JAMIA HAMDARD

DEPARTMENT OF PARAMEDICAL SCIENCES

CBCS ENABLED SYLLABUS
Bachelors of Optometry

SYLLABUS FOR

BACHELORS OF OPTOMETRY

Choice Based Credit System (CBCS)

Approval Date: 24TH September 2019 **(39th BOARD OF STUDIES)**

DEPARTMENT OF PARAMEDICAL SCIENCES

JAMIA HAMDARD

Deemed to be University

Accredited in 'A' Grade by NAAC

Declared to be designated as Institute of Eminence (IoE) by MHRD, GOI

NEW DELHI 110062

www.jamiahamdard.edu

PROGRAM NAME: Bachelors of Optometry
PROGRAM CODE: 316
ACADEMIC SESSION OF INTRODUCTION OF THE PROGRAMME: (2022-2023)
SCHOOL NAME: SNSAH
DEAPRTMENT NAME: DEPARTMENT OF PARAMEDICAL SCIENCES

APPROVAL DATE OF THE BOARD OF STUDIES (B.O.S) MEETING FOR THE PRESENT SYLLABUS
24TH September 2019 (39TH BOARD OF STUDIES)

APPROVAL DATE AND NUMBER OF ACADEMIC COUNCIL OF MEETING FOR THE PRESENT SYLLABUS
39th AC (24TH September 2019)

Internal Quality Assurance Cell (IQAC)

GUIDELINES FOR PREPARING THE

UGC – LEARNING OUTCOMES-BASED CURRICULUM

JAMIA HAMDARD, NEW DELHI - 110062

Internal Quality Assurance Cell (IQAC)

Template for Programm under on UGC – Learning Outcomes-Based Curriculum Framework

School of Nursing and Allied Health Science

Department of Paramedical Sciences

Vision Statement: To create an institute of national and international repute in Paramedic offering state of the art education entailing the finest skills combined with compassionate patient care.

Mission Statements

MS1: To provide a quality paramedical education and prepare human and competent global Paramedic professionals.

MS 2: To provide highest level of quality patient care and can make contribution towards education and research.

MS 3: To provide the most advanced and comprehensive course offerings to health sciences students possible by employing the most qualified faculty, utilizing the most advanced technology.

Bachelors of Optometry

QUALIFICATION DESCRIPTORS (QDs)

Upon the completion of Academic Programme students will be able to:

QD-1 To Know about the skills in their specialization including research and current developments in the field of optometry

QD-2 To learn the systematic, extensive and logical knowledge about their field

QD-3 To understand the field as a whole including an understanding of the established theories, principals and concepts.

QD-4 To Remembers one's own learning, needs relating to current and emerging areas of study, making use of owns learning for research and development.

QD-5 To use of Knowledge, understanding and skills for assessment of vast range of ideas and complex problems and to find their real life solutions

Mapping Qualification Descriptors (QDs) with Mission Statements (MS)

	MS-1	MS-2	MS-3
QD-1	3	3	2
QD-2	3	3	3
QD-3	3	3	3
QD-4	3	3	3
QD-5	3	2	2

School of Nursing and Allied Health Science

Department of Paramedical Sciences

Bachelors of Optometry

PROGRAM LEARNING OUTCOMES (PLOs) (12)

After completing this Course, the students should be able to

PLO-1 course aims at preparing an Optometrist as an independent care provider in the field of EYE

PLO -2 Communicating and helping patient to come out from the denial phase.

PLO -3 Membership of a multidisciplinary health team

PLO -4 Ethics and accountability at all levels(clinical , professional, personal and social)

PLO -5 Commitment to professional excellence

PLO -6 Leadership and mentorship

PLO -7 Social accountability and responsibility

PLO -8 Scientific attitude lifelong learning

PLO -9 Advancement opportunities

PROGRAM SPECIFIC OUTCOMES (PSOs)

After completing this Course, the students should be able to

PSO-1 Dispense Spectacles to the patients of all age groups according to the patients requirement.

PSO-2 Diagnose the patients binocular vision abnormality and to treat it.

PSO-3 Dispense the contact lens in different eye abnormalities.

PSO-4 Diagnose type of visual impairment, to dispense the devices & rehabilitate the patients

Mapping of Program Learning Outcomes (PLOs)

With Qualification Descriptors (QDs)

	QD-1	QD-2	QD-3	QD-4	QD-5
PLO-1	**3**	**3**	**2**	**3**	**3**
PLO-2	**3**	**3**	**3**	**2**	**2**
PLO-3	**2**	**3**	**3**	**3**	**2**
PLO-4	**2**	**2**	**2**	**2**	**2**
PLO-5	**2**	**1**	**3**	**3**	**3**
PLO-6	**3**	**3**	**3**	**3**	**3**
PLO-7	**2**	**3**	**3**	**2**	**2**
PLO-8	**3**	**3**	**3**	**2**	**2**
PLO-9	**2**	**3**	**3**	**2**	**2**

‘3’ ‘High-level’ mapping, 2 for ‘Medium-level’ mapping, 1 for ‘Low-level’ mapping.

School of Nursing and Allied health sciences

Department Of Paramedical sciences

Name of the Academic Program-Bachelors of Optometry

Course Code: 316 Title of the Course: BOPT

COURSE LEARNING OUTCOMES (CLOs)

After completing this Course, the student's should be able to

CLO-1-Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the human body.
CLO-2 Explain the normal functioning of various organ systems of the body and their interactions.
CLO-3 Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa.

CLO-4 Commonly used ocular drugs, mechanism, indications, contraindications, drug dosage and adverse effects

CLO-5 knowledge of dispensing various spectacle and specialized lenses

CLO-6 students should be able to gain theoretical as well as practical knowledge of all the ophthalmic instruments

CLO-7 provides a detailed explanation of, and differentiates between the etiology, investigation and management of binocular vision anomalies.

CLO-8 clinical examination of low vision patients and prescribing them all the devices and rehabilitation

Mapping of Course Learning Outcomes (CLOs)with Program Learning Outcomes (PLOs) and Program Specific Outcomes (PSOs)

	PLO 1	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CLO 1	2	3	3	3	2	2	1	2	1	**1**	**1**	**1**	**2**
CLO 2	2	2	2	3	3	3	3	2	2	**3**	**3**	**2**	**3**
CLO 3	3	3	3	2	2	3	2	2	2	**1**	**1**	**2**	**2**
CLO 4	3	2	2	2	2	3	3	1	3	**3**	**2**	**2**	**2**
CLO 5	2	2	2	3	2	3	3	3	2	**2**	**2**	**2**	**3**
CLO 6	2	3	1	1	3	3	3	2	2	**2**	**2**	**3**	**1**
CLO 7	2	2	2	2	2	1	1	2	1	**2**	**3**	**3**	**1**
CLO 8	3	2	3	3	2	2	1	2	2	**1**	**1**	**2**	**3**

‘3’ for ‘High-level’ mapping, 2 for ‘Medium-level’ mapping, 1 for ‘Low-level’ mapping.

a.	Name of the Course	**BACHELOR OF OPTOMETRY**
b.	Nature	Regular
c.	Duration	Minimum: Three Years & a half (six months compulsory rotatary internship included) (3 ½ years full time Integrated Program, Lateral entry in third semester for students with two year Diploma inoptometry or orthoptics)
d.	Medium of Instruction and Examinations	English
e.	**Eligibility Criteria**	
	Educational Requirements	Eligibility for the admission : must have passed in10+2 or equivalent qualification with science discipline from a recognized institution with 50%aggregates Those in possession of central/state recognized two year diploma will be permitted lateral entry intofourth semester
f.	Commencement of the course	July of every year
h.	Mode of Admission	Admission to the course will be made on the basis of the merit determined by the score of CET conducted by Jamia Hamdard. Students who have appeared in NEET after interview can also be given admission. For admission against the foreign national/NRI/Industry sponsored seats, students will be required to appear only in interview, conducted by Jamia Hamdard.
i.	Period of Completion (Span Period)	Not more than 06 years
J.	Fees	As per university norms.
k.	Total Number of Studentsper year	25
l.	Total number of Semesters and examinations	Six Semesters and Semester Examination in every December and May
m.	Total Theory Papers	14+ 01 assignment+04 qualifying exams
n.	Total Credits	47
o.	Minimum Average Pass Marks	50% in each subject, Grade E

COURSE CURRICULUM

Course Structure

The course work shall be divided into six semesters as given below:

Semester-I	July to mid December
Semester-II	January to mid May
Semester-III	July to mid December
Semester-IV	January to mid May
Semester –V	July to Mid December
Semester –VI	January to mid May

1. During an academic year, a candidate shall be enrolled only for one course of study and shall notappear at any other examination of this or any other University.
2. The semester-wise course outline, total marks allocated to each course, internal assessment and semester examinations marks for all specialization are listed in Annexure. Detailed course contentof the syllabus shall be prescribed by the Board of Studies (BOS) and shall be reviewed periodically.
3. The BOS, depending on circumstances prevailing in the market, may change any paper andincrease or decrease the number of optional papers.

Attendance

- All students must attend every lecture delivered, however, to account for the late joining or other such contingencies, the attendance requirement for appearing in the semester examinations shall be a minimum of 75% of the total classes actually held.
- In order to maintain the attendance record of a course, a roll call will be taken by the teacher in every scheduled lecture.
- Attendance on account of participation in the prescribed functions of NCC, NSS, Inter- University sports, educational tours/field work assigned by the university to students shall be credited to the aggregate, provided the attendance record, duly counter signed by the officer in-charge, is sent to the Head of Department within two weeks time after the functionactivity.
- The teacher in-charge will consolidate the attendance record for the lectures for each student. The statements of attendance of students shall be

displayed on the Department's Notice Boardby the teacher concerned at the beginning of the following month and consolidated attendance before the conclusion of each semester as given in the University Calendar. A copy of the same shall be sent to the Head of Department for record. Notices displayed on theNotice Board shall be deemed to be a proper notification, and no individual notice shall be sent to students.

- If a student is found to be continuously absent from the classes without information for a period of 30 days, the teacher in charge shall report it to the Head of Department, who will inform the Registrar through the Dean. Registrar will issue a notice to such student, as to whyhis/ her admission should not be cancelled. The Registrar will take a decision on cancellation of admission within 30 days of issue of the notice. A copy of the order shall be communicated to the student.
- A student with less than 75% attendance of the lectures in each course shall be detained from appearing in the semester examination of that course. The Dean of Faculty concerned may consider application for the condo nation of shortage of attendance up to 5% on account sickness or any other extra ordinary circumstances, provided the medical certificate duly certified by registered Medical Practitioner, had been submitted within 7 days of the recoveryfrom the illness.
- A student detained on account of attendance will be re-admitted to the same class in the next academic year on payment of current fees except Enrolment and identity card fees

Internal Assessment

- Internal assessment for 25 marks in respect of theory papers will be based on written tests, assignments, presentations, viva-voice etc.
- The evaluation shall be done by course instructors and marks will be notified within a week of such test.
- There shall be two written tests in each course in a semester. The test will be conducted as per the academic calendar individual faculty member to announce the date for tests or conduct them as per academic calendar.
- The teacher concerned shall maintain records of marks of various components of evaluation for each student and the same will be confidential and notified at the end of the semester.
- The internal assessment marks shall he submitted by head of the Department to the Registrar at the end of the semester.
- A candidate who has to reappear (as an ex-student) in the semester examination of a course will retain the marks of internal assessment.
- A student who will be required to seek re-admission, fo whatever reason, will have to appear for internal assessment and tests afresh.

Semester Examinations

- The Semester examinations shall be held at the end of each semester as notified in the academic calendar. There shall be no supplementary examination. Candidates shall appear in the examination of their uncleared papers in the next semester examination of the same paper along with other students of junior batch. Thus, the uncleared papers of Semester - I shall be cleared in Semester- IIIand those of Semester - II in Semester-IV. Likewise, the examination of uncleared papers of semester V and VI would be taken up by the student next year along with the junior batch.
- The duration of semester examinations of each theory paper will be 3 hours.
- The question papers shall be set by either an external or an internal examiner duly appointed by the Board of Studies and approved by the Vice Chancellor.
- The papers set by the examiners shall be moderated by a panel of moderators constituted by the Board of Studies at the time of approving the panel of examiners.
- The minimum pass marks shall be 50% (grade D) in each theory and viva-voce (combined examination).
- Every candidate shall have to prepare a project study / assignment in the Sixth semester. The subject of project/assignment shall be approved on the recommendations of the supervisor(s) and the Head of the Department.
- A student shall be required to maintain record of periodic progress in the project in a diary. He / she should be in constant touch with his/her supervisor and obtain

his/her signature in the diary regularly. There would be continuous appraisal ofthe project.

Promotion Criteria

- A student shall be promoted to semester-III if he/she has secured at least 50% marks each inat least 06 subjects out of 10 prescribed in Semester - I and Semester - II taken together.
- No student shall be promoted to Semester –V if he/she has more than 04 uncleared papers of the preceding semesters taken together.
- After the declaration of the semester-VI results, if a student has any paper uncleared of any semester, he/ she will have to reappear in these papers in concerned semester in next academic year as an ex-student along with the next batch.
- The degree will be granted only after clearing all the semester examination and completion of six months compulsory internship from the parent institution or in extraordinary circumstances from a government hospital after taking permission from the head of the departments of the concerned hospitals.
- For all the papers labeled as qualifying exams the student needs to clear these papers during the span period, to be awarded the degree

Span Period

A student must complete all the requirements of degree within a period of Six years from his/ her admission. In a genuine case, if only dissertation is left to be cleared, permission may be granted to submit it even beyond the period of Six years with prior approval of the Vice Chancellor.

Grading System

The grade awarded to a student in any particular course will be based on his/her performance insessionals and final examinations combined together. The letter grades and their equivalent numerical points are listed below:

% Of Marks Scored	Grade	Grade Points	Description of Performance
80% or more	A+	10	Outstanding
75% or more but less than 80%	A	9	Excellent
70% or more but less than 75%	B	8	Good
60% or more but less than 70%	C	7	Average
50% or more but less than 60%	D	6	Marginal
45% or more but less than 50%	E	5	Fail
Absent/ Detained	I	-	Incomplete

Earned Credit (E C)

The credit for the course in which a student has obtained "D" or a higher grade will be counted ascredits earned by him/ her. Any course in which a student has obtained "I" grade will not be counted towards his/ her earned credits

Evaluation of Performances

- SGPA (Semester Grade Point Average) will be awarded on successful completion of each semester
- CGPA (Cumulative Grade Point Average) which is the grade point average for all thecompleted semester at any point in time, which will be awarded in each semester on successful completion of the current semester as well as all of the previous semester. CGPA is not applicable in semester I.

Calculation of SGPA and CGPA in a semester

$$\text{SGPA} = \frac{\sum_{I}^{n} (\text{Earned Credits} \times \text{Grade Point})_I}{n}$$

(Course Credits Registered)I

Where ‘n’ is the number of subjects/papers registered

(Earned Credits X Grade Point)I I

CGPA = $\frac{\text{(Earned Credits X Grade Point)I I}}{\text{(Course Credits Registered)I}}$

m

 (Course Credits Registered)I

Where ‘m’ is the number of semester passed

For Example

Semester - I

Course name	**Subject Credits**	**Marks**	**Grade Awarded**	**Grade Point**	**Points secured (Subject credits x grade point)**
101	3	56	D	6	18
102	3	65	C	7	21
103	3	55	D	6	18
104	3	68	C	7	21
105	3	62	C	7	21
TOTAL	**15**	306		**33**	**99**

Total credits = 15Points secured= 99

SGPA =99/15 = 6.6

Semester II

Course name	**Subject Credits**	**Marks**	**Grade Awarded**	**Grade Point**	**Points secured**
201	3	63	C	7	21
202	3	62	C	7	21
203	3	76	A	9	27
204	3	55	D	6	18
205	3	61	C	7	21
TOTAL	**15**	**317**		**36**	**118**

Total credits = 15 Points secured = 118 SGPA= 118/15 = 7.80 CGPA = 217/30 = 7.23

Classification of successful candidates:

The result of successful candidates who fulfill the criteria for the award of degree shall beclassified at the end of last semester, on the basis of his/her CGPA

- Classification shall be done on the basis following criteria: -
- He/ she shall be awarded “Distinction” if her/ his final CGPA is 9 and above and passed allthe semester examinations in the first attempt
- He/ she shall be awarded “First Division” if her/ his final CGPA is 6.75 and above but lessthan 9.00
- He/ she shall be awarded “Second Division” if her/ his final CGPA is 6.00 and above but lessthan 6.75.
- He/ she shall be awarded “Pass” if her/ his final CGPA is 5.00 and above but less than 6.00
- He / she shall be treated as “Fail” if his/ her final CGPA is less than 5.00

Note: One credit hour is equal to 25 hours of teaching for theory as well as practical.Credits for theory given against the subject in the course syllabus

Semester 1

GFC-101 Human Anatomy (Theory)

L- 2 CH T- 0 P-0

Unit 1: 12 Hrs

Introduction to Anatomy Anatomical terms, planes, organization of human body- cell, tissue, organ & organ system. Musculo-skeletal system: Types of bones, structure & divisions of the skeleton system, name of all the bones and their parts, joints- classification. Structure and types of muscles Anatomy of the Nervous system Central nervous system & Peripheral nervous system- different components.

Unit 2: 12 Hours

Anatomy of Circulatory system: General plan of circulatory system and its components. Heart- size, location, coverings, chambers, blood supply, nerve supply, the blood vessels General plan of circulation, pulmonary circulation. Name of arteries and veins and their positions Lymphatic system - general plan Anatomy of the Respiratory system: Organs of Respiratory System –(Brief knowledge of parts and position)

Unit 3:13 Hours

Anatomy of the Digestive system: Anatomy of alimentary tract; Parts of the tract Accessory glands of digestion; Pancreas, Liver, Gall Bladder Anatomy of Excretory system Kidneys- location, gross structure, excretory ducts, ureters, urinary bladder, urethra.

Unit 4: 13 Hrs

Reproductive system Male Reproductive System Female Reproductive System Anatomy of the endocrine system Name of all endocrine glands their positions, Hormones, and their functions- Pituitary, Thyroid, Parathyroid, Adrenal glands, Gonads & Islets of pancreas

GFC-103 Human Anatomy (Practical)

L- 0hrs T- 0hrs P-1hrs

1. Demonstrations of different parts of human body – 12hrs
2. General slides of tissues & organs Preservation – 13 hrs

Reference Books:

1. Human Anatomy Regional and Applied Vol. 1, Vol.2 & Vol.3 B.D.Chaurasia C.B.S.Publishers, New Delhi.
2. Handbook of General Anatomy B.D.Chaurasia C.B.S.Publishers, New Delhi.
3. Textbook of Human Histology Inderbir Singh Jaypee Brothers, Medical Publishers,Delhi.
4. Gray's Anatomy Susan Standring Elsevier Churchill Livingstone, Edinburg

Teaching-Learning Strategies in brief (4 to 5 sentences)

- Student centric discussion is a teaching strategy that allows students to understand more topics or concepts via collaboration.
- Collaborative learning is a teaching strategy that focuses on encouraging teamwork and partnership.
- Visual, Auditory and Kinesthetic it is a very comprehensive teaching strategy that focuses on improved learning experiences using three main sensory receivers.
- Spaced learning is a teaching strategy that makes practicing a skill or retrieving information efficient for students.

Assessment methods and weightages in brief (4 to 5 sentences)

- Progress of learners towards achieving learning outcomes may be assessed making creative use of the following, either independently or in combination
- Time-constrained examinations (say 1-hour or 2-hour tests)
- Closed-book and open-book tests (if applicable, rather than doing as a rule)
- Problem based assignments
- Real life simulations
- Observation of practical skills (speaking, listening, problem solving within a peer group or a class) individual project reports (case-study or term papers within a given word limit)
- Team project reports
- Oral presentations, including seminar presentation; viva voce, interviews; peer and self-assessment etc. and any other pedagogic approaches as may be relevant keeping in view the learners' level, credit load and class size

GFC-102 Human Physiology (Theory)

L- 2 CH T- 0 CH P-0CH

Unit 1:12 Hrs

General Physiology Cell, Transport across cell membrane, homeostasis, resting membrane potential, action potential, Blood Composition and functions of Blood RBC, WBC, Platelet count, Haemoglobin Blood Groups - ABO and RH grouping Hemostasis & Anticoagulants.

Unit 2:12 Hrs

Cardiovascular system Cardiac muscle, Pacemaker & conducting tissue Cardiac Cycle Cardiac output, Heart rate, ECG Arterial blood pressure. Respiratory System Functions of Respiratory system Mechanism of respiration, lung volumes & capacities.

Unit 3:13 Hrs

Nerve & Muscle physiology Neuron structure & properties Neuromuscular junction Skeletal muscle structure mechanism of contraction Cerebrospinal Fluid (CSF): Composition, functions & Circulation. Central & autonomic Nervous system Organization of CNS Functions of various parts of Brain, in brief Composition, functions and circulation of CSF Differences between sympathetic and parasympathetic division.

Unit 4:13Hrs

Digestive system Functional Anatomy, organization & innervations Composition and functions of all Digestive juices Digestion & Absorption of carbohydrates, proteins and fats Excretory System Kidneys: Functions, Nephron, Juxta-glomerular Apparatus Renal circulation Mechanism of Urine formation GFR.

Endocrine and Reproductive systems Endocrine glands & hormones secreted Functions of Reproductive system Male Reproductive System: spermatogenesis, Testosterone. Female reproductive system: Ovulation, Menstrual cycle. Pregnancy test.

GFC-104 Human Physiology (Practical)

L- 2 CH T- 0 CH P-0CH

1. Measurement of Blood pressure, heart rate, pulse rate, respiratory rate, reflexes. 12hrs
2. Blood Groups - ABO and RH grouping estimation. 13hrs

Reference Books:

1.Textbook of Physiology Guyton (Arthur C) Prism Publishers Bangalore

2. Review of medical. Physiology Ganong Appleton and Lange.

3. Essential of medical physiology by K.Sembulingam.

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GFC-104 Medical Ethics, Legal Aspects of and medical terminology Theory

Role Definition and Interaction, Ethical, Moral, and Legal Responsibilities Medical terminology- The course employs a body systems-oriented, word-analysis approach to learning medical terminology. The goal of the class is to prepare students for the terminology they might encounter in their subsequent coursework, in their clinical rotations and ultimately in their roles as health care professionals.

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GFC-106, English Skills Theory

It is designated to help the students to acquire a good command over English language for common and medical terminology used in medical practice. Objectives: Ability to speak and write proper English Ability to read and understand English Ability to understand and practice medical terminology.

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GFC-107 Computer Skills Practical

Computer applications Related to optometry students

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EVS, Environment Science And Health Theory

Introduction to Environment and Health Sources, health hazards and control of environmental pollution Water- safe and wholesome water Sanitary sources of water Understanding the methods of purification of water on small scale and large scale Various biological standards, including WHO guidelines for third world country Concept and methods for assessing quality of water Domestic refuse, sewage, human excreta and sewage their effects on environment and health, methods and issues related to their disposal. Awareness of standards of housing and the effect of poor housing on health Role of arthropods in the causation of diseases, mode of transmission of arthropods borne diseases, methods of control

Recommended Books:

1. Textbook of Environmental Studies for undergraduate courses By Erach Bharucha, Orient Longman Private Limited /Universities Press India Pvt. Ltd.

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Semester 2

BOPT 201, OCULAR ANATOMY, PHYSIOLOGY & BIOCHEMISTRY

L- 2 CH T- 0 CH P-0CH

UNIT-I

Anatomy of the Eye – 12 hrs

- Sclera, cornea, choroid, Ciliary body, iris, retina
- Refractory media - Aqueous humor, anterior chamber, posterior chamber, Lens, vitreous
- Eyelids, conjunctiva, Coats of the eyeball

UNIT-II - 10 hrs

- Bony orbit & par nasal sinuses
- Extrinsic ocular muscles, their action and control of their movements
- Visual pathway, Development of eye and adenexa

UNIT-III - 15hrs

Ocular Physiology

- Protective mechanisms in the eye: Eyelid and Tears
- Tear film – composition, layers, functions & dysfunction, diagnostic tests
- Cornea – biochemical composition, functions
- Corneal metabolism
- Nutrient uptake energy
- Transparency
- Barrier mechanism –pump action
- Lens – composition
- Metabolism
- Transparency
- Iris and pupil-reflexes
- Aqueous humor –composition – function – aqueous humor production

UNIT-IV -13 hrs

- Retinal neurochemistry
- Retina – function
- Vitamin A-retinal function and metabolism
- Vision – general aspects of sensation
- Pigments of the eye and photo chemistry
- The visual stimulus
- Visual acuity-physiology
- Visual perception-binocular vision, stereoscopic vision, optical illusion
- Color vision and color vision defects.

BOPT-204 OCULAR ANATOMY, PHYSIOLOGY & BIOCHEMISTRY Practical

L- 0 CH T- 0 CH P-1CH

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa. 13Hrs
2. 2. Identify the microscopic structures of various tissues in the eye and correlate the structure with the functions. – 12 Hrs

Recommended Books

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

Teaching-Learning Strategies in brief

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BOPT 202, PHYSICAL & GEOMETRICAL OPTICS Theory

UNIT-I – 8 Hrs

- Nature of light:
- Wave Nature of Light
- Properties of light

- Radiometry & Photometry: Basic concepts and definitions in Photometry

UNIT-II – 15 Hrs

- Rectilinear propagation, ray, beam, reflection, refraction,
- Refraction through Spherical Surfaces
- Lens- shapes,
- Vergences and conversion factors, divergence and convergence of wave fronts by spherical surfaces,
- Definition of dioptre, working of spherical lenses - primary and secondary focal points
- Prism Diopter, Prentice's Law, deviations, ophthalmic prisms - thin and thick
- Spherical refracting surfaces - convex, concave,
- Dioptric power - focal points, nodal points and nodal plane
- Lateral magnification.
- Thin lens equation - lenses in contact separated.
- Two lens systems - reduced system
- Thick lenses - front and back vertex powers - reduced system - dioptric power of equivalent lenses, cardinal points.
- Cylindrical and sphero-cylindrical lenses: principle meridians, refraction by a cylindricallens, sphero-cylindrical lenses, circle of least confusion, interval of sturm, refraction through a sphero-cylindrical lens, writing prescription in different forms
- Stops and Pupils
- Depth of field and depth of focus
- Aberrations of lenses & optical system:
- Dispersion by a prism, Achromatic prisms
- Chromatic aberrations
- Spherical aberrations, coma, astigmatism, curvature, distortion - causes and methods of minimizing aberrations

UNIT-III – 10 Hrs

Optical Instruments

- Microscope
- Telescope

Lasers

- Basic laser principles
- Coherence - spatial, temporal
- Laser pumping
- Lasers in medicine & their types
- Ophthalmic applications

UNIT-IV – 6 Hrs

Principles of Lighting

- Visual task: Factors affecting visual tasks
- Light & vision: Discomfort glare, visual ability, relationship among Lighting, visibility
- and task performance

- Light sources: Modern light sources - spectral energy distribution – luminous efficiency -
- color temperature - color rendering
- Illumination: Luminous flux, candela, illumination
- Lighting system Design: Design approach, Design Process, Concept of Lighting design,physical consideration and psychological consideration and types of lighting.
- Photometry: Measurement of illumination, photometers and filters.

BOPT-205, PHYSICAL & GEOMETRICAL OPTICS PRACTICALS:

L- 0 CH T- 0 CH P-1 CH

1.Thick Prism – determination of prism angle and dispersive power; calculation of the refractive index

2. Thin Prism – measurement of deviation; calculation of the prism diopter

3. Image formation by spherical mirrors

4. Convex lens - power determination using lens gauge, power determination using distant object method;

5. Concave lens – in combination with a convex lens – power determination

6. Imaging by a cylindrical lens – relationship between cylinder axis and image orientation

7. Imaging by a sphero-cylindrical lens – sphere and cylinder in contact.

Reference books:

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

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BOPT 203, OCULAR PHARMACOLOGY

L- 2 CH T- 0 CH P-0 CH

Unit 1- 15 hrs

- Ocular preparations, formulations
- Ocular pharmacokinetics-Methods of drug administration,
- Special drug delivery systems
- Ocular toxicology

UNIT-II- 20 Hrs

Drugs in Ophthalmology

- Agents used to aid diagnosis
- Drugs and biological agents used in ocular surgery
- Anesthetics used in ophthalmic procedures
- Drug treatment of glaucoma, accommodative esotropia and ocular myasthenia
- Pharmacotherapy of ocular infections-Bacterial, Viral, Fungal, Chlamydia
- Drugs used in inflammatory disorders of the eye
- Drug treatment of degenerative disorders of the eye

UNIT-III – 15 Hrs

- Immuno-modulators in ophthalmic practice
- Use of other agents in ophthalmic practice
- Vitamins
- Antioxidants
    - Wetting agents
    - Tear substitutes

BOPT 206, OCULAR PHARMACOLOGY Practical

L- 0CH T- 0 CH P- 1 CH

1. Basic principle of pharmacokinetics & Pharmacodynamics

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

REFERENCE BOOKS:

1. K D Tripathi: Essentials of Medical Pharmacology. 5th edition, Jaypee, New Delhi, 2004

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

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SEMESTER 3

BOPT 301, OPTICAL LENSES & DISPENSING OPTICS

UNIT-I – 15h Hrs

Spectacle Lenses

- Introduction to spectacle lenses
- Forms of lenses
- Cylindrical and spherocylindrical lenses
- Properties of crossed cylinders
- Toric lenses, toric transposition
- Astigmatic lenses
- Axis Direction of astigmatic lenses
- Obliquely crossed cylinders
- Miscellaneous spectacle lenses
- Vertex distance and vertex power
- Tilt induced power
- Aberrations in ophthalmic lenses
- Fresnel prisms, Lenses and Magnifiers
- Manufacture of glass
- Lens surfacing
- Principle of surface generation and glass cements
- Lens quality
- Faults in lens material
- Faults on lens surface
- Inspecting the quality of lenses
- Toughened lenses

UNIT-II – 15 Hrs

Ophthalmic Lenses

- Definition of prisms, Units of prism power
- Thickness difference and Base apex notations
- Dividing, Compounding and Resolving prisms
- Rotary prisms and effective prism power in near vision
- Prismatic effect, decentration, Prentice Rule
- Prismatic effect of spherocylinder and Plano cylinders
- Differential prismatic effects
- Tinted and protective lenses
- Characteristics of tinted lenses
- Absorptive Glasses
- Polarizing Filters
- Photochromatic Filters

- Reflecting filters
- Bifocal lenses
- Trifocal lenses
- Progressive addition lenses
- Lenticular lenses
- Reflection from spectacle lenses, ghost images, Reflections in bifocals at the dividing line
- Antireflection coating, ant scratch coating, antifog coating, Mirror coating,edge coating, Hard Multi Coating (HMC)
- Field of view of lenses
- Aspherical lenses

UNIT-III – 10 Hrs

Spectacle Frames

- Types and parts
- Classification of spectacle frames-material, weight, temple, position, coloration
- Frame construction, frame measurements and markings

Dispensing Optics

- Surfacing and polishing glass lenses
- Glazing
- Frame manipulation and repair
- Facial measurements and frame choice
- Frame and dimension measurements of complete pair of spectacles
- Complete dispensing for subjects.
- Special lenses – examination of specimens
- Lens faults in sections
- Measurements of assorted faces for spectacle
- Lens edging
- Making and edging of bifocal lenses
- Edging of lenses for plastic, metal and rimless frames
- Joining plastics by different solvents

UNIT-IV – 5 Hrs

Optometric Instruments

- Trail lens box and its accessories -Best form lenses
- Lensometer, lens gauge or clock

BOPT 304, OPTICAL LENSES & DISPENSING OPTICS Practical

L- 0 CH T- 0 CH P- 1 CH

Hands on training on the following:

1. To select the tool power for grinding process
2. Spectacle frames –manufacture process & materials
3. Art and science of dispensing spectacle lens and frames based on the glass prescription.
4. Reading of spectacle prescription. Counseling the patient
5. Lens edge thickness calculation
6. Frame & lens measurements and selection
7. Writing spectacle lens order
8. Facial measurements – Inter-papillary distance measurement and measuring heights (single vision, multifocal, progressives)
9. Lens verification and axis marking and fitting of all lens types
10. Final checking of finished spectacle with frame adjustments
11. Delivery and follow-up
12. Troubleshooting complaints and handling patient's questions

Reference Books:

1. C W Brooks, IM Borish: System for Ophthalmic Dispensing, 3rdedition, Butterworth - Heinemann, 2007

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BOPT 302, VISUAL OPTICS

L- 2 CH T- 0 CH P-0CH

UNIT-I – 15 Hrs

- Vergence and power
- Conjugate points, object space and image space
- Sign convention
- Spherical Mirror, catoptrics power
- Cardinal points
- Magnification
- Axis of eye
- Optics of Cornea and aqueous
- Crystalline lens
- Vitreous
- Schematic and reduced eye
- Keratometry

UNIT-II- 20 Hrs

Ametropia

- Etiology of refractive anomalies
- Contributing variability and their ranges
- Populating distributions and their ranges
- Optical component measurement
- Growth of eye in relation to refractive errors
- Emmetropia
- Myopia
- Hyperopia
- Astigmatism
- Anisometropia and Aniseikonia
- Presbyopia
- Aphakia and pseudophakia
- Correction and management of Amblyopia

Accommodation and Vertex Distance

- Relationship between Accommodation and convergence, A/C Ratio
- Ocular refraction versus spectacle refraction
- Ocular accommodation versus spectacle accommodation

- Spectacle magnification and relative spectacle magnification
- Retinal image blur
- Depth of focus and depth of field

UNIT-III – 15 Hrs

- **Retinoscopy**-speed of reflex and optimum condition
- Dynamic and Static
- Review of objective refractive method
- Cross cylinder method for astigmatism, astigmatic fan test
- Difficulties in objective tests and their avoidance
- Transposition of lenses
- Spherical equivalent
- Prescribing prism
- Binocular Refraction

BOPT 305, VISUAL OPTICS

L- 0CH T- 0 CH P-1CH

Hands on practice for the following :

2. Visual acuity
3. Use of slit lamp and Keratometry to find principle meridians
4. Measurement of accommodation
5. Presbyopia correction and methods – accommodative reserve balancing the relative accommodation
6. Methods of differentiating axial and refractive ametropia
7. Practice of Retinoscopy
    - Prescription writing
    - Binocular refraction
    - Vision therapy
    - Photo refraction
    - Exercise for vergence
8. Ocular symptoms, the past prescriptions-its influence
9. Examination of muscle balance, Eye lids, conjunctiva & sclera

Cornea, lens, Iris, ciliary body and pupil

10. Examination of angle of anterior chamber

Reference books:

1. M P Keating: Geometric, Physical and Visual optics, 2nd edition, Butterworth-Heinemann, USA, 2002 2.
2. HL Rubin: Optics for clinicians, 2nd edition, Triad publishing company. Florida, 1974

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BOPT 303, OPTOMETRIC INSTRUMENTS & CLINICAL EXAMINATIONS OF VISUAL SYSTEM

L- 2 CH T- 0 CH P-0CH

UNIT-I- 20 Hrs

- Refractor head units, optical considerations of refractor units
- Trial frame design
- Near vision difficulties with units and trial frame
- Retinoscope-types available
- Adjustments of retinoscopes – special features
- Test charts standards, choice of test charts Interpretation of objective findings
- Interpretation of objective tests-polarizing and displacement etc, Projection charts
- Illumination of the consulting room special instruments

UNIT-II – 30 Hrs

- Brightness acuity tester
- Vision analyzer
- Pupilometer
- Keratometry and corneal topography
- Slit lamp
- Tonometer – Principles, uses and types

- Ophthalmoscopes and related devices

Special Equipments

- Fundus camera
- Orthoptics instruments
- Color vision testing devices
- Fields of vision and screening devices
- Ophthalmic ultrasonography - ultrasound/ A- scan/ B-scan/ UBM
- Electro-diagnostics - ERG/VPG/EOG
- Nerve fiber analyzer
- Scanning laser devices

BOPT 306, OPTOMETRIC INSTRUMENTS & CLINICAL EXAMINATIONS OF VISUAL SYSTEM

L- 0CH T- 0 CH P-1CH

To gain the basic practical skill in handling the following instruments

1. Visual Acuity chart/drum

2. Retinoscope

3. Trail Box

4. Jackson Cross cylinder

5. Direct ophthalmoscope

6. Slit lamp Biomicroscope

7. Slit lamp Ophthalmoscopy (+90, 78 D)

8. Gonioscope

9. Tonometer: Applanation & schiotz Tonometer

10. Keratometer

11. Perimeter

12. Electrodiagnostic instrument (ERG, VEP, EOG) 1

13. A –Scan Ultrasound

14. Lensometer

Reference books:

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

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SEMESTER 4

BOPT 401, SQUINT AND BINOCULAR VISION

L- 2 CH T- 0 CH P-0CH

UNIT-I – 25 Hrs

- Spatial Sense
- Evolution of binocular vision
- Binocular fusion, suppression, rivalry & summation
- Visual direction, local sign & corresponding points
- Panum's Space
- Stereopsis
- Development of Binocular vision
- The longitudinal horopter
- Neural aspects of binocular vision
- Visually guided behavior and Aniseikonia
- ARC
- Qualitative & Quantitative Diagnosis of Strabismus

UNIT-II – 10 Hrs

- Esodeviation
- Exodeviation
- A-V Phenomena
- Cyclovertical squint
- Psuedostrabismus

UNIT-III – 10 |Hrs

- Amblyopia and Eccentric Fixation
- Treatment of amblyopia

UNIT-IV – 10 Hrs

- Special forms of strabismus
- Non surgical management of strabismus

BOPT 404, SQUINT AND BINOCULAR VISION Practical

L- 0CH T- 0 CH P-1CH

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

2. Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely.

Reference 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

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BOPT 402, VISUAL AIDS

L- 2 CH T- 0 CH P-0CH

Unit 1 – 25 Hrs

- Identifying the Low Vision Patients
- History & diagnostic procedures in low vision case management
- Optics of Low Vision Aids
- Demonstrating aids-optical, non optical, electronic
- Teaching the Patient to Use Aids
- Guidelines to determine magnification and selecting low vision aids for distance, intermediate and near

Unit -2 – 25 Hrs

- Children with Low Vision

- Choice of tests, Aids in different pathological conditions
- Light, glare and contrast in low vision care and rehabilitation bi-optic telescope
- Optical Devices for Field Defects
- Contact lens combined system
- Rehabilitation of the visually handicapped

BOPT 405, VISUAL AIDS (Practical)

L- 0CH T- 0 CH P-1CH

1. Practical 1: Attending in low vision care clinic and history taking.

2. Practical 2
2: 2.1 determining the type of telescope and its magnification (Direct comparison method & calculated method)
2.2 Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers.

3. Practical 3

3: 3.1 inducing visual impairment and prescribing magnification.

3.2 Determining reading speed with different types of low vision aids with same magnification.

3.3 Determining reading speed with a low vision aid of different magnifications.

REFERENCE BOOKS:

1. Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999

2.Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991

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BOPT 403, CONTACT LENS

L- 2 CH T- 0 CH P-0CH

UNIT-I – 15 Hrs

- History of Contact Lens
- Corneal physiology and contact lens
- Preliminary measurements and investigations
- Slit lamp biomircoscopy
- Contact Lens Materials
- Optics of Contact Lens
- Glossary of terms: Contact Lenses
- Indications and Contraindications of Contact Lens
- Types & design of Contact lenses
- Keratometry, Placido's disc, Topography

UNIT-II – 15 Hrs

Contact Lens Fitting

- Handling
- Fitting of spherical soft Contact Lens
- Fitting of spherical RGP Contact Lens, low DK and high DK
- Effects of RGP Contact Lens parameter changes on lens fitting
- Fitting in astigmatism, Keratoconus, aphakia, pseudophakia
- Lens care and hygiene instructions compliance
- Follow up post fitting examination, Care of Contact Lens, Contact Lens solutions
- Complications of Contact Lens

UNIT-III – 10 Hrs

- Fitting Contact Lens in children
- CL following ocular surgeries
- Use of secular microscopy and pachymetry in CL
- Modification of finished lenses

- Instrumentation in Contact Lens practice
- Checking finished lens parameters
- Edging and polishing curves of contact lenses
- Contact Lens for special purpose-swimming, sports, occupational etc

UNIT-IV – 10 Hrs

- Recent developments in Contact Lens
- Review of lenses available in India
- Current Contact Lens research

BOPT 406, CONTACT LENS Practical

L- 0CH T- 0 CH P-1CH

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

Reference Books:

1. Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
2. E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008

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SEMESTER 5

BOPT 501, OCULAR DISEASES

L- 1 CH T- 1 CH P-0CH

UNIT-I – 5 Hrs

Eyelids

- Congenital and developmental anomalies of eyelids
- Blepharospasm
- Ectropion and Entropion
- Trichiasis and Symblepharon
- Eyelid inflammations
- Eyelid tumors
- Ptosis
- Eyelid trauma

Lacrimal pump

- Methods of Lacrimal apparatus evaluation
- Congenital and developmental anomalies of lacrimal system
- Lacrimal obstructions
- Lacrimal sac tumors
- Lacrimal trauma

UNIT-II – 10 hrs

Conjunctival diseases- inflammation & degenerations

Cornea – methods of examination, inflammation, degenerations & dystrophy, opacity,

- Ectasia and Staphyloma, Keratoplasty, Refractive surgery, metabolic diseases associated& corneal changes
- **Scleritis** and episcleritis
- Orbital abnormalities
- Methods of **orbital** examinations
- Congenital and developmental anomalies of orbit
- Orbital tumors, inflammations, sinus disorders affecting the orbit, trauma
- Vitamin A deficiency

Lens

- Congenital & acquired anomalies & their management

UNIT-III – 6 Hrs

Uveal Tract

- Uveitis, Congenital anomalies of choroids

- Diseases of choroids
- Tumors
- Glaucoma screening
- Classification of glaucoma

Vitreous and Retina

Developmental abnormalities

- Vitreous haemorrhage, degenerations
- Retinal vascular diseases
- Retinal tumors
- Electromagnetic radiation & its effect on the retina
- Hereditary macular disorders
- Peripheral retinal Degenerations
- Retinal holes and detachments
- Intraocular foreign bodies

UNIT-IV 4 Hrs

OTHERS

- Neuro ophthalmic examination
- History
- Visual function testing
- Technique of pupillary examination
- Ocular motility
- Visual sensory system
- Visual field
- Nystagmus
- Ocular motor nerves and medical longitudinal fasciculus
- Eye and systemic diseases

BOPT 504, OCULAR DISEASES Practical

L- 0CH T- 0 CH P-1CH

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

Reference Books:

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

Teaching-Learning Strategies in brief

- Student centric discussion is a teaching strategy that allows students to understand more topics or concepts via collaboration.
- Collaborative learning is a teaching strategy that focuses on encouraging teamwork and partnership.

- Visual, Auditory and Kinesthetic it is a very comprehensive teaching strategy that focuses on improved learning experiences using three main sensory receivers.
- Spaced learning is a teaching strategy that makes practicing a skill or retrieving information efficient for students.

Assessment methods and weightages in brief

Progress of learners towards achieving learning outcomes may be assessed making creative use of the following, either independently or in combination

- Time-constrained examinations (say 1-hour or 2-hour tests)
- Closed-book and open-book tests (if applicable, rather than doing as a rule)
- Problem based assignments
- Real life simulations
- Observation of practical skills (speaking, listening, problem solving within a peer group or a class) individual project reports (case-study or term papers within a given word limit)
- Team project reports
- Oral presentations, including seminar presentation; viva voce, interviews; peer and self-assessment etc. and any other pedagogic approaches as may be relevant keeping in view the learners' level, credit load and class size

BOPT502, PUBLIC HEALTH AND COMMUNITY OPTOMETRY

L- 1 CH T- 1 CH P-0CH

UNIT-I – 10 Hrs

- Global medicine and evolution of public health in India
- Public health of optometry-concepts and implementation
- Health care delivery systems in India and determinants of health
- Levels of prevention-optometrist's role in community
- Concepts of national health program

UNIT-II – 10 Hrs

- Screening in population
- Basics in research methodology in populations
- Demography and vital statistics
- Epidemiology of blindness-cataract, glaucoma, deficiency disorders
- Natural history of disease, transmission of disease

UNIT-III – 5 Hrs

- National and international agencies in health plan
- Fundamentals of health economics, health plan
- Quality assessment in health delivery program

BOPT505, PUBLIC HEALTH AND COMMUNITY OPTOMETRY Practical

L- 0CH T- 0CH P-1CH

1. Organize health education programmes in the community
2. Vision screening for various eye diseases in the community and for different age groups

REFERENCE BOOKS:

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

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BOPT 503, GERIATRIC OPTOMETRY & PEDIATRIC OPTOMETRY

L- 1 CH T- 1 CH P-0CH

Geriatric Optometry – 13 Hrs

Structural, physiological & Optical changes in the ageing eye

Ocular diseases common in old eye, with special reference to cataract disorders,

vascular

Diseases of the ageing eye

Special considerations in ophthalmic dispensing to the elderly

Management of visual problems of aging

How to carry on one's visual takes overcoming the problems of ageing

Pediatric Optometry – 12 Hrs

Genetic, Prenatal, Perinatal & Postnatal factors

Measurement of visual acuity

Normal Appearance, pathology and structural anomalies

Measurement of refractive status

Determining binocular status

Determining sensory motor adaptability

BOPT 506, GERIATRIC OPTOMETRY & PEDIATRIC OPTOMETRY

Practical

L- 0CH T- 0 CH P-1CH

1. Optometric Examination of the Older Adult
2. Spectacle dispensing in elderly – Considerations of spectacle lenses and frames
3. Rehabilitation in geriatrics.
4. The ability to take a thorough pediatric history which encompasses the relevant developmental, visual, medical and educational issues.
5. To be able to diagnose disorders of refraction, accommodation and vergence, and be able do assessment and management of these disorders.
6. Dispensing contact lens, Spectacle, low vision aids and referral to the surgeon or other specialists at the appropriate timing.
7. Have a capacity for highly evolved communication and co-management with other professionals involved in pediatric assessment and care

REFERENCE BOOKS:

1. OP Sharma: Geriatric Care –A textbook of geriatrics and Gerontology, viva books, New Delhi, 2005

2. Pediatric Optometry –William Harvey/ Bernard Gilmartin, Butterworth –Heinemann, 2004

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SEMESTER 6

BOPT-601

Total credits05

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

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