:**

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

**Prerequisites:** Ocular anatomy, Physiology

**Course Plan**

**Unit-1**

**1. Binocular Vision and Space perception.**

- Relative subjective visual direction.
- Retinomotor value
- Grades of BSV
- SMP and Cyclopean Eye
- Correspondence,
- Fusion, Diplopia, Retinal rivalry
- Horopter
- Physiological Diplopia and Suppression
- Stereopsis, Panum's area, BSV.
- Stereopsis and monocular clues – significance.
- Egocentric location, clinical application.
- Theories of Binocular vision.

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**2. Anatomy of Extra Ocular Muscles.**

- Recti and Oblique's, LPS.
- Innervation & Blood Supply.

**Unit-2**

**3. Physiology of Ocular movements.**

- Center of rotation, Axes of Fick.
- Action of individual muscle

**4. Laws of ocular motility.**

- Donder's and Listing's law
- Sherrington's law
- Hering's law

**Unit-3**

**5. Uniocular & Binocular movements – fixation,**

- Saccadic & pursuits.
- Version & Vergence.
- fixation & field of fixation

**6. Near Vision Complex Accommodation**

- Definition and mechanism (process).
- Methods of measurement.
- Stimulus and innervation.
- Types of accommodation.
- Anomalies of accommodation aetiology and management.

**Unit-4**

**7. Convergence**

- Definition and mechanism.
- Methods of measurement.
- Types and components of convergence – Tonic,
- Accommodative, fusional, proximal.
- Anomalies of Convergence – aetiology and management.

**8. Sensory adaptations**

- Confusion

**9. Suppression**

- Investigations
- Management
- Blind spot syndrome.

**10. Abnormal Retinal Correspondence**

- Investigation and management
- Blind spot syndrome

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**Unit-5**

**11. Eccentric fixation**

- Investigation and management

**12. Amblyopia**

- Classification
- Aetiology
- Investigation
- Management

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*Arjun*





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**SUBJECT NAME: SYSTEMIC DISEASES**

**SUBJECT CODE: BOP-505**

**Instructor in Charge:** 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

**Text Books:**

1. C Haslett, E R Chilvers, N A boon, N R Coledge, J A Hunter: 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**

**Unit-I**

**Hypertension**

- Definition, classification, Epidemiology, clinical
- Examination, complications, and management.
- Hypertensive retinopathy

**Diabetes Mellitus**

- Classification, pathophysiology, clinical
- Presentations, diagnosis, and management,
- Complications
- Diabetic Retinopathy

**Thyroid Disease**

- Physiology, testing for thyroid disease,
- Hyperthyroidism, Hypothyroidism, Thyroiditis,
- Thyroid tumors
- Grave's Ophthalmopathy

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## Unit-2

### Acquired Heart Disease

- Ischemic Heart Disease, Congestive heart failure,
- Disorders of cardiac rhythm
- Ophthalmic considerations

### Cancer

- Incidence
- Etiology
- Therapy
- Ophthalmologic considerations

### Connective Tissue Disease

- Rheumatic arthritis
- Systemic lupus erythematosus
- Scleroderma
- Polymyositis and dermatomyositis
- Sjogren syndrome
- Behcet's syndrome
- Eye and connective tissue disease

## Unit-3

### Tuberculosis

- Features,
- Aetiology, pathology, clinical
- Pulmonary tuberculosis, diagnosis, complications,
- Treatment tuberculosis and the eye.

### Herpes virus (Herpes simplex, Varicella Zoster)

- Cytomegalovirus, Epstein Barr Virus) Herpes and the eye

### Hepatitis (Hepatitis A, B, C)

- Acquired Immunodeficiency Syndrome

## Unit-4

### Anemia

- Diagnosis, clinical evaluation consequences, Sickle cell disease, treatment,
- Ophthalmologic consideration

### Common Tropical Medical Ailments

- Malaria
- Typhoid
- Dengue
- Filariases
- Onchocerciasis
- Cysticercosis
- Leprosy

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**Nutritional and Metabolic disorders**

- Obesity
- Hyperlipidemias
- Kwashiorkor
- Vitamin A Deficiency
- Vitamin D Deficiency
- Vitamin E Deficiency
- Vitamin K Deficiency
- Vitamin B1, B2, Deficiency
- Vitamin C Deficiency

**Myasthenia Gravis**

**Unit-5**

**First Aid**

- General Medical Emergencies
- Preoperative precautions in ocular surgeries

**Psychiatry**

- Basic knowledge of psychiatric condition and Patient management

**Genetics**

- Introduction to genetics
- Organization of the cell
- Chromosome structure and cell division
- Gene structure and basic principles of Genetics.
- Genetic disorders and their diagnosis.
- Genes and the eye
- Genetic counseling and genetic engineering

Total no. of hours - 60

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**SUBJECT NAME: RESEARCH METHODOLOGY AND BIOSTATISTICS**

**SUBJECT CODE: BOP506**

**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.

**Text Books:**

1. Mausner & Bahn: Epidemiology-An Introductory text, 2<sup>nd</sup> 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**

**Unit-1**

1. Introduction to research methods
2. Identifying research problem
3. Ethical issues in research
4. Research design

**Unit-2**

5. Types of Data
6. Research tools and Data collection methods
7. Sampling methods
8. Developing a research proposal

**Unit-3**

**Biostatistics**

9. Basics of Biostatistics
  - Introduction of Biostatistics
  - Measures of Morality
  - Sampling
  - Statistical significance
  - Correlation
  - Sample size determination.
  - Presentation



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- Statistics -Collection of Data
- Including classification and diagrammatic
- Representation -frequency distribution. Measure of central tendency; measures of dispersion.
- Theoretical distributions.
- Binomial
- Normal
- Sampling necessity of methods and techniques.
- Chi. Square test ( $2 \times 2$ )

**Unit-4**

10. Hospital Statistics and data (evaluation and representation)

**Unit-5**

11. Use of computerized software for statistics.

Total no. of hours – 60

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**SUBJECT NAME: CLINICAL OPTOMETRY (STUDENTSHIP)**

**SUBJECT CODE: BOP-507**

**Total: 75 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 advance procedure in those areas. Students will participate in advance and specialized diagnostic and management procedure. Students will get practical experience of the knowledge acquired from Geriatric and paediatric optometry courses. Hands-on experience under supervision will be providing various outreach programmes namely, school vision screening, glaucoma and diabetic retinopathy screening etc., Students also get hand-on practical sessions on the following courses namely contact lens, low vision care, geriatric optometry and paediatric optometry.

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## Sixth Semester (31-36 months)

Subject code	Course Titles	Hours Per Week		Theory Marks		Practical Marks		Total	CR
		L	T/P	Internal	External	Internal	External		
BOP-601	Contact lens -II	4	1	40	60	40	60	200	5
BOP-602	Binocular Vision -II	4	1	40	60	40	60	200	5
BOP-603	Public Health & Community Optometry	3	-	40	60	-	-	100	3
BOP-604	Practice Management	3	-	40	60	-	-	100	3
BOP-605	Occupational Optometry	3	-	40	60	-	-	100	3
BOP-606	Optometry Law & Ethics	3	-	40	60	-	-	100	3
BOP-607	Research Project-I	4	-	40	60	-	-	100	4
BOP-608	Clinical Optometry -V	-	4	-	-	40	60	100	4
Total		24	6	280	420	120	180	1000	30
Total Hours in Semester		550							

### NOTE:

Abbreviations: L - Lecture, T - Tutorials and P - Practical

Considering four months per semester as working months, total contact hours per semester shall be 550 (Five hundred and Fifty)

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*Ummato*

*Shriya*



**SUBJECT NAME: CONTACT LENSES II**

**SUBJECT CODE: BOP-601**

**Instructor in Charge:** At least M. Optom optometrists with higher qualification.

**Course Description:** The subject provides the student with suitable knowledge both in theoretical and practical aspects of Contact Lenses.

**Course Objectives:**

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

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

**Text Books:**

1. IACLE modules 1 – 10
2. CLAO volumes 1, 2, 3
3. Anthony J. Phillips: Contact Lenses, 5th edition, Butterworth-Heinemann, 2006
4. Elisabeth A. W. Milis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
5. E S. Bennett, V.A. Hennerly 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:**

**Unit-1**

1. SCL Materials & Review of manufacturing Techniques
2. Comparison of RGP vs. SCL
3. Pre-fitting considerations for SCL

**Unit-2**

4. Fitting philosophies for SCL
5. Fitting assessment in Soft Contact Lenses: Type 5 (of fit – Steep, Flat, Optimum)
6. Calculation and finalizing SCL parameters Disposable Lenses Advantages and availability
7. Soft Toric CL.
  - Stabilization techniques
  - Parameter selection
  - Fitting assessment

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**Unit-3**

8. Common Handling Instructions
  - Insertion & Removal Techniques
  - Do's and Don'ts
9. Care and Maintenance of Soft lenses
  - Cleaning agents & Importance
  - Rinsing agents & Importance
  - Disinfecting agents & importance
  - Lubricating & Enzymatic cleaners
10. Follow up visit examination.

**Unit-4**

11. Complications of Soft lenses
12. Therapeutic contact lenses
  - Indications
  - Fitting consideration

**Unit-5**

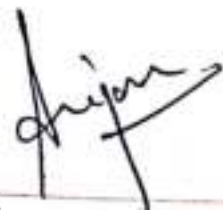
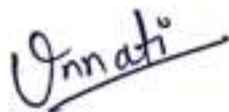
13. Specialty Acting
  - Aphakic
  - Pediatrics
  - Post refractive surgery
14. Management of Presbyopia with Contact lenses

Total no. of hours - 45

**Practical (Total: 15 hours)**

- Examination of old soft Lens RGP Lens fitting
- RGP Lens Fit Assessment and fluorescein pattern
- Special RGP fitting (Aphakia, pseudophakia & Keratoconus)
- RGP over refraction and Lens flexure
- Examination of old RGP Lens
- RGP Lens parameters
- Fitting Cosmetic Contact lenses
- Slit lamp examination of Contact Lens wearers.
- Fitting Toric Contact lens
- Bandage Contact Lens
- SPM & Pachymetry at SN during Clinics.
- Specialty Contact lens fitting

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**SUBJECT NAME: BINOCULAR VISION II**

**SUBJECT CODE: BOP-602**

**Instructor in Charge:** Optometrists with B. Optom and experience in Binocular vision course teaching, M. Optom or specialized fellowship in Binocular vision optometry

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

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

**Text Books:**

Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.

Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd

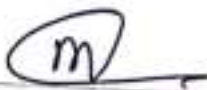
Gunter K. V. Mosby Company

Mitchell Scheiman, Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

**Prerequisites:** Ocular anatomy, Binocular Vision -I

**Course Plan:**

- Neuro-muscular anomalies Classification and etiological factors
- History-recording and significance.
- Convergent strabismus
- Accommodative convergent squint
- Classification
- Investigation and Management
- Non accommodative Convergent squint
- Classification
- Investigation and Management
- Divergent Strabismus
- Classification
- A & V phenomenon
- Investigation and Management





- Vertical strabismus
- Classification
- Investigation and Management
- Vertical strabismus
- Classification
- Investigation and Management
- Paralytic Strabismus
- Acquired and Congenital
- Clinical Characteristics
- Distinction from comitant and restrictive Squint
- Investigations
- History and symptoms
- Head Posture
- Diplopia Charting
- Hess chart
- PBCT
- Nine directions
- Binocular field of vision
- Amblyopia and Treatment of Amblyopia
- Nystagmus
- Non-surgical Management of Squint
- Restrictive Strabismus
- Features
- Musculo-fascical anomalies
- Duane's Retraction syndrome
- Clinical features and management
- Brown's Superior oblique sheath syndrome
- Strabismus fixus
- Congenital muscle fibrosis
- Surgical management

Total no. of hours - 60

**Practical (Total: 15 hours):**

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

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**SUBJECT CODE: PUBLIC HEALTH AND COMMUNITY OPTOMETRY**

**SUBJECT CODE: BOP-603**

**Instructor in Charge:** 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:

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

**Text Books:**

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

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

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

**Course Plan**

**Unit-1**

- Public Health Optometry: Concepts and implementation, Stages of diseases
- Dimensions, determinants and indicators of health
- Levels of disease prevention and levels of health care patterns
- Epidemiology of blindness – Defining blindness and visual impairment

**Unit-2**

- Eye in primary health care
- Contrasting between Clinical and community health programs
- Community Eye Care Programs
- Community based rehabilitation programs

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- Nutritional Blindness with reference to Vitamin A deficiency

**Unit-3**

- Vision 2020: The Right to Sight
- Screening for eye diseases
- National and International health agencies, NPCB, LAPB
- Role of an optometrist in Public Health

**Unit-4**

- Organization and Management of Eye Care Programs-Service Delivery models
- Health manpower and planning & Health Economics
- Evaluation and assessment of health programmes

**Unit-5**

- Optometrists role in school eye health programmes
- Basics of Tele Optometry and its application in Public Health
- Information, Education and Communication for Eye Care programs

Total no. of hours - 45

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**SUBJECT NAME: PRACTICE MANAGEMENT**

**SUBJECT CODE: BOP-604**

**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.

**Text Books:** Faculty to recommend

**Reference Books:** Faculty to recommend

**Prerequisites:** Basic Clinical experience

**Course Plan**

**1. Business Management:**

- Practice establishment and development
- Stock control and costing
- Staffing and staff relations
- Business computerization

**2. Accounting Principles:**

- Sources of finance
- Bookkeeping and cash flow

**3. Taxation and taxation planning**

**4. Professionalism and Values**

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

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Total no. of hours - 45



**SUBJECT NAME: OCCUPATIONAL OPTOMETRY**

**SUBJECT CODE: BOP-605**

**Instructor in Charge:** Occupational Health professional and/or Optometrist with experience in occupational eye health

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

**Course Objectives:**

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

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

**Text Books:**

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

**Reference Books:**

GW Good: Occupational Vision Manual available in the following website: [www.aos.org](http://www.aos.org)  
N.A. Smith: Lighting for Occupational Optometry, IHSC Handbook Series, Safchem Services, 1999  
J Anshel: Visual Ergonomics Handbook, CRC Press, 2005  
G Carson, S Doshi, W. Harvey: Eye Essentials: Environmental & Occupational Optometry, Butterworth-Heinemann, 2008

**Course Plan:**

**Unit-1**

- Introduction to Occupational health, hygiene and safety, international bodies like ILO, WHO, National bodies etc. Acts and Rules – Factories Act, WCA, ESI Act.

**Unit-2**

- Electromagnetic Radiation and its effects on Eye
- Light-Definitions and units, Sources, advantages and disadvantages, standards
- Color-Definition, Color theory, Color coding, Color defects, Color Vision tests





**Unit-3**

- Occupational ocular hazards and preventive/protective methods
- Task Analysis
- Industrial Vision Screening – Modified clinical method and Industrial Vision test

**Unit-4**

- Vision Standards – Railways, Roadways, Airlines/ Armed forces
- Visual Display Units
- Contact lens and work

**Unit 5**

- Role of Optometrist in occupational health.
- Sports vision

Total no. of hours - 45

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**SUBJECT NAME: OPTOMETRY LAW AND ETHICS**

**SUBJECT CODE: BOP-606**

**Instructor in Charge:** Legal professional and/or Optometrist with experience in optometry law and ethics. Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.




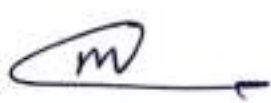
Medical ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice". Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum.

#### **Course Plan**

Few of the important and relevant topics that need to focus on are as follows:

- Medical Ethics-Definition-Goal-Scope
- Introduction to Code of conduct
- Basic principles of medical Ethics-Confidentiality
- Malpractice and negligence – Rational and irrational drug therapy
- Autonomy and informed consent – Right of patients
- Care of the terminally ill-Euthanasia
- Organ transplantation
- Medico legal aspects of medical Records-Medico legal case and Type-Records and document related to MLC ownership of medical records Confidentiality Privilege communication – Release of medical information Unauthorized disclosure retention of medical records –other various aspects.
- Professional Indemnity insurance policy
- Development of standardized protocol to avoid near miss or sentinel events
- Obtaining an informed consent.
- National Commission for allied & Healthcare Professions (NCAHP) Act 2021.

Total no. of hours - 45

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**SUBJECT NAME: RESEARCH PROJECT-I**

**SUBJECT CODE: BOP-607**

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 and writing up the research proposal, data collection, data analysis, thesis writing and presentation.

Project is spread through sixth to eighth semester.

**Total no. of hours - 60**

*N. K. Pandey*

*J. S. Mishra*      *Ujjwala*      *Prakash*





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**SUBJECT NAME: CLINICAL OPTOMETRY (STUDENTSHIP)**

**SUBJECT CODEL: BOP-608**

The course is the final series of five directed clinical courses. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. Practical aspects of Binocular vision II, public health & community optometry, and occupational optometry will be covered under the studentship.

**Total no. of hours – 60 hours**

*N. Upadhyay*

*[Signature]*

*[Signature]* *[Signature]*



**Seventh-Eighth Semester (Internship) (37-48 months)**

Subject code	Course Titles	Hours Per Week			Hours Per Semester			IA* (Marks)	UE* (Marks)	Practical/ Viva voice (Marks)	Total (IA+UE) Marks
		L/T	P/C/RP	Total	L/T	P/C/RP	Total				
BOP-701	B.Optom internship	2	20	22	30	720	750	50	-	50	100
BOP-801	B.Optom internship	2	20	22	30	720	750	50	-	50	100
BOP-802	Research Project II	0	4	4	-	-	150	100	-	-	100
BOP-803	Research Project III	0	4	4	-	-	150	100	-	-	100
<b>Total</b>		<b>4</b>	<b>48</b>	<b>52</b>	<b>60</b>	<b>1140</b>	<b>1800</b>	<b>300</b>	<b>-</b>	<b>100</b>	<b>400</b>

**Internship is for 12 months.**

**Total number of working days (after deducting for national holidays & Sundays Examination): 250 days (6 days/week; 6 hours/ day) 1500 hours or minimum of 18 weeks/semester (216 days)**

**Students are encouraged to involve in community outreach activities as part of their clinical postings without absenting himself/herself for the other regular classes.**

**Project report (thesis) needs to be submitted at the end of internship**

*Imran*

*S. U. Pradyumna*

*Chhatra*

*Prigar*



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.

During these semesters students also will continue the research work allotted during the sixth semester and submit the final report and make presentation in front of the experts.

Internships postings can be in the following locations: Eye Hospitals, Eye clinics in general hospital, Independent eye clinics, Optometric clinics in eye hospitals, general hospitals or optical showrooms, optical showrooms and other relevant locations wherein the learning objective can be achieved.

Short period of training to eye care (instruments, optical, contact lens) related manufacturing set-Ups, corporates and non-governmental organizations.

#### **Skills based outcomes and monitorable indicators for Optometrist**

##### **First year**

- Role play
- Clinical Observations
- Vision Check
- Basic Lensometry

##### **Second year**

- History taking
- CEVS practical
- Refraction Hands On including optical dispensing
- Clinical Observations
- Vision screening camps

##### **Third year:**

- Clinical Observation
- Hands-on under senior optometrists
- Case reporting
- Case discussion
- Vision screening camps
- Diagnostic interpretations

*N. Upadhyay I*

*Anurag*

*Anjali*

*Anjali*





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**Internship:**

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

\*\*\*\*\*

*S. Upadhyay*

*Imran*

*Imrat*

*Sigra*