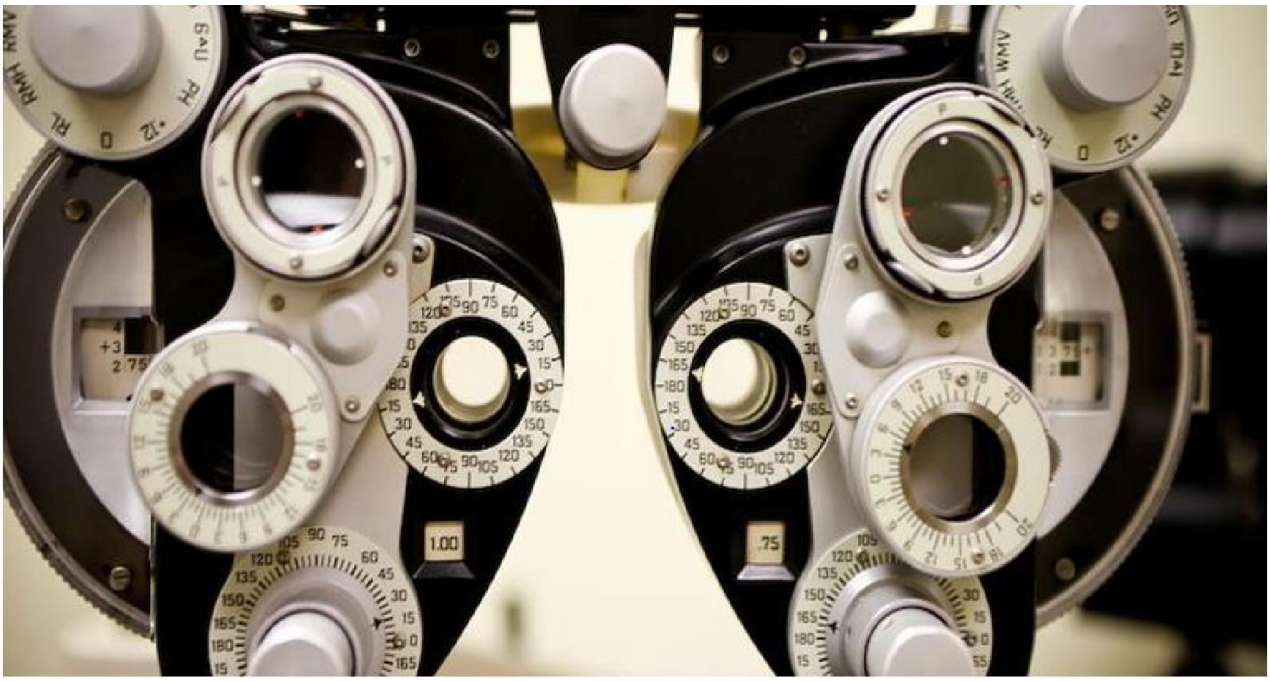
# NOIDA INTERNATIONAL UNIVERSITY

## SCHOOL OF HEALTH SCIENCES

# CURRICULUM FOR BACHELOR OF OPTOMETRY



**w.e.f – 2021 - 2022**

## Who is an Allied and Healthcare Professional?

The Ministry of Health and Family Welfare, accepted in its entirety the definition of an allied and healthcare professional based on the afore-mentioned report, though the same has evolved after multiple consultations and the recommended definition is now as follows-

*'Allied and healthcare professionals (AHPs) include individuals involved with the delivery of health or healthcare related*
*services, with qualification and competence in therapeutic, diagnostic, curative, preventive and/or rehabilitative interventions. They work in multidisciplinary health teams in varied healthcare settings including doctors (physicians and specialist), nurses and public health officials to promote, protect, treat and/or manage a person('s) physical, mental, social, emotional, environmental health and holistic well-being.'*[1]

Since the past few years, many professional groups have been interacting and seeking guidance on all those who would qualify under the purview of "allied and healthcare professionals". In the healthcare system, statutory bodies exist for clinicians, nurses, pharmacists and dental practitioners; but a regulatory structure for around 50 professions is absent in India. Currently, the Government is considering these professions (as listed Annex-1) under the ambit of the allied and healthcare system. However, this number is subject to changes and modifications over time, particularly considering how quickly new technologies and new clinical avenues are expanding globally, creating newer cadres of such professionals.

## Scope and need for allied and healthcare professionals in the Indian healthcare system

The quality of medical care has improved tremendously in the last few decades due to the advances in technology, thus creating fresh challenges in the field of healthcare. It is now widely recognized that health service delivery is a team effort involving both clinicians and non-clinicians, and is not the sole duty of physicians and nurses. Professionals that can competently handle sophisticated machinery and advanced protocols are now in high demand. In fact, diagnosis is now so dependent on technology, that allied and healthcare professionals (AHPs) are vital to successful treatment delivery.

Effective delivery of healthcare services depends largely on the nature of education, training and appropriate orientation towards community health of all categories of health personnel, and their capacity to function as an integrated team. For instance in the UK, more than 84,000 AHPs, with a range of skills and expertise, play key roles within the National Health Service, working autonomously, in multi-professional teams in various settings. All of them are first-contact practitioners and work across a wide range of locations and sectors within acute, primary and community care. Australia's health system is managed not just by their doctors and nurses, but also by the 90,000 university-trained, autonomous AHPs vital to the system.

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. Although an enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care, the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out- of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long term treatment ensures return to normal life. AHPs also play a significant role to care for patients who struggle mentally and emotionally in the current challenging environment and require mental health support; and help them return to well-being. Children with communication difficulties, the elderly, cancer

patients, patients with long term conditions such as diabetes, people with vision problems and amputees; the list of people and potential patients who benefit from AHPs is indefinite.

Thus, the breadth and scope of the allied and healthcare practice varies from one end to another, including areas of work listed below:

- Across the age span of human development from neonate to old age;
- With patients having complex and challenging problems resulting from systemic illnesses such as in the case of diabetes, cardiac abnormalities/conditions and elderly care to name a few;
- Towards health promotion and disease prevention, as well as assessment, management and evaluation of interventions and protocols for treatment;
- In a broad range of settings from a patient's home to community, primary care centers, to tertiary care settings; and

With an understanding of the healthcare issues associated with diverse socio-economies and cultural norms within the society

## Credit hours vs traditional system

Recently the National Assessment and Accreditation Council (NAAC) and the University Grants Commission (UGC) have highlighted the need for the development of a Choice-Based Credit System (CBCS), at par with global standards and the adoption of an effective grading system to measure a learner's performance.[17] All the major higher education providers across the globe are operating a system of credits. The European Credit Transfer System (ECTS), the 'National Qualifications Framework' in Australia, the Pan-Canadian Protocol on the Transferability of University Credits, the Credit Accumulation and Transfer System (CATS) in the UK as well as the systems operating in the US, Japan, etc. are examples of these. Globally, a need now exists for the use of a fully convertible credit-based system that can be accepted at other universities. It has now become imperative to offer flexible curricular choices and provide learners mobility due to the popularity of initiatives such as 'twinning programmes', 'joint degrees' and 'study abroad' programmes.[18]

In order to ensure global acceptability of the graduates, the current curriculum structure is divided into smaller sections with focus on hours of studying which can be converted into credit hours as per the international norms followed by various other countries.

## Statement of Philosophy– Why this profession holds so much importance

An estimated 456 million people of India's population of 1.12 billion people require vision correction (spectacles, contact lenses or refractive surgery) to be able to see and function for learning, work and life in general. Twenty six million people are blind or vision impaired due to eye disease. A further 133 million people, including 11 million children, are blind or vision impaired simply from lack of an eye examination and an appropriate pair of glasses (uncorrected refractive error).

Blindness and vision impairment place a significant economic burden on families, communities and society at large – due to lost productivity, as well as the cost of education and rehabilitation[22]. About 85% of all vision impairment and 75% of blindness globally could be avoided[23], prevented or cured if the appropriately trained personnel and care facilities existed. The World Health Organisation (WHO) and the International Agency for the Prevention of Blindness (IAPB) launched the global initiative VISION 2020: the Right to Sight to eliminate avoidable blindness and vision impairment.

Uncorrected refractive error is the major cause of avoidable vision impairment, and the second most common cause of blindness. *"Without appropriate optical correction, millions of children are losing educational opportunities and adults are excluded from productive working lives, with severe economic and social consequences. Individuals and families are pushed into a cycle of deepening poverty because of their inability to see"* In 2007, an estimated 456 million people of India's population of 1.12 billion people required vision correction (spectacles, contact lenses or surgery) to be able to see and function for learning, work and general life activities. This included 37 million children younger than 16 years of age. Almost all of these 456 million adults and children would have normal vision if they had access to an eye examination and an appropriate pair of spectacles. However, lack of access has left 133 million of them,

including 11 million children, blind or vision impaired from uncorrected refractive error. The burden of avoidable blindness and vision impairment on the health care system in India is significant, with India currently having the highest number of blind people in the world. The direct and indirect cost, including lost productivity, due to uncorrected refractive error in India has been estimated at $23 billion per year (I$269 billion globally). As the population ages, future demand for eye care services will increase substantially. Enhancing access to these services will require an increase in the number of eye care professionals, as well as more efficient utilisation of existing professionals.

Optometry is recognized by the World Health Organization (WHO) as an independent profession through its ongoing official relations with the World Council of Optometry (WCO) – the international optometric organization which represents almost 300,000 optometrists from 87 member organizations in 47 countries.

Optometry as a profession has the primary public health responsibility for eliminating uncorrected refractive error. To provide excellent vision care to all the people of the country, India needs 116,000 optometrists. India currently has approximately 9,000 4-year trained optometrists and an estimated 30,000 2-year trained eye care personnel.

## About Optometry

Optometry means a health care profession that is autonomous and concerned especially with examining the eye for defects and faults of refraction, with prescribing correctional lenses, eye exercises and/or visual rehabilitation care for visually impaired, with diagnosing diseases of the eye, and with treating such diseases or referring them for treatment.

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

## Syllabus Curriculum

This ordinance may be called the Ordinance relating to Bachelor of Optometry. It shall come into force with effect from academic year 2021 - 2022.
This is a new course and its Ordinance is related to B.Sc.(optometry). Optometry means a health care profession that is autonomous and concerned especially with examining the eye for defects and faults of refraction, with prescribing correctional lenses, eye exercises and/or visual rehabilitation care for visually impaired, with diagnosing diseases of the eye, and with treating such diseases or referring them for treatment.

Optometry as a profession has the primary public health responsibility for eliminating uncorrected refractive error (the leading cause of vision impairment globally). As primary eye care practitioners, optometrists have a vital role in detecting potentially serious eye diseases such as cataract, glaucoma and Diabetic retinopathy, age-related maculopathy, as well as general health conditions such as hypertension and diabetes, which means optometrists can also help alleviate the burden of other causes of blindness through diagnosis, referral and in some cases co-management. Optometry can and should play a leading role in eye care provision at the primary level, and can also assist at secondary and tertiary levels where possible, working with ophthalmologists and other eye care providers towards the unified goal of combating blindness. The program has been developed through inputs from the medical and experts in the field. The faculty comprises experienced trainers available permanently at the campus and also subject

matter experts as visiting faculty. The teaching pedagogy includes theory, practical, case studies, role plays, study material, internship etc to keep the learning experiential and collaborative.

## Selection procedure:

He/she has passed the Higher Secondary (10+2) or equivalent examination recognized by any Indian University or a duly constituted Board with pass marks (50%) in physics, chemistry, biology.
OR
Diploma in Optometry after completing 12th class/ 10 +2 of CBSE or equivalent with minimum aggregate of 50% marks in physics, chemistry and biology/mathematics provided the candidate has passed in each subject separately.

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

- English, Physics, Chemistry, Botany, Zoology
- English, Physics, Chemistry, Biology/ and any other language
- He/she has attained the age of 17 years as on 31st December of the year of admission.
- He/she has to furnish at the time of submission of application form, a certificate of Physical fitness from a registered medical practitioner and two references from persons other than relatives testifying to satisfactory general character.

Admission to Bachelor in Optometry course shall be made on the basis of eligibility and an entrance test to be conducted for the purpose. No candidate will be admitted on any ground unless he/she has appeared in the admission test and interview.

Entrance test, to be conducted by the university as per the syllabus under 10 +2 scheme of CBSE, subject-wise distribution of questions will be as 40% in Physics, 25% in Biology/25% in Chemistry, 10% in English (Language & Comprehension) and 10% in General Awareness about health-related methods.

Successful candidates on the basis of written Test will be called for the interview & shall face an interview board. The interview board will include the Head of the Department of Optometry (Chairman of the Board), senior faculty members along with other nominees, whose recommendations shall be final for the selection of the students.

During subsequent counselling (s) the seat will be allotted as per the merit of the candidate depending on the availability of seats on that particular day.
Candidates who fail to attend the Medical Examination on the notified date(s) will forfeit the claim for admission and placement in the waiting list except permitted by the competent authority under special circumstances.

The name of the student(s) who remain(s) absent from classes for more than 15 days at a stretch after joining the said course will be struck off from the college rolls without giving any notice.

**Provision of Lateral Entry**:

Lateral entry to second year of undergraduate optometry programme for candidates who have passed diploma program (Refraction or its equivalent) from the Government Boards and recognized by State/Central University, fulfilling the conditions specified and these students are eligible to take admission on lateral entry system only if the related subjects have been studied at diploma level.

# Teaching Course

It is recommended that any programme developed from this curriculum should have a minimum of the following duration to qualify as a professional course in optometry - 4-year programme (including 1 year of clinical training /internship)

The course structure shall be as given below:

## B.Sc. Optometry

### First year -

| S.No. | Course Code | Course Titles | Theory Hours | Practical Hours | Total Hours (Theory + Practical) | Credits | 1A* | UE** | Exam Duration (IA/UE) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | BOP101 | General Anatomy | 120 | 30 | 150 | 5 | 25 | 75 | 3 Hours |
| 2 | BOP102 | General Physiology | 120 | 30 | 150 | 5 | 25 | 75 | 3 Hours |
| 3 | BOP103 | General Biochemistry | 60 | 30 | 90 | 3 | 25 | 75 | 3 Hours |
| 4 | BOP104 | General Microbiology | 60 | 0 | 60 | 2 | 25 | 75 | 3 Hours |
| 5 | BOP105 | Nutrition | 60 | 0 | 60 | 2 | 25 | 75 | 3 Hours |
| 6 | BOP106 | Pathology | 60 | 0 | 60 | 2 | 25 | 75 | 3 Hours |
| 7 | BOP107 | Basics of Computers # | 30 | 0 | 30 | | 100 | | 3 Hours |
| 8 | BOP108 | English and Communication # | 30 | 0 | 30 | | 100 | | 3 Hours |

# - Not included in university exams

*IA – Internal Assessment

**UE-University Examinations

### Second Year –

| S.No. | Course Code | Course Titles | Theory Hours | Practical Hours | Total Hours (Theory + Practical) | Credits | 1A* | UE** | Exam Duration (IA/UE) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | BOP 201 | Geometrical Optics | 90 | 30 | 120 | 4 | 25 | 75 | 3 Hours |
| 2 | BOP 202 | Visual Optics | 60 | 30 | 90 | 3 | 25 | 75 | 3 Hours |
| 3 | BOP 203 | Basic and Ocular Pharmacology | 90 | 0 | 90 | 3 | 25 | 75 | 3 Hours |
| 4 | BOP 204 | Physical Optics | 60 | 30 | 90 | 3 | 25 | 75 | 3 Hours |
| 5 | BOP 205 | Optometric Instruments | 120 | 30 | 150 | 5 | 25 | 75 | 3 Hours |
| 6 | BOP 206 | Practice Management | 60 | 0 | 60 | 2 | 25 | 75 | 3 Hours |
| 7 | BOP 207 | Dispensing Optics and Public Health and Community Optometry | 90 | 0 | 90 | 3 | 25 | 75 | 3 Hours |
| 8 | BOP 208 | Binocular Vision | 120 | 30 | 150 | 5 | 25 | 75 | 3 Hours |
| 9 | BOP 209 | Systemic Disease | 90 | 0 | 90 | 3 | 25 | 75 | 3 Hours |
| 10 | BOP 251 | Core Practical Examination | | 100 | 100 | 2 | 25 | 75 | 3 Hours |
| | | Clinical Postings # | | 100 | 100 | | | | |

# Not included in university exams

Note: Clinical postings can be encouraged on Saturdays too.

## Third Year –

| S.No. | Course Code | Course Titles | Theory Hours | Practical Hours | Total Hours (Theory + Practical) | Credits | 1A* | UE** | Exam Duration (IA/UE) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | BOP 301 | Contact Lens | 120 | 30 | 150 | 5 | 25 | 75 | 3 Hours |
| 2 | BOP 302 | Low Vision Care | 60 | 30 | 90 | 3 | 25 | 75 | 3 Hours |
| 3 | BOP 303 | Ocular Disease and Glaucoma | 120 | 30 | 150 | 5 | 25 | 75 | 3 Hours |
| 4 | BOP 304 | Clinical Examination of Visual System | 60 | 0 | 60 | 2 | 25 | 75 | 3 Hours |
| 5 | BOP 305 | Indian Medicine and Telemedicine | 60 | 0 | 60 | 2 | 25 | 75 | 3 Hours |
| 6 | BOP 306 | Optometric Optics | 90 | 0 | 90 | 3 | 25 | 75 | 3 Hours |
| 7 | BOP 307 | Introduction to Quality and Patient Safety | 30 | 0 | 30 | 1 | 25 | 75 | 3 Hours |
| 8 | BOP 308 | Medical Psychology | 30 | 0 | 30 | 1 | 25 | 75 | 3 Hours |
| 9 | BOP 309 | Medical Law and Ethics | 60 | 0 | 60 | 2 | 25 | 75 | 3 Hours |
| 10 | BOP 310 | Geriatric Optometry, Pediatric Optometry & Occupational Optometry | 120 | 30 | 150 | 5 | 25 | 75 | 3 Hours |
| 11 | BOP 311 | Research Methodology and Biostatistics | 90 | 0 | 90 | 3 | 25 | 75 | 3 Hours |
| 12 | BOP 351 | Core Practical Examination | | 100 | 100 | 2 | 25 | 75 | 3 Hours |
| | | Clinical Postings # | | 100 | 100 | | | | |

# Not included in university exams
Note: Clinical postings can be encouraged on Saturdays too.

## Fourth Year –

| S.No. | Course Code | Course Titles | Theory Hours | Practical Hours | Total Hours (Theory + Practical) | Credits | 1A* | UE** | Exam Duration (IA/UE) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | BOP 401 | Internship and Research Project# | | 1500 | 1500 | | 100 | | 3 Hours |

# Not included in university exams

SUMMER TRAINING PROJECT REPORT:

After the internal examination, every student during the program will undergo an on-the-clinical posting

and after course completion final examination, every student will go for internship and research project in various organizations & hospitals. Internship is for 12 months (July – June) or 1 year. Total number of 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

During the training, the organization (where the student is undergoing training) will assign a problem/project to the student.

The student, after completion of the training, will submit a report at the end of the session.

The report will have two certificates. One by the Head of the Department and the other by the Reporting Officer of the organization where the student has undergone training. These two certificates should be attached in the beginning of the report.

The report will be evaluated by two external examiners. They shall award marks on the Internship Report independently out of a maximum of 100 marks each. There will be no internal examination.

## 12. Comprehensive Viva Voce

A comprehensive viva voce shall be conducted at the end the fourth Semester in order to judge the extent to which the student has understood various topics and is judged for application of knowledge gained. This is also to see the student's level of articulation of what is learnt by him. The idea is to ensure that the students assimilate what is being taught and see their relevance in the practical field and also the inter relationships of various parameters.

The viva voce is of 100 marks and will be conducted by the external examiner appointed by the University.

## Attendance

The students are expected to attend all the classes and should not have less than 75 % attendance in theory as well as in practical classes, wherever held, to become eligible to appear for the university examination. Short fall in attendance can, however, be condoned in deserving cases to the extent of 10% by the Director/Dean. If the short fall is more than 10% but not more than 15%, the Director/Dean may recommend deserving cases to the Vice Chancellor for condonation. The order of the Vice Chancellor in this regard shall be final.

## Examination

The examination in each semester shall be conducted in two parts:

Internal assessment will be of 25 marks as under: -

I. Midterm written test including in-between snap tests if any, shall carry 10 marks independently in each subject.
II. A maximum of 15 marks shall be awarded for class presentation, assignments, extra-curricular activities as well as in the form of teacher's assessment independently in each subject.

University Examination carrying 75 marks.

The marks obtained in the two parts of the examination together shall be aggregated for the purpose of determining the total marks obtained by a student in a particular paper/subject of study.

The student shall have to obtain minimum 50% marks in internal assessment to be eligible for appearing in University Examination.

A special examination may be held in the month of August for the students of the first year of the course to enable them to reappear in those papers in which they had failed or could not appear due to any reason other than shortage of attendance. Students detained due to shortage of attendance may also appear in the special examination provided they make up their attendance by attending extra classes which may be arranged between 15th May to 31st July.

## Paper setting & Evaluation

The work of setting the end semester examination papers and evaluation of scripts and conduct of the end semester practical examination shall be assigned to the course teachers as well as to External Experts ordinarily in the ratio of 50:50 for internal and external paper setting & evaluation respectively.

## Results

The result shall be prepared at the end of each academic year of the course by aggregating the marks obtained in the theory and practical examinations in all the semesters of the course till date. A candidate shall be declared as passed at the end of an academic year if he/she secures minimum 50% marks in each theory & practical paper separately (including project reports and comprehensive viva) and 50% in aggregate.

If a candidate fails in only one head/subject and having passed in all other head/subject of the given examination of the year than his/her deficiency of maximum five (05) marks may be Fulfilled by grace marks as per university notification no.-

All those who are declared as passed at the end of an academic year shall be promoted to the next academic year

If a student obtained 40% marks in at least 50% of the papers (ignoring fractions), he/she will be provisionally promoted to the next year with carryover papers and will have to appear & obtain pass marks in carryover papers along with the subsequent regular examinations for the relevant semester.

A student not covered by clause (a) to (d) above shall have the following options to complete his/her course –

He/ she may take admission on payment of full annual course fee and repeat the entire year of study. He /She shall be treated as a regular student.

Or

He /She may pay only University exam fee for the End Semester Examination and appear in the End Semester University exams directly. He /She shall not be allowed to attend classes and the Sessional marks obtained earlier shall be retained.

Or

He /She may pay half of the annual course fee and attend classes. The sessional marks obtained by him/her earlier shall be retained. There will not be any requirement of minimum attendance for appearing in the University examination

The examination for students reappearing in any papers shall be held along with the subsequent regular examinations for the relevant semester.

The final result at the end of the course shall be prepared as below by aggregating the marks obtained in all the semesters: -

## Power to Modify

In the event of any emergent situation, if any deviation is considered necessary, the Vice Chancellor is authorized to modify the ordinance. Subject to subsequent ratification by the Executive Council

# FIRST YEAR

## Course code- BOP 101

## Course name- General Anatomy

## Course credit- 5

## Total contact hour - 150 hours

**COURSE DESCRIPTION:**

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

**COURSE OBJECTIVES:**

By the end of this course the students will demonstrate the anatomy of the human body regarding upper limb, lower limb thorax, abdomen, and head and neck. Also, students will demonstrate the ability to gain practical skills enabling them to recognize and differentiate bones, muscles, vessels, nerves and viscera of the body. The student can gain skill in reading and understanding radiological images of the body and identify through palpation the anatomical landmarks on the surface of the body. Course description: It is designed to provide students with the working knowledge of the structure of the human body which is an essential foundation for their clinical studies.

**COURSE CONTENT:**

**UNIT 1**

**Introduction: human body as a whole –**

Theory:

Definition of anatomy and its divisions Terms of location, positions and planes Cell mid its organelles Epithelium-definition, classification, describe with examples, function

Glands- classification, describe serous & mucous glands with examples Basic tissues - classification with examples

Practical:

Histology of types of epitheliums

Histology of serous, mucous & mixed salivary gland

**UNIT 2**

**Locomotion and support**

Theory

Cartilage - types with example & histology

Bone - Classification, names of bone cells, parts of long bone, names of all bones, vertebral column, fontanels of fetal skull Joints - Classification of joints with examples, synovial joint (in detail for radiology) Muscular system: Classification of muscular tissue & histology

Names of muscles of the body Practical:

Histology of the 3 types of cartilage

Demo of all bones showing parts, radiographs of normal bones & joints

**UNIT 3**

**Cardiovascular system**

Theory:

Heart-size, location, chambers, exterior & interior Blood supply of heart

Systemic & pulmonary circulation

Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery

Peripheral pulse

Inferior vena cava, portal vein, portosystemic anastomosis, Great saphenous vein, Dural venous sinuses Lymphatic system- Histology of lymphatic tissues, Names of regional lymphatics, axillary and inguinal lymph nodes in brief
Practical:
Demonstration of heart and vessels in the body
Histology of large artery, medium sized artery & vein, large vein
Microscopic appearance of large artery, medium sized artery & vein, large vein pericardium Histology of lymph node, spleen, tonsil & thymus Normal chest radiograph showing heart shadows Normal angiograms

**UNIT 4**
**Gastro-intestinal system**
Theory:
Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer's ring) Esophagus, stomach, small and large intestine, liver, gallbladder, pancreas Radiographs of abdomen

**UNIT 6 –**
**Respiratory system**
Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments.
Histology of trachea, lung and pleura
Names of paranasal air sinuses.
Practical:
Demonstration of parts of the respiratory system. Normal radiographs of chest
Histology of lung and trachea

**UNIT 6**
**Peritoneum**
Theory:
Description in brief Practical:
Demonstration of reflections

**UNIT 7**
**Urinary system**
Theory: Kidney, ureter, urinary bladder, male and female urethra
Histology of kidney, ureter and urinary bladder
Practical:
Demonstration of parts of urinary system Histology of kidney, ureter, urinary bladder
Radiographs of abdomen-lVP, retrograde cryptogram

**UNIT 8**
**Reproductive system**
Theory:
Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology) Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology) Mammary gland - gross,
Practical:
Demonstration of section of male and female pelvis with organs in situ
Histology of testis, vas deferens, epididymis, prostate, uterus, fallopian tubes and ovary

**UNIT 9**
**Endocrine glands**
Theory:
Names of all endocrine glands in detail on pituitary gland, thyroid gland, parathyroid gland, suprarenal gland - (gross & histology)

Practical:
Demonstration of the glands
Histology of pituitary, thyroid, parathyroid, suprarenal glands

**UNIT 10**
**Nervous system**
Theory:
Neuron Classification of NS
Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (gross & histology) Meninges, Ventricles & cerebrospinal fluid
Practical:
Histology of peripheral nerve & optic nerve Demonstration of all plexuses and nerves in the body Demonstration of all part of brain
Histology of cerebrum, cerebellum, spinal

**UNIT 11**
**Sensory organs**
Theory:
Skin: Skin-histology Appendages of skin Eye: Parts of eye & lacrimal apparatus
Ear: parts of ear- external. middle and inner ear and contents
Practical: Histology of thin and thick skin Demonstration and histology of eyeball Histology of cornea & retina

**UNIT 12**
**Embryology**
Spermatogenesis & oogenesis, Ovulation, fertilization Fetal circulation Placenta

**COURSE LEARNING OUTCOMES:**

**CLO 1** – Students can demonstrate the location, position and planes. Explain the anatomy, physiology and functions of various Tissues and cell organization of cellular systems. . They will be able to demonstrate epithelial and glands (Unit 1).
**CLO 2** - Classify different types of tissue and explain anatomy and physiology of skeletal system, joints and muscular system. Demonstrate the bones of all parts (Unit 2).
**CLO 3** - Describe how the heart is positioned in the thoracic cavity. List and describe the layers of the heart wall. Name the chambers of the heart and their valves. Name the major vessels that enter and exit the heart and their branches. Describe blood flow through the heart. Explain how the conduction system of the heart controls proper blood flow (Unit 3).
**CLO 4-** Identify the organs of the alimentary canal from proximal to distal, and briefly state their function. Identify the accessory digestive organs and briefly state their function. Describe the four fundamental tissue layers of the alimentary canal (Unit 4).
**CLO 5** - Outline the forces that allow for air movement into and out of the lungs. Outline the process of gas exchange. Summarize the process of oxygen and carbon dioxide transport within the respiratory system. Create a flow chart illustrating how respiration is controlled (Unit 5).
**CLO 6** – What are the nine regions of the abdomen? Explain peritoneum, its layers, peritoneal cavity, blood supply, nerve supply, lymphatic drainage, venous drainage and functions of peritoneum (Unit 6)
**CLO 7** - Describe different parts of the urinary system, their further subdivisions, dimensions, weight, size, shape, location, relations, functions, blood supply, nerve supply, lymphatic drainage, venous drainage and applied anatomy (Unit 7).
**CLO 8** – Describe different parts of male and female reproductive system, their further subdivisions, dimensions, weight, size, shape, location, relations, functions, blood supply, nerve supply, lymphatic drainage, venous drainage and applied anatomy (Unit 8).
**CLO 9** - Describe different endocrine glands (pituitary, thyroid, parathyroid and suprarenal gland), their further subdivisions, dimensions, weight, size, shape, location, relations, functions, blood supply, nerve supply, lymphatic drainage, venous drainage and applied anatomy (Unit 9).

**CLO 10** - Identify the anatomical and functional divisions of the nervous system. Relate the functional and structural differences between gray matter and white matter structures of the nervous system to the structure of neurons. List the basic functions of the nervous system (Unit 10).
**CLO 11** - Describe different sensory organs (skin, eye and ear), their further subdivisions, dimensions, weight, size, shape, location, relations, functions, blood supply, nerve supply, lymphatic drainage, venous drainage and applied anatomy (Unit 11).
**CLO 12** - Describe spermatogenesis, oogenesis, ovulation and fertilization. Explain Fetal circulation. Describe placenta and its functions (Unit 12).

**TEXT BOOKS:**

Human Anatomy by BD Chaurasia (4 Volume)

**REFERENCE BOOKS:**

Gray's Anatomy by Richard Drake & A. Wayne Vogl & Adam W. M. Mitchell

**WEB LINKS:**
https://guides.lib.uw.edu
www.linkedin.com ›SlideShare

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code- BOP 102
# Course name- General Physiology
# Course credit- 5
# Total contact hour - 150 hour

**COURSE OBJECTIVES:**

To provide in-depth instruction in the organization, structures, and functions of the human body. Students will learn the terminology of physiology of each body system and how they interrelate to maintain homeostasis.

**COURSE DESCRIPTION**:

The student will demonstrate a thorough understanding of the normal physiology of each organ system of the body.

**COURSE CONTENT:**

**UNIT 1.**
**General Physiology:**
Cell: morphology, Structure and function of cell organelles Structure of cell membrane Transport across cell membrane Intercellular communication Homeostasis

**UNIT 2.**
**Blood:**
Introduction-composition & function of blood W.B.C., R.B.C, Platelet's formation & functions, Immunity Plasma: composition, formation & functions, Plasma Proteins: -types & functions Blood Groups- types, significance, determination Hemoglobin Hemostasis Lymph-composition, formation, circulation & functions.

**UNIT 3.**
**Cardiovascular system:**
Conducting system-components, impulse conduction Heart valves Cardiac cycle- definition, phases of cardiac cycle Cardiac output- definition, normal value, determinants. Stroke volume and its regulation Heart rate and its regulation: Arterial pulse, Blood pressure- definition, normal values, factors affecting blood pressure Shock-definition, classification, causes and features Basic idea of ECG Cardiovascular changes during exercise.

**UNIT 4.**
**Respiratory System:**
Mechanics of respiration Lung volumes and capacities Pulmonary circulation, transport of respiratory gases Factors affecting respiration Regulation of respiration-neural regulation, voluntary control and chemical regulation Hypoxia, Hypercapnia, Hypocapnia Artificial respiration Disorders of respiration-dyspnoea, orthopnea, hyperpnea, hyperventilation, apnea, tachypnoea Respiratory changes during exercise.

**UNIT 5.**
**Nerve Muscle Physiology:**
Muscles- classification, structure, properties, Excitation contraction coupling Motor unit, EMG, factors affecting muscle tension, Muscle tone, fatigue, exercise Nerve – structure and function of neurons, classification, properties Resting membrane potential & Action potential their ionic basis All or None phenomenon Neuromuscular transmission Ionic basis of nerve conduction Concept of nerve injury &

Wallerian degeneration Synapses Electrical events in postsynaptic neurons Inhibition & facilitation at synapses Chemical transmission of synaptic activity Principal neurotransmitters. 6. Nervous system: Introduction, central and peripheral nervous system, functions of nervous system.

**UNIT 6.**
**Reflexes-**
Monosynaptic, polysynaptic, superficial, deep & withdrawal reflex Sense organ, receptors, electrical & chemical events in receptors Sensory pathways for touch, temperature, pain, proprioception & others Control of tone & posture: Integration at spinal, brain stem, cerebellar, basal ganglion levels, along with their functions Motor mechanism: motor cortex, motor pathway: the descending tracts-pyramidal & extra pyramidal tracts-origin, course, termination & functions. Upper motor neuron and lower motor neuron paralysis. Spinal cord lesions- complete transection & hemi section of the spinal cord Autonomic nervous system: features and actions of parasympathetic & sympathetic nervous system Hypothalamus Higher functions of nervous system Special senses- eye, ear, nose, mouth + - + Water excretion, concentration of urine-regulation of Na, Cl, K excretion

**UNIT 7.**
**Renal System:**
Physiology of kidney and urine formation Glomerular filtration rate, clearance, Tubular function.

**UNIT 8.**
**Digestive System:**
Digestion & absorption of nutrients, Gastrointestinal secretions & their regulation Functions of Liver & Stomach.

**UNIT 9.**
**Endocrinology:**
Physiology of the endocrine glands – Pituitary, Pineal Body, Thyroid, Parathyroid, Adrenal, Gonads, Thymus, Pancreas. Hormones secreted by these glands, their classifications and functions.

**UNIT 10.**
**Male & female reproductive system:**
Male - Functions of testes, pubertal changes in males, testosterone - action & regulations of secretion. Female - Functions of ovaries and uterus, pubertal changes, menstrual cycle, estrogens and progesterone - action and regulation.

**COURSE LEARNING OUTCOMES:**

At the end of the course students will be able to...
**CLO 1:** Describe the structure and function of cellular organelles (Unit 1).
**CLO 2:** Describe and classify functions of blood and types of cells (Unit 2).
**CLO 3**: Name the chambers of heart and their valves. Name the major vessels that enter and exit the heart. Describe blood flow through the heart. Describe the stages of cardiac cycle (Unit 3)
**CLO 4**: Explain the function of respiratory system. Name the organs of the system. Define the parts of internal nose and their functions (Unit 4)
**CLO 5:** Name the functions of the skeletal system. Describe and compare the basic differences between the anatomy of skeletal, smooth and cardiac muscles. List the structural and functional classification of neurons. Explain how a neuron transmits a nerve impulse (Unit 5).
**CLO 6:** Describe the structure of spinal cord. Name and number the spinal nerves (Unit 6)
**CLO 7:** Define the following internal parts of the kidneys: cortex, medulla, medullary pyramids, renal papillae, renal columns and major and minor calyces. Name the parts of a nephron and describe the flow of urine through this renal tubule. List the functions of the nephrons (Unit 7).
**CLO 8**: Explain the major digestive enzymes and how they function. Explain the functions of the liver (Unit 8)

**CLO 9:** List the functions of hormones. Describe how the hypothalamus of the brain controls the endocrine system. Name the endocrine glands and state where they are located. List the major hormones and their effects on the body (Unit 9)
**CLO 10:** Name the internal parts of a testis. Explain the effects of testosterone on the male body. Describe the phases of the menstrual cycle (Unit 10)

**PRACTICALS**

Examination of pulse, B.P., Respiratory rate.
Reflexes
Spirometer to measure various lung capacities & volumes, Respiratory rate, Tidal volume, IRV, IC, ERV, EC, residual volume on Spirometer.
Estimate of Hemoglobin, R.B.C., W.B.C., TLC, DLC, ESR count. E Blood indices, Blood grouping, Bleeding & Clotting time

**TEXT BOOKS:**

Textbook of Physiology- AK Jain

Surface and Radiological Anatomy – Hamilton et al (Heffer)

Essentials Of Medical Physiology: by K Sembulingam

Anatomy and Physiology for Nurses

**REFERENCE BOOKS:**

Essentials of Human Anatomy – Russel

An Atlas of normal radiographic Anatomy – Ross and Wilson

**WEB LINKS:**

https://www.physoc.org/
http://aups.org.au/
https://www.hapsweb.org/default.aspx

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course Code- BOP 103
# Course Name- General Biochemistry
# Course credit- 3
# Total Contact hour - 90 hour

**COURSE OBJECTIVES:**

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

**COURSE DESCRIPTION**:

This course will be taught in 1st yr. 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.

**COURSE CONTENT:**

**UNIT-1**
**Biomolecular and the Cell: -**
Cell Structure, cell theory, cell membrane, cell organelles and their function.

**UNIT-2**
**Tools of Biochemistry: -**
Microscopy- simple & compound microscopy, phase contrast, dark field, florescence & electron microscopy (TEM & SEM).

**UNIT-3**
**Carbohydrates: -**
Carbohydrate's classification & properties, chemical structure & properties of monosaccharide, disaccharide & polysaccharide.

**UNIT-4**
**Protein: -**
It's properties, function & classification. Amino acids properties, essential & non- essential amino acids.

**UNIT-5**
**Nucleic Acids and Nucleotides: -**
Chemical structure & base composition nucleoside & double helical structure- DNA & RNA.

**UNIT-6**
**Lipids: -**
Classification & chemical structure & properties of lipids (fatty acids) & biological significance.

**UNIT-7**
**Vitamins & Minerals: -**
Properties water- & fat-soluble vitamins, deficiency & their clinical significance. Na, K, Ca, P, Fe, Cu and Se. (requirements, availability and properties)

**UNIT-8**
**Enzymes: -**
Properties protein & non protein enzyme, ribozyme, lock & key mechanism & clinical significance.

**UNIT-9**
**Hormones: -**
Properties of endocrine glands brief outline of various endocrine glands & secretion of Hormone

**PRACTICAL:**

Safety of measurements Specimen collection
Introduction to laboratory apparatus
Introduction to instruments
Acids and bases and their indicators
Quality control
Special investigations

**COURSE LEARNING OBJECTIVES**

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

**CLO 1:** Knowledge about Structure, function and interrelationship of bio-molecules and consequences of deviation from normal (Unit 1-9).
**CLO 2:** Ability to understand Integration of the various aspects of metabolism, and their regulatory pathways (Unit 1-9).
**CLO 3:** Ability to understand Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data (Unit 3).

**TEXT BOOKS**

Practical Clinical Biochemistry by Harold Varley
Textbook of biochemistry by P. B. Godker
Principal of Biochemistry by u. Satyanarayana
Principal of Biochemistry by M. A. Siddiqi

**REFERENCE BOOKS**

Instrumental Analysis by Chatwal Anand
Textbook of Medical Biochemistry by Chatterjee, Shinde
Principal of Biochemistry by Lehninger

**ONLINE LINKS FOR STUDY & REFERENCE MATERIALS**

http://www.freebookcentre.net/Chemistry/BioChemistry-Books
https://www.slideshare.net/

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |

| | |
|---|---|
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course Code- BOP 104
# Course Name- General Microbiology
# Course credit- 2
# Total Contact hour - 60 hour

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

**COURSE OBJECTIVE:**

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 and
To understand basic principles of diagnostic ocular microbiology.

**COURSE PLAN:**

**UNIT 1:**
Morphology and principles of cultivating bacteria

**UNIT 2:**
Sterilization and disinfection used in laboratory and hospital practice

**UNIT 3:**
Common bacterial infections of the eye

**UNIT 4:**
Common fungal infections of the eye

**UNIT 5:**
Common viral infections of the eye

**UNIT 6:**
Common parasitic infections of the eye.

**COURSE LEARNING OBJECTIVE:**

**CLO 1:** To prepare the students to gain essential knowledge about the characteristics of bacteria, viruses, fungi and parasites (Unit 1 and 2)
**CLO 2**: To acquire knowledge of the principles of sterilization and disinfection in hospital and ophthalmic practice (Unit 2 – 6)
**CLO 3:** To understand the pathogenesis of the diseases caused by the organisms in the human body with particular reference to the eye infections (Unit 3-6)
**CLO 4:** To understand basic principles of diagnostic ocular microbiology (Unit 3-6).

**TEXT BOOK:**

BURTON G.R.W: Microbiology for the Health Sciences, third edition, J.P. Lippincott Co., St. Louis, 1988.
M J Pelczar (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, McGRAW HILL Publisher, New Delhi, 1994 MACKIE & McCartney Practical Medical Microbiology SYDNEY M. FINEGOLD & ELLEN JO BARON: Diagnostic Microbiology (DM)

**ONLINE LINKS FOR STUDY & REFERENCE MATERIALS**

- http://www.freebookcentre.net/Chemistry/BioChemistry-Books
- https://www.slideshare.net/

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25; final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course Code- BOP 105
# Course Name- Nutrition
# Course credit- 2
# Total Contact hour - 60 hour

**COURSE OBJECTIVES:**
Explain about Balanced diet. Describe Protein
Explain briefly about Carbohydrates Explain Vitamins
Describe Minerals Describe carotenoids.

**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.

**COURSE PLAN:**

**UNIT 1:**
**Introduction.**
History of Nutrition
Nutrition as a science Food groups, RDA
Balanced diet, diet planning. Assessment of nutritional status

**UNIT 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 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 4:**
**Fats**
Sources and functions Essential fatty acids Excess and deficiency Lipids and the eye. Hyperlipidemia, heart diseases, atherosclerosis.

**UNIT 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.)

**UNIT 6:**
**Vitamins**
General functions, and food sources
Vitamin deficiencies and associated eye disorders with particular emphasis to Vitamin A Promoting sound habits in pregnancy, lactation and infancy.
Nutrient with antioxidants. Properties Digestion of Proteins, carbohydrates & lipid Essential amino acids.

Miscellaneous
Measles and associated eye disorders, low birthweight

**COURSE LEARNING OBJECTIVE:**

**CLO 1:** Knowledge about balanced diet (Unit 1 and 2)
**CLO 2:** Ability to understand protein (Unit 3)
**CLO 3:** Ability to understand about carbohydrates (Unit 4)
**CLO 4:** Ability to understand about minerals (Unit 5)
**CLO 5:** Ability to understand about vitamins (Unit 6)

**TEXT BOOK:**

M Swaminathan: Handbook of Food and Nutrition, fifth edition, Bangalore printing & publishing Co.Ltd, Bangalore, 2004

**REFERENCE:**

C Gopalan, BV Rama Sastri, SC Balasubramanian: Nutritive Value of Indian Foods, National Institute of Nutrition, ICMR, Hyderabad,2004
Frank Eperjesi & Stephen Beatty: Nutrition and the Eye A practical Approach, Elsevier Butterworth-Heinemann, USA, 2006

**ONLINE LINKS FOR STUDY & REFERENCE MATERIALS**

http://www.freebookcentre.net/Chemistry/BioChemistry-Books
https://www.slideshare.net/

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25; Final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course Code- BOP 106
# Course Name- Pathology
# Course credit- 2
# Total Contact hour - 60 hour

**COURSE OBJECTIVE:**

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

**COURSE DESCRIPTION**:
This course describes basic aspects of disease processes with reference to specific entities relevant in this course.

**COURSE PLAN:**

**UNIT 1:**
Inflammation and repair

**UNIT 2:**
Infection in general

**UNIT 3:**
Specific infections: Tuberculosis, Leprosy, Syphilis, Fungal infection, Viral chlamydial infection

**UNIT 4:**
Neoplasia, Hematology anemia leukemia

**UNIT 5:**
Bleeding disorders, Circulatory disturbances, Thrombosis, Infraction and Embolism

**UNIT 6:**
Clinical pathology, Interpretation of urine report, Interpretation of blood smears

**UNIT 7:**
Immune system, Shock, Anaphylaxis, Allergy

**COURSE LEARNING OBJECTIVES:**

**CLO 1:** Knowledge about Inflammation and repair aspects (Unit 1).
**CLO 2:** Ability to understand Pathology of various eye parts and adnexa (Unit 2-6).

**TEXT BOOKS:**

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
S R Lakhani Susan AD & Caroline JF: Basic Pathology: An introduction to the mechanism of disease, 1993.

**ONLINE LINKS FOR STUDY & REFERENCE MATERIALS**

http://www.freebookcentre.net/Chemistry/BioChemistry-Books
https://www.slideshare.net/

**Assessment Method**:

(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course Code- BOP 107
# Course Name- Basics of Computer
# Course credit- 1
# Total Contact hour - 30 hour

**COURSE OBJECTIVE:**

The role of computer technology and to some extent able to gain hand-on experience in using computers.

**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.

**COURSE PLAN:**

**UNIT 1:**
**Introduction to Computer:**
Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
Input output devices: Input devices (keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices (monitors, pointers, plotters, screen image projector, voice response systems).
Processor and memory: The Central Processing Unit (CPU), main memory.
Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disc, mass storage devices.

**UNIT 2:**
**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.

**UNIT 4:**
**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 5:**
**Introduction of Operating System:**
Introduction, operating system concepts, types of operating system. Computer networks: introduction, types of networks (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.

**UNIT 6:**
**Internet and its Applications:**
Definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web

(WWW)), www browsers, use of the internet.
Application of Computers in clinical settings.

**COURSE LEARNING OBJECTIVES**:

**CLO 1:** At the end of course, students will able to know about handling of Microsoft office (UNIT 1-6)

**TEXT BOOK:**

Satish Jain basic computer course made simple

**ONLINE LINKS FOR STUDY & REFERENCE MATERIALS:**

http://www.freebookcentre.net/Chemistry/BioChemistry-Books
https://www.slideshare.net/

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course Code- BOP 108
# Course Name- English and Communication
# Course credit- 1
# Total Contact hour - 30 hour

**COURSE OBJECTIVE:**

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.

**COURSE DESCRIPTION:**

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

**COURSE PLAN**

| | Functional English | | Topics |
|---|---|---|---|
| | **UNIT 1**<br>**Basics of Grammar** | | Vocabulary<br>Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words |
| | **UNIT 2**<br>**Basics of Grammar – Part II** | | Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms |

| | Functional English | | Topics |
|---|---|---|---|
| | **UNIT 3**<br>**Writing Skills** | | Letter Writing, Email, Essay, Articles, Memos, one-word substitutes, note making and Comprehension |
| | **UNIT 4**<br>**Writing and Reading** | | Summary writing, Creative writing, newspaper reading |
| | **UNIT 5**<br>**Practical Exercise** | | Formal speech, Phonetics, semantics and pronunciation |

| | Communication | | Topics |
|---|---|---|---|
| | **UNIT 6**<br>**Introduction** | | Communication process. Elements of communication<br>Barriers of communication and how to overcome them. Nuances for communicating with patients and their attenders in hospitals |
| | **UNIT 7**<br>**Speaking** | | Importance of speaking efficiently Voice culture. Preparation of speech. Secrets of good delivery Audience psychology, handling Presentation skills.<br>Individual feedback for each student Conference/Interview technique |
| | **UNIT 8**<br>**Listening** | | Importance of listening Self-assessment Action plan execution. Barriers in listening.<br>Good and persuasive listening |
| | **UNIT 9**<br>**Reading** | | What is efficient and fast reading Awareness of existing reading habits Tested techniques for improving speed Improving concentration and comprehension through systematic study. |
| | **UNIT 10** | | Basics of non-verbal communication |

| | |
|---|---|
| **Non-Verbal Communication** | Rapport building skills using neuro- linguistic programming (NLP) |

**COURSE LEARNING OBJECTIVES:**

**CLO 1:** At the end of the course students will able to - 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 (Unit 1-10).

**TEXT BOOK:**

Graham Lock, Functional English Grammar: Introduction to Second Language Teachers. Cambridge University Press, New York, 1996.

**REFERENCE:**

Gwen Van Servellen. Communication for Health care professionals: Concepts, practice and evidence, Jones & Bartlett Publications, USA, 2009

**ONLINE LINKS FOR STUDY & REFERENCE MATERIALS**

http://www.freebookcentre.net/Chemistry/BioChemistry-Books
https://www.slideshare.net/

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# SECOND YEAR

## Course code: BOP-201
## Course name: GEOMETRICAL OPTICS
## Course credit hours: 4
## Total contact hour: 120

**COURSE 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.

**COURSE DESCRIPTION:**

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

**COURSE CONTENT:**

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

| | |
|---|---|
| **UNIT 19.** | 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 |
| **UNIT 20.** | Newton's formula; linear magnification; angular magnification |
| **UNIT 21.** | Nodal Planes |
| **UNIT 22.** | Thin lens as a special case of thick lens; review of sign convention |
| **UNIT 23.** | Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions |
| **UNIT 24.** | Imaging by a thin concave lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions |
| **UNIT 25.** | Prentice's Rule |
| **UNIT 26.** | System of two thin lenses; review of front and back vertex powers and equivalent power, review of six cardinal points. |
| **UNIT 27.** | System of more than two thin lenses; calculation of equivalent power using magnification formula |
| **UNIT 28** | Vergence and vergence techniques |
| **UNIT 29** | Gullstrand's schematic eyes, visual acuity, Stile Crawford |
| **UNIT 30** | Emmetropia and ametropia 4. Blur retinal Imaginary |
| **UNIT 31** | 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 |
| **UNIT 32** | Thin lens model of the eye –angular magnification –spectacle and relative spectacle magnification. |
| **UNIT 33** | Aperture stops- entrance and exit pupils. |
| **UNIT 34** | Astigmatism. - To calculate the position of the line image in a sphero-cylindrical lens. |
| **UNIT 35** | Accommodation –Accommodation formulae and calculations. |
| **UNIT 36** | Presbyopia- Spectacle magnification, angular magnification of spectacle lens, near point, calculation of add, depth of field. |
| **UNIT 37** | Spatial distribution of optical information- modulation transfer functions- Spatial filtering applications. |
| **UNIT 38** | Visual optics of aphakia and pseudophakia |

**PRACTICAL**

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 mirrors
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. 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 by two cylinders in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinders' powers and orientations
Imaging by a spherocylindrical lens – sphere and cylinder in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinder's power and orientation

**COURSE LEARNING OUTCOMES:**

**CLO 1 -** The candidates should demonstrate fundamental knowledge and insight into geometrical optics

in order for the candidate to be able to understand and solve problems related to the eye and optical instruments/lenses, their function and correction (Unit 1-3).

**CLO 2**- Knowledge and understanding should be demonstrated in the areas of: (1) refraction at single spherical or plane surfaces, (2) thin lenses, (3) thick lenses, (4) aberrations, (5) apertures, (6) spherocylindrical lenses, (7) thin prisms, (8) mirrors, and ophthalmic and optical instruments (Unit 4-6).

**CLO 3 -** The aim is to achieve knowledge of the fundamentals of geometrical optics and how they apply to the human eye (Unit 7-9).

**CLO 4** -Describe refraction at single spherical or plane surfaces with regard to Curvature and sagitta; Refractive index and rectilinear propagation; Vergence and dioptric power; Object-image relationships, including apparent depth Ray tracing, nodal point, and nodal ray; Lateral (trans linear) and angular magnification; Snell's law of refraction (Unit 10-12).

**CLO 5 –** Describe Thin lenses with regard to Vergence: dioptric and effective power; Object-image relationships; Lateral (trans linear) and angular magnification; Thin lens systems; Prismatic effect (Prentice's rule and prism effectivity); Ray tracing, optical center, and optic axis (Unit 13-16).

**CLO 6 –** Describe Thick lenses in terms of Cardinal points; Vertex power and equivalent power; Lateral (trans linear) and angular magnification; Reduced systems (Unit 17-20).

**CLO 7 –** Describe Aberrations in terms of Spherical; Gama; Oblique astigmatism; Curvature of field; Distortion; Chromatic (longitudinal and lateral); Higher order aberrations (Unit 21-25)

**CLO 8 –** Describe Apertures with regard to Entrance and exit pupil size and location; Depth of focus, depth of field, hyperfocal distance; Field of view and half illumination (Unit 26-28).

**CLO 9 -** Describe Spherocylindrical lenses in terms of Location of foci, image planes, principal meridians, and circle of least confusion; Obliquely crossed spherocylindrical lenses; Transposition; Prismatic effect (Unit 29-31).

**CLO 10 –** Describe Thin prisms with regard to Unit of measurement (prism dioptre); Prism deviation; Combination of thin prisms; Resolution of an oblique prism into horizontal and vertical components; Total internal reflection (Unit 32-34).

**CLO 11 –** Describe Mirrors in terms of Planar and spherical reflection; Proportion of light reflected from a surface (Fresnel's law); Focal power, focal length, and curvature; Object-image relationships; Magnification; Lens / mirror systems and Ray tracing (Unit 35-36).

**CLO 12 –** Describe Ophthalmic and optical Instruments in terms of Direct and indirect ophthalmoscopes; Retinoscope; Focimeter; Biomicroscope (Slit-lamp microscope); Radioscope (Micro spherometer); Keratometry (Ophthalmometer); Diagnostic lenses (gonioscopy, fundus, etc.) (Unit 37-38)

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

Loshin D. S. 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.

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**
https://guides.lib.uw.edu

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |

| | |
|---|---|
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# COURSE CODE: BOP 202
# COURSE NAME: VISUAL OPTICS
# COURSE CREDIT: 3
# TOTAL HOURS: 90

**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.

**COURSE OBJECTIVES:**

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

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

**COURSE PLAN**

**UNIT 1**
**Review of Geometrical Optics:**
Vergence and power
Conjugacy, object space and image space
Sign convention
Spherical refracting surface
Spherical mirror; catoptric power
Cardinal points
Magnification
Light and visual function
Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Birefringence, Dichroism
Aberration and application Spherical and Chromatic

**UNIT 2**
**Optics of Ocular Structure**
Cornea and aqueous
Crystalline lens
Vitreous
Schematic and reduced eye

**UNIT 3**
**Measurements of Optical Constants of the Eye**
Corneal curvature and thickness
Keratometry
Curvature of the lens and ophthalmodynamometer
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 4**
**Refractive anomalies and their causes**
Etiology of refractive anomalies

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

**UNIT 5**

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

**UNIT 6**
**Convergence:**
Type, Measurement and Anomalies
Relationship between accommodation and convergence-AC/A ratio

**UNIT 7**
**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 8**
**Subjective Refraction:**
Principle and fogging
Fixed astigmatic dial (Clock dial), Combination of fixed and rotator dial (Fan and block test), J.C.C
Duochrome test
- Binocular balancing- alternate occlusion, prism dissociation, dissociate Duochrome balance,
Borish dissociated fogging
- Binocular refraction-Various techniques

**UNIT 9**
**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

**COURSE LEARNING OUTCOMES:**

**CLO 1**. What is geometrical optics with regards to vergence and power, conjugacy, object space Conjugacy, object space and image space, Sign convention, Spherical refracting surface, Spherical mirror; catoptric power, Cardinal points, Magnification, Light and visual function, Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Birefringence, Dichroism and Aberration and application Spherical and Chromatic (Unit 1)
**CLO 2.** Students should know about the detailed anatomy and physiology of optical structures like cornea, aqueous humor, crystalline lens, vitreous humor, schematic and reduced eye (Unit 2).

**CLO 3.** Students should know how to measure different optical constants of the eye in detail and also about the basic aspects of vision (Unit 3).
**CLO 4**. Students should know about the etiology, contributing factors of refractive anomalies and the population affected by it. They should also know how to do optical measurements and the relationship between growing eyes and refractive errors (Unit 4).
**CLO 5.** Students should know about accommodation with regards to far and near accommodation, its range, amplitude, mechanism, variations, anomalies of accommodation (Unit 5).
**CLO 6.** Students should know about convergence with respect to its types, measurement, anomalies and its relationship with accommodation (Unit 6).
**CLO 7**. Students should know about the static and dynamic refraction in detail with respect to streak retinoscopy, dynamic retinoscopy, radical retinoscopy and near retinoscopy along with cycloplegic refraction (Unit 7).
**CLO 8.** Students should know about subjective refraction its principle, fogging, clock dial, fan and block test and douchrome test (Unit 8)
**CLO 9.** Students should know about the effective power magnification and its different aspects in detail (Unit 9).

**TEXT BOOK:**

A H Tunnacliffe: Visual optics, The Association of British Optician, 1987
AG Bennett & RB Rabbets: Clinical Visual optics, 3rd edition, Butterworth Heinemann, 1998

**REFERENCE BOOKS:**

M P 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: Primary Care Optometry,4th edition, Butterworth –Heineman, USA,2002

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**
https://guides.lib.uw.edu

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# COURSE CODE: BOP 203
# COURSE NAME: BASIC AND OCULAR PHARMACOLOGY
# COURSE CREDIT: 3
# TOTAL HOURS: 90

**COURSE OBJECTIVES-**

To know the structural activity relationship of different classes of drugs.

**COURSE DESCRIPTION-**

This course introduces the student to basic pharmacology of common drugs used, their importance in the overall treatment including Physiotherapy. The student after completing the course will be able to understand the general principles of drug action and the handling of drugs by the body. The student will be aware of the contribution of both drug and physiotherapy factors in the outcome of treatment.

**COURSE CONTENT:**

**UNIT 1 –**
General concepts about pharmacodynamics and Pharmacokinetics Principles involved in drug activity.

**UNIT 2 –**
Autonomic nervous system.
Anatomy & functional organisation.
List of drugs acting on ANS including dose, route of administration, indications, contraindications and adverse effects.

**UNIT 3 -**
Cardiovascular drugs- Enumerate the mode of action, side effects and therapeutic uses of the following drugs.
Antihypertensives
Beta Adrenergic antagonists' Alpha Adrenergic antagonists Peripheral Vasodilators Calcium channel blockers
b. Antiarrhythmic drugs
c. Cardiac glycosides
d. Sympathetic and nonsympathetic inotropic agents.
e. Coronary vasodilators.
f. Antianginal and anti-failure agents
g. Lipid lowering & anti atherosclerotic drugs.
h. Drugs used in Hemostasis - anticoagulants Thrombolytics and antithrombotic. Cardioplegic drugs- History, Principles and types of cardioplegia.
Primary solutions - History, principles & types. Drugs used in the treatment of shock.
Pharmacological protection of organs during CPB

**UNIT 4 -**
Anesthetic agents.
Definition of general and local anesthetics. Classification of general anesthetics.
Pharmacokinetics and Pharmacodynamics of inhaled anesthetic agents. Intravenous general anesthetic agents.
Local anesthetics - classification mechanism of action, duration of action and methods to prolong the duration of action. Preparation, dose and routes of administration.

**UNIT 5 -**

Analgesics
Definition and classification
Routes of administration, dose, frequency of administration,
Side effects and management of non-opioid and opioid analgesics

**UNIT 6 -**
Antihistamines and antiemetics-
Classification, Mechanism of action, adverse effects, Preparations, dose and routes and administration.

**UNIT 7 -**
CNS stimulants and depressants
Alcohol
Sedatives, hypnotics and narcotics CNS stimulants
Neuromuscular blocking agents and muscle relaxants. Inhalational gases and emergency drugs.

**UNIT 8 -**
Pharmacotherapy of respiratory disorders
Introduction - Modulators of bronchial smooth muscle tone and pulmonary vascular smooth muscle tone
Pharmacotherapy of bronchial asthma
Pharmacotherapy of cough Mucokinetic and mucolytic agents
Use of bland aerosols in respiratory care.
Corticosteroids - Classification, mechanism of action, adverse effects and complications Preparation, dose and routes of administration.

**UNIT 9 –**
Pharmacotherapy of renal disorders
Diuretics
Renal physiology
Side of action of diuretics Adverse effects
Preparations, dose and routes of administration.

**UNIT 10 -**
Chemotherapy of infections
Definition
Classification and mechanism of action of antimicrobial agents Combination of antimicrobial agents
Chemoprophylaxis.
Classification, spectrum of activity, dose, routes of administration and adverse effects of penicillin, cephalosporins, aminoglycosides, tetracyclines, chloramphenicol, antitubercular drugs.

**UNIT 11 -**
Miscellaneous.
IV fluids- various preparations and their usage. Electrolyte supplements
Immunosuppressive agents
New drugs included in perfusion technology. Drugs used in metabolic and electrolyte imbalance.

**COURSE LEARNING OUTCOMES:**

**CLO 1:** Define pharmacology & its branches (Unit 1).
**CLO 2:** Describe autonomic nervous system and affecting drugs (Unit 2)
**CLO 3:** Able to know Drugs used in treatment of Heart (Unit 3).
**CLO 4:** Define anesthesia & its types (Unit 4)
**CLO 5:** Define pain & drugs used for pain relief (Unit 5)
**CLO 6:** Define vomiting drugs used in gastrointestinal dysfunction (Unit 6)
**CLO 7:** Define Nervous system & drugs used for Nervous system. (Unit 7)
**CLO 8:** Define cardiopulmonary bypass & drugs uses (Unit 3).

**CLO 9:** Mechanism of drugs acting on renal system (Unit 9)
**CLO 10**: Describe structures of Respiratory tract & drugs used for respiratory disorders (Unit 8).
**CLO 12:** Define infection & uses of drugs in infection control (Unit 10).
**CLO 13:** Able to describe mechanism of action of drugs and other new updates in medicines (Unit 11).

**TEXT BOOKS:**

Essential of Medical Pharmacology- K. D. Tripathi
Pharmacology in Rehabilitation- Ciccone.

**REFERENCE BOOKS:**

T J Zimmerman, K S Kooner: Text Book of Ocular Pharmacology, Lippincott-Raven, 1997

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**
https://guides.lib.uw.edu

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP - 204
# Course name: PHYSICAL OPTICS
# Course credit hours: 03
# Total contact hour: 90

**COURSE 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.

**COURSE DESCRIPTION:**

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

**COURSE CONTENT:**

| S.No. | Topics |
|---|---|
| **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. |
| **UNIT 2.** | Sources of light; Electromagnetic Spectrum. |
| **UNIT 3.** | Polarized light; linearly polarized light; and circularly polarized light. |
| **UNIT 4.** | Intensity of polarized light; Malus'S Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle. |
| **UNIT 5.** | Birefringence; ordinary and extraordinary rays. |
| **UNIT 6.** | Relationship between amplitude and intensity. |
| **UNIT 7.** | Coherence; interference; constructive interference, destructive interference; fringes; fringe width. |
| **UNIT 8.** | Double slits, multiple slits, gratings. |
| **UNIT 9.** | Diffraction; diffraction by a circular aperture; Airy's disc |
| **UNIT 10.** | Resolution of an instrument (telescope, for example); Rayleigh's criterion |
| **UNIT 11.** | Scattering; Rayleigh's scattering; Tyndall effect. |
| **UNIT 12.** | Fluorescence and Phosphorescence |
| **UNIT 13.** | Basics of Lasers –coherence; population inversion; spontaneous emission; Einstein's theory of lasers. |
| **UNIT 14.** | Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units |
| **UNIT 15.** | Inverse square law of photometry; Lambert's law. |
| **UNIT 16.** | Other units of light measurement; retinal illumination; Trolands |

**PRACTICAL:**

Each practical session could be evaluated for 10 marks and the total could be added to the final evaluations. These practicals 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 vapor lamp; determination of wavelengths of light from Mercury vapour lamp
Circular Apertures – measurements of Airy's disc for apertures of various sizes Verification of Malus' Law using a polarizer – analyzer combination Demonstration of birefringence using Calcite crystals
Measurement of the resolving power of telescopes. Newton's rings
Demonstration of fluorescence and phosphorescence using crystals and paints

**COURSE LEARNING OUTCOMES:**

**CLO 1 -** The candidates should demonstrate fundamental knowledge and insight into physical optics in order for the candidate to be able to understand and solve problems related to the eye and optical instruments/lenses, their function and correction (Unit 1,2,3).
**CLO 2 -** Knowledge and understanding should be demonstrated in the areas of: (3) wave optics, (2) interaction of light on matter, (3) polarization, (4) transmission through successive (4) polarizers, and (5) image quality (Unit 4,5).
**CLO 3 -** The aim is to achieve knowledge of the fundamentals of physical optics and how they apply to the human eye (Unit 6,7,8).
**CLO 4 –** Explain Wave optics with regard to Characteristics of wave motion; Classifications of the electromagnetic spectrum; Total and partial coherence; Diffraction (single slit, circular aperture, limits of resolution, zone plates); Interference (double slit, multiple slits, thin film, antireflective coatings, holography); Scattering (Rayleigh compared to Tyndall); Dispersion (Unit 9,10)
**CLO 5 -** Explain Interaction of light and matter in terms of atomic energy levels, absorption and emission line spectra; Continuous spectra (Black body radiator and gray body radiator characteristics); Fluorescence (photons, energy levels); Lasers (theory of operation, speckle pattern); Spectral transmission (Unit 11,12)
**CLO 6 –** Describe Polarization in terms of Linearly polarized light; Circular and elliptical polarization; Polarization by reflection (glare reduction, Brewster's law); Effects of scattering on polarization; Transmission through successive polarizers (stress analysis, Malus' law) (Unit 13,14).
**CLO 7 –** Describe Image Quality in terms of Resolving power; Point and line spread function; Modulation transfer function (Fourier optics) (Unit 15,16).

**TEXT BOOKS:**

Subrahmanyan N, BrijLal, A textbook of Optics, S. Chand Co Ltd, New Delhi, India, 2003.

**REFERENCE BOOKS:**

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

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**

https://guides.lib.uw.edu

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, Final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP-205
# Course name: OPTOMETRIC INSTRUMENTS
# Course credit hours: 05
# Total contact hour: 150

**COURSE OBJECTIVES:**

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

1. Visual Acuity chart/drum
2. Retinoscope
3. Trail Box
4. Jackson Cross cylinder
5. Direct ophthalmoscope

**COURSE DESCRIPTION:**

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

**COURSE CONTENT:**

Refractive instruments -
Optotypes and MTF, Spatial Frequency Test charts standards.
Choice of test charts Trial case lenses
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
Ophthalmoscopes and related devices Design of ophthalmoscopes – illumination Design of ophthalmoscopes- viewing Ophthalmoscope disc
Filters for ophthalmoscopy Indirect ophthalmoscope Lensometer, Lens gauges or clock Slit lamp
Tonometer
Keratometry and corneal topography Refractometer
Orthoptic Instruments (Synoptophore Only) Color Vision Testing Devices
Fields of Vision and Screening Devices Scans
ERG
New Instruments

**COURSE LEARNING OUTCOMES:**

**CLO 1 -** Describe Physical characteristics of ophthalmic lenses in terms of Geometry of lens surfaces (spherical, cylindrical, toric, aspheric); Lens form; Lens thickness (centre, edge, gradients); Specification of lens size and shape; Materials (index of refraction, dispersion, hardness, specific gravity)
**CLO 2 -** Describe Optical characteristics of ophthalmic lenses in terms of Locations of and relationships between the optic axis, optical centre, geometric centre, and major reference points; Principles of corrected curve lens design; Verification of lens prescriptions (focimeter, lens measure); Writing and transposing lens prescriptions; Effect of lens tilt (spheres and spherocylinders about a principal meridian); Effective power (for near and for changes in vertex distances)
**CLO 3 –** Describe Ophthalmic prisms and prismatic effects of lenses in terms of Thickness differences

across a prism; Prismatic effects in the periphery of a lens (spheres, spherocylinders); Decentration (prism from decentration, decentering to obtain prism, interpupillary distance); Correction of vertical prism effect; Slab off (front, back, top, bottom, reverse); Double slab off; Dissimilar segments; Compensated R segments; Prism segments; Multiple corrections; Fresnel prisms; Fresnel power additions

**CLO 4 –** Describe Multifocal lenses in terms of Types (fused, 1-piece, progressive power additions and blended lenses); Methods of producing add powers; Segment centre location; Image movement; Total displacement, horizontal and vertical imbalance; Placement of distance and multifocal optical centre; Optical and physical characteristics of segments (design and calculations, progressive adds, aberrations, surface characteristics); Specifying multifocal height, size, shape and location of segment

**CLO 5 –** Describe Spectacle magnification in terms of Shape and power factors; Iseikonic lens design

**CLO 6 –** Describe Absorptive lenses in terms of Specification of lens tints and absorptive coatings (including spectral transmission curves); Characteristics of photochromic lenses; Relationship between lens thickness and spectral transmission; Special occupational requirements

**CLO 7 –** Describe Impact resistance in terms of Degrees of resistance of ophthalmic lens materials; Methods of rendering materials impact resistant; Methods of verifying impact resistance; Performance of materials upon impact and after impact; Specifications of occupational safety lenses.

**CLO 8 –** Describe Spectacle Applications in terms of Spectacle lens prescriptions for ametropia; Lens problems of aberrations, weight, thickness, limits of field, secondary images, magnification, jump and displacement; Frame and lens design, including types of single vision and multiple focal lenses, kinds of lens materials, base curves and cylinder forms, character and placement of multi-focal, optical centers, and frame specifications. Evaluation of lenses and frames, via focimeter, lens gauge, and observation, for optical center positioning, powers, and other specifications of design Fitting and adjusting frames for the wearer Patient counselling information associated with the dispensing of prescriptions for different ametropias

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**

https://guides.lib.uw.edu

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, Final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP - 206
# Course name: PRACTICE MANAGEMENT
# Course credit hours: 02
# Total contact hour: 60

**COURSE OBJECTIVES:**

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

**COURSE DESCRIPTION:**

This course deals with all aspects of optometry practice management - business, accounting, taxation, professional values, and quality & safety aspects.

**COURSE CONTENT:**

**UNIT 1 –**
Business Management
Practice establishment and development Stock control and costing
Staffing and staff relations Business computerization

**UNIT 2 –**
Accounting Principles
Sources of finance
Bookkeeping and cash flow

**UNIT 3 -**
Taxation and taxation planning

**UNIT 4 -**
Professionalism and Values
Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality
Personal values- ethical or moral values
Attitude and behavior- professional behavior, treating people equally
Code of conduct, professional accountability and responsibility, misconduct Differences between professions and importance of team efforts

**UNIT 5 -**
Cultural issues in the healthcare environment

**COURSE LEARNING OUTCOMES:**

**CLO 1:** Understand the concepts related to Business (Unit 1).
**CLO 2**: Demonstrate the roles, skills and functions of management (Unit 2).
**CLO 3:** Analyze effective application of PPM knowledge to diagnose and solve organizational problems and develop optimal managerial decisions (Unit 3).
**CLO 4:** Understand the complexities associated with management of human resources in the organizations and integrate the learning in handling these complexities (Unit 4,5).

**TEXT BOOKS:**
Financial & Management Accounting (Theory & Practices)

**REFERENCE BOOKS:**

Principles and Practice of Management by P. Subba Rao, Hari Shankar Pande

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**

https://guides.lib.uw.edu

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP - 207
# Course name: DISPENSING OPTICS & PUBLIC HEALTH & COMMUNITY OPTOMETRY
# Course credit hours: 03
# Total contact hour: 90

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

**COURSE OBJECTIVES:**
At the end of the course students will be knowledgeable in the following areas:
1. Community based eye care in India. 2. Prevalence of various eye diseases 3. Developing Information Education Communication materials on eye and vision care for the benefit of the public 4. Organize health education programs in the community 5. Vision screening for various eye diseases in the community and for different age group

**DISPENSING OPTICS:**

**UNIT 1 –**
Components of spectacle prescription & interpretation, transposition, Add and near power relation

**UNIT 2 –**
Frame selection –based on spectacle prescription, professional requirements, age group, face shape

**UNIT 3 –**
Measuring Interpupillary distance (IPD) for distance & near, bifocal height

**UNIT 4 –**
Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments – facial wrap, pantoscopic tilt

**UNIT 5 –**
Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements)

**UNIT 6 –**
Neutralization –Hand & lensometer, axis marking, prism marking

**UNIT 7 –**
Faults in spectacles (lens fitting, frame fitting, patients' complaints, description, detection and correction)

**UNIT 8 –**
Final checking & dispensing of spectacles to customers, counseling on wearing & maintaining of spectacles, Accessories –Bands, chains, boxes, slevets, cleaners, screwdriver kit

**UNIT 9 –**
Spectacle repairs –tools, methods, soldering, riveting, frame adjustments

**UNIT 10 –**
Special types of spectacle frames
Monocles
Ptosis crutches
Industrial safety glasses

Welding glasses

**UNIT 11 –**
Frame availability in Indian market

**UNIT 12 –**
FAQs by customers and their ideal answers

**PUBLIC HEALTH AND COMMUNITY OPTOMETRY**
**UNIT 13 -**
Public Health Optometry: Concepts and implementation, Stages of diseases

**UNIT 14 –**
Dimensions, determinants and indicators of health

**UNIT 15 –**
Levels of disease prevention and levels of health care patterns

**UNIT 16 –**
Epidemiology of blindness – Defining blindness and visual impairment

**UNIT 17–**
Eye in primary health care

**UNIT 18 –**
Contrasting between Clinical and community health programs

**UNIT 19 –**
Community Eye Care Programs

**UNIT 20 –**
Community based rehabilitation programs

**UNIT 21 –**
Nutritional Blindness with reference to Vitamin A deficiency

**UNIT 22 –**
Vision 2020: The Right to Sight

**UNIT 23 –**
Screening for eye diseases

**UNIT 24 –**
National and International health agencies, NPCB

**UNIT 25 –**
Role of an optometrist in Public Health

**UNIT 26 –**
Organization and Management of Eye Care Programs – Service Delivery models
**UNIT 27 –**
Health manpower and planning & Health Economics

**UNIT 28 –**
Evaluation and assessment of health programs

**UNIT 29 –**
Optometrist's role in school eye health programs

**UNIT 30 –**
Basics of Tele Optometry and its application in Public Health

**UNIT 31 –**
Information, Education and Communication for Eye Care programs

**COURSE LEARNING OUTCOMES:**

**CLO 1.** By the end of this unit students should be able to know and understand what are the different components of spectacle prescription, their interpretation and transposition. Students should also know about add and near power relationships (Unit 1).

**CLO 2.** By the end of this unit students should be able to know and understand the different ways of frame selection –based on spectacle prescription, professional requirements, age group and face shape (Unit 2).

**CLO 3.** By the end of this unit students should be able to know and understand how to measure Interpupillary distance (IPD) for distance & near and bifocal height (Unit 3).

**CLO 4.** By the end of this unit students should be able to know and understand how to do lens & frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments related to facial wrap, and pantoscopic tilt (Unit 4)

**CLO 5.** By the end of this unit students should be able to know and understand how to do recordings and ordering of lenses with regard to power, add, diameter, base, material, type, and lens enhancements (Unit 5)

**CLO 6.** By the end of this unit students should be able to know and understand what Neutralization is and its different aspects in detail (Unit 6)

**CLO 7.** By the end of this unit students should be able to know and understand what are different types of faults that can be seen in spectacle lenses and how to correct them (Unit 7)

**CLO 8.** By the end of this unit students should be able to know and understand how to do final checking & dispensing of spectacles to customers, counseling on wearing & maintaining of spectacles and different accessories available for it (Unit 8)

**CLO 9.** By the end of this unit students should be able to know and understand what are the different tools, methods and adjustments that can be done for spectacle repair (Unit 9)

**CLO 10.** By the end of this unit students should be able to know and understand in detail about the special types of spectacle frames (Unit 10)

**CLO 11.** By the end of this unit students should be able to know and understand what are the different types of frames that are available in Indian market and their quantity (Unit 11)

**CLO 12**. By the end of this unit students should be able to know and understand what will be the possible questions asked by the subjects and how to answer them (Unit 12)

**CLO 13**. By the end of this unit students should be able to know and understand public health optometry in detail and also, they should know the different stages of diseases (Unit 13)

**CLO 14.** By the end of this unit students should be able to know and understand what is health in detail and its dimensions, determinants and indicators (Unit 14)

**CLO 15.** By the end of this unit students should be able to know and understand how to prevent diseases and what are the different levels of health care patterns (Unit 15)

**CLO 16**. By the end of this unit students should be able to know and understand in detail about definition, epidemiology of blindness and visual impairment (Unit 16)

**CLO 17.** By the end of this unit students should be able to know and understand in detail about primary care of eye (Unit 17)

**CLO 18.** By the end of this unit students should be able to know and understand about what are the different community-based rehabilitation programs for such patients (Unit 18)

**CLO 19.** By the end of this unit students should be able to know and understand in detail about different types of nutritional diseases and their management with emphasis on Vitamin A deficiency (Unit 19)

**CLO 20**. By the end of this unit students should be able to know and understand the act - VISION 2020 in detail (Unit 20)

**CLO 21.** By the end of this unit students should be able to know and understand what are the different

methods for screening eye diseases (Unit 21)
**CLO 22**. By the end of this unit students should be able to know about the National and International agencies dealing with these patients (Unit 22)
**CLO 23.** By the end of this unit students should be able to know about the role of optometrist in the community (Unit 23)
**CLO 24.** By the end of this unit students should be able to know in detail about eye care programs organizations and their management (Unit 24)
**CLO 25.** By the end of this unit students should be able to know about health economics, manpower and planning in detail (Unit 25)
**CLO 26.** By the end of this unit students should be able to know how to evaluate and access health programs (Unit 26)
**CLO 27**. By the end of this unit students should be able to know about the role of optometrist in school health care programs (Unit 27)
**CLO 28**. By the end of this unit students should be able to know and understand about tele optometry and its application in the health care system (Unit 28)
**CLO 29.** By the end of this unit students should be able to know and understand in detail about eye care programs with regards to information, education and communication (Unit 29,30,31)

**TEXT BOOKS:**

GVS Murthy, S K 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
Jalie MO: Ophthalmic lens and Dispensing, 3rd edition, Butterworth –Heinemann, 2008
Troy E. Fannin, Theodore Grosvenor: Clinical Optics, 2nd edition, Butterworth – Heinemann, 1996
C W Brooks, IM Borish: System for Ophthalmic Dispensing, 3rdedition, Butterworth - Heinemann, 2007
Michael P Keating: Geometric, Phisical& Visual Optics, 2nd edition, Butterworth – Heinemann, 2002

**REFERENCE BOOKS:**

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

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**
https://guides.lib.uw.edu

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP - 208
# Course name: BINOCULAR VISION
# Course credit hours: 05
# Total contact hour: 150

**COURSE OBJECTIVES:**

On successful completion of this module, a student will be expected to be able to: -
1. Demonstrate an in-depth knowledge of the gross anatomy and physiology relating to the extraocular muscles.
2. Provide a detailed explanation of, and differentiate between the etiology, investigation and management of binocular vision anomalies.
3. Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely.

**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 CONTENT:**

**UNIT 1 –**
Binocular Vision and Space perception.
Relative subjective visual direction.
Retino motor value
Grades of BSV
SMP and Cyclopean Eye Correspondence
Fusion, Diplopia, Retinal rivalry Horopter
Physiological Diplopia and Suppression Stereopsis, Panum's area, BSV.
Stereopsis and monocular clues - significance. Egocentric location, clinical applications.
Theories of Binocular vision.

**UNIT 2 –**
Anatomy of Extra Ocular Muscles. Rectus and Obliques, LPS. Innervation & Blood Supply.

**UNIT 3 –**
Physiology of Ocular movements. Center of rotation, Axes of Fick. Action of individual muscle.

**UNIT 4 –**
Laws of ocular motility Donder's and Listing's law Sherrington's law
Hering's law

**UNIT 5 –**
Uniocular & Binocular movements - fixation, saccadic & pursuits. Version And Vergence.
Fixation & field of fixation

**UNIT 6 –**

Near Vision Complex Accommodation Definition and mechanism (process). Methods of measurement.
Stimulus and innervation.
Types of accommodation.
Anomalies of accommodation – etiology and management.

**UNIT 7 –**

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

**UNIT 8 –**

Sensory adaptations
Confusion

**UNIT 9 –**

Suppression Investigations
Management
Blind spot syndrome

**UNIT 10 –**

Abnormal Retinal Correspondence Investigation and management
Blind spot syndrome

**UNIT 11 –**

Eccentric Fixation Investigation and management

**UNIT 12 –**

Amblyopia Classification Etiology Investigation Management

**UNIT 13 –**

Neuro-muscular anomalies Classification and etiological factors
History – recording and significance.

**UNIT 14 –**

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
Paralytic Strabismus - Acquired and Congenital Clinical Characteristics
Distinction from combatant and restrictive Squint
Restrictive Strabismus – Features, Musculo-fascial anomalies Duane's Retraction syndrome Clinical features and management
Brown's Superior oblique sheath syndrome Strabismus fixus
Congenital muscle fibrosis
Surgical and Non- Surgical management of Squint
Investigations History and symptoms Head Posture Diplopia Charting PBCT
Nine directions Binocular field of vision

**UNIT 16 -**

Nystagmus

**COURSE LEARNING OUTCOMES:**

**CLO 1 -** After completion of this unit students will be able to know about-Relative subjective and visual direction; About the Fusion, Diplopia, Retinal rivalry; Physiological Diplopia and Suppression.; Egocentric location, clinical applications (Unit 1)
**CLO 2 -** After completion of this unit students will be able to know about- Anatomy of Extra Ocular Muscles (Unit 2)
**CLO 3 -** After completion of this unit students will be able to know about- Physiology of center of rotation and Axes of Fick Action of ocular muscles (Unit 3)
**CLO 4 -** After completion of this unit students will be able to know about- Different laws related to ocular motility (Unit 4)
**CLO 5 -** After completion of this unit students will be able to know about- fixation, saccadic & pursuits of ocular movements (Unit 5)
**CLO 6 -** After completion of this unit students will be able to know about- Mechanism of near vision complex; Different methods of near vision measurement; Types, Anomalies and management of near vision complex accommodation (Unit 6)
**CLO 7 -** After completion of this unit students will be able to know about- Convergence in detail (Unit 7)
**CLO 8 -** After completion of this unit students will be able to know about- Sensory adaptations in detail (Unit 8)
**CLO 9 -** After completion of this unit students will be able to know about- suppression in detail (Unit 9)
**CLO 10 -** After completion of this unit students will be able to know about- Abnormal Retinal correspondence, its investigation, management, and Blind spot syndrome (Unit 10)
**CLO 11** - After completion of this unit students will be able to know about- Eccentric Fixation, its investigation and management (Unit 11)
**CLO 12 -** After completion of this unit students will be able to know about- Amblyopia, neuro muscular anomalies, strabismus, nystagmus in detail (Unit 12 - 16).

**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

**REFERENCE BOOKS:**

Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincott Williams & Wilkins publishers
C Haslett, E R Chilvers, N A boon, N R Coledge, J A A Hunter: Davidson's Principles and Practice of Medicine, Ed. John Macleod, 19th Ed., ELBS/Churchill Livingstone. (PPM), 2002
Basic and clinical Science course: Update on General Medicine, American Academy of Ophthalmology, Section 1, 1999

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**

https://www.sciencedirect.com/topics/neuroscience/binocular-vision
http://webeye.ophth.uiowa.edu/eyeforum/tutorials/bhola-binocularvision.htm
https://www.artisanpediatriceyecare.com/specialty-services/binocular-vision-assessment/
www.slideshare.com

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP - 209
# Course name: Systemic Diseases
# Course credit hours: 03
# Total contact hour: 90

**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

**COURSE PLAN**

**UNIT 1 –**
**Hypertension**
Definition, classification, Epidemiology, clinical examination, complications, and management. Hypertensive retinopathy

**UNIT 2 –**
**Diabetes Mellitus**
Classification, pathophysiology, clinical presentations, diagnosis, and management, Complications Diabetic Retinopathy

**UNIT 3 –**
**Thyroid Disease**
Physiology, testing for thyroid disease, Hyperthyroidism, Hypothyroidism, Thyroiditis, Thyroid tumors Grave's Ophthalmopathy

**UNIT 4 –**
**Acquired Heart Disease**
Ischemic Heart Disease, Congestive heart failure, Disorders of cardiac rhythm Ophthalmic considerations

**UNIT 5 –**
**Cancer:**
Incidence Etiology Therapy
Ophthalmologic consideration

**UNIT 6 –**
**Connective Tissue Diseases** Rheumatic arthritis
Systemic lupus erythematosus Scleroderma
Polymyositis and dermatomyositis Sjogren syndrome
Behcet's syndrome
Eye and connective tissue disease

**UNIT 7 –**
**Tuberculosis**
Aetiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complications, treatment tuberculosis and the eye.

**UNIT 8 –**

**Herpes virus** (Herpes simplex, Varicella Zoster, Cytomegalovirus, Epstein Barr Virus) Herpes and the eye

**UNIT 9 –**
**Hepatitis**
Hepatitis A, B, C

**UNIT 10 –**
**Acquired immunodeficiency syndrome**

**UNIT 11 –**
**Anemia**
Diagnosis, clinical evaluation, consequences, Sickle cell disease, treatment, Ophthalmologic considerations

**UNIT 12 –**
**Common Tropical Medical Ailments**
Malaria
Typhoid Dengue Filariasis Onchocerciasis Cysticercosis Leprosy

**UNIT 13 –**
**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

**UNIT 14 –**
**Myasthenia Gravis**

**UNIT 15 –**
First Aid General Medical Emergencies
Preoperative precautions in ocular surgeries

**UNIT 16 –**
**Psychiatry**
Basic knowledge of psychiatric condition and Patient Management

**UNIT 17 –**
**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.

**COURSE LEARNING OUTCOMES:**
**CLO 1 -** After completion of this unit students will be able to know about- Management of hypertensive patient in details; Hypertensive retinopathy (Unit 1)
**CLO 2 -** After completion of this unit students will be able to know about-Management of diabetes mellitus; Diabetic retinopathy (Unit 2)
**CLO 3 -** After completion of this unit students will be able to know about-Physiology of thyroid disorders; Grave's Ophthalmopathy in details (Unit 3)
**CLO 4 -** After completion of this unit students will be able to know about- Acquired Heart Diseases and their ophthalmic considerations (Unit 4)
**CLO 5 -** After completion of this unit students will be able to know about- Incidence, etiology, and

therapies for cancer; Ophthalmic considerations in cancer disease (Unit 5)
**CLO 6 -** After completion of this unit students will be able to know about- Common connective tissue disorders and their management; Connective tissue diseases in relation to eyes (Unit 6)
**CLO 7 -** After completion of this unit students will be able to know about- Tuberculosis disease and its management in details; Tuberculosis and its impact in ophthalmology (Unit 7)
**CLO 8 -** After completion of this unit students will be able to know about- Herpes virus and its different forms, and their effect on eyes (Unit 8)
**CLO 9 -** After completion of this unit students will be able to know about- Hepatitis and its management in details (Unit 9)
**CLO 10 -** After completion of this unit students will be able to know about-acquired immunodeficiency syndrome and its management in details (Unit 10)
**CLO 11 -** After completion of this unit students will be able to know about- Anemia, its management in detail and Ophthalmologic considerations in regard with anemia (Unit 11)
**CLO 12 -** After completion of this unit students will be able to know about-Common Tropical Medical Ailments and their ophthalmic considerations (Unit 12)
**CLO 13 -** After completion of this unit students will be able to know about- Common Nutritional and Metabolic disorders in details and their ophthalmic considerations (Unit 13)
**CLO 14 -** After completion of this unit students will be able to know about-Common Nutritional and Metabolic disorders in details and their ophthalmic considerations (Unit 13)
**CLO 15 -** After completion of this unit students will be able to know about-Myasthenia Gravis and its ophthalmic considerations (Unit 14)
**CLO 16 -** After completion of this unit students will be able to know about- First Aid in General Medical Emergencies and their ophthalmic considerations (Unit 15)
**CLO 17 -** After completion of this unit students will be able to know about- Basic knowledge of psychiatric conditions and their management (Unit 16)
**CLO 18 -** After completion of this unit students will be able to know about- Basics of Genetics and its implications in ophthalmology (Unit 17)

**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

**REFERENCE BOOKS:**

Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincott Williams & Wilkins publishers
C Haslett, E R Chilvers, N A boon, N R Coledge, J A A Hunter: Davidson's Principles and Practice of Medicine, Ed. John Macleod, 19th Ed., ELBS/Churchill Livingstone. (PPM), 2002
Basic and clinical Science course: Update on General Medicine, American Academy of Ophthalmology, Section 1, 1999

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**

https://www.sciencedirect.com/topics/neuroscience/binocular-vision
http://webeye.ophth.uiowa.edu/eyeforum/tutorials/bhola-binocularvision.htm
https://www.artisanpediatriceyecare.com/specialty-services/binocular-vision-assessment/
www.slideshare.com

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# THIRD YEAR

## Course code: BOP - 301

## Course name: CONTACT LENS

## Course credit hours: 05

## Total contact hour: 150

**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

**COURSE DESCRIPTION:**

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

**COURSE CONTENT:**

**UNIT 1 –**
Introduction to Contact lenses - Definition. Classification / Types

**UNIT 2 –**
History of Contact Lenses

**UNIT 3 –**
Optics of Contact Lenses - Magnification & Visual field, Accommodation & Convergence. Back & Front Vertex Power / Vertex distance calculation

**UNIT 4 –**
Review of Anatomy & Physiology of - Tear film, Cornea, Lids & Conjunctiva

**UNIT 5 –**
Introduction to CL materials - Monomers, Polymers

**UNIT 6 –**
Properties of CL materials - Physiological (Dk, Ionicity, Water content), Physical (Elasticity, Tensile strength, Rigidity), Optical (Transmission, Refractive index)

**UNIT 7 –**
Indications and contraindications

**UNIT 8 –**
Parameters / Designs of Contact Lenses & Terminology

**UNIT 9 –**
RGP Contact Lens materials

**UNIT 10 –**
Manufacturing Rigid and Soft Contact Lenses – various methods

**UNIT 11 –**
Pre-Fitting examination – steps, significance, recording of results

**UNIT 12 –**
Correction of Astigmatism with RGP lens

**UNIT 13 –**
Types of fit – Steep, Flat, Optimum – on spherical cornea with spherical lenses

**UNIT 14 –**
Types of fit – Steep, Flat, Optimum – on Toric cornea with spherical lenses

**UNIT 15 –**
Calculation and finalising Contact lens parameters

**UNIT 16 –**
Ordering Rigid Contact Lenses – writing a prescription to the Laboratory

**UNIT 17 –**
Checking and verifying Contact lenses from Laboratory

**UNIT 18 –**
Modifications possible with Rigid lenses

**UNIT 19 –**
Common Handling Instructions -Insertion & Removal Techniques, Do's and Don'ts

**UNIT 20 –**
Care and Maintenance of Rigid lenses -cleaning agents & Importance, Rinsing agents & Importance. Disinfecting agents & importance, Lubricating & Enzymatic cleaners

**UNIT 21 –**
Follow up visit examination

**UNIT 22 –**
Complications of RGP lenses

**UNIT 23 –**
SCL Materials & Review of manufacturing techniques

**UNIT 24 –**
Comparison of RGP vs. SCL

**UNIT 25 –**
Pre-fitting considerations for SCL

**UNIT 26 –**
Fitting philosophies for SCL

**UNIT 27 –**
Fit assessment in Soft Contact Lenses: Types of fit – Steep, Flat, Optimum

**UNIT 28 –**
Calculation and finalising SCL parameters - Disposable lenses, Advantages and availability

**UNIT 29 –**
Soft Toric CL - Stabilization techniques, Parameter selection, Fitting assessment

**UNIT 30 –**
Common Handling Instructions - Insertion & Removal Techniques, Do's and Don'ts

**UNIT 31 –**
Care and Maintenance of Soft lenses - cleaning agents & Importance, rinsing agents & Importance, disinfecting agents & importance, Lubricating & Enzymatic cleaners

**UNIT 32 –**
Follow up visit examination

**UNIT 33 –**
Complications of Soft lenses

**UNIT 34 –**
Therapeutic contact lenses – Indications, Fitting consideration

**UNIT 35 –**
Specialty fitting – Aphakia, Pediatric, Post refractive surgery

**UNIT 36 –**
Management of Presbyopia with Contact lenses

**PRACTICAL**

Measurement of Ocular dimensions Pupillary diameter and lid characteristics Blink rate and TBUT
Schirmer's test, Slit lamp examination of tear layer
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, pseudophakia & Keratoconus) RGP over refraction and Lens flexure
Examination of old RGP Lens RGP Lens parameters
Slit lamp examination of Contact Lens wearers Examination of old soft Lens
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 Lens
Slit lamp examination of Contact Lens wearers Fitting Toric Contact Lens
Bandage Contact Lens
SPM & Pachymetry at SN During Clinics Specialty Contact Lens fitting (at SN during clinics

**COURSE LEARNING OUTCOMES:**

**CLO 1 -** After completion of this unit students will be able to know about definition, classification of the contact lenses in detail (Unit 1)
**CLO 2 -** After completion of this unit students will be able to know about the history of the contact lenses (Unit 2)

**CLO 3 -** After completion of this unit students will be able to know about Optics of Contact Lenses in terms of Magnification, Visual field, Accommodation, Convergence, Back & Front Vertex Power and Vertex distance calculation (Unit 3)
**CLO 4 -** After completion of this unit students will be able to know about detailed anatomy and physiology of Tear film, Cornea, Lids & Conjunctiva (Unit 4)
**CLO 5 -** After completion of this unit students will be able to know about the materials used in the formation of contact lens mainly monomers and Polymers (Unit 5)
**CLO 6 -** After completion of this unit students will be able to know about properties of contact lens materials with regard to physiological (Dk, Ionicity, Water content) properties, physical (Elasticity, Tensile strength, Rigidity) properties and Optical (Transmission, Refractive index) properties (Unit 6)
**CLO 7 -** After completion of this unit students will be able to know about indications and contraindications of contact lens (Unit 7)
**CLO 8 -** After completion of this unit students will be able to know about parameters and designs of contact lenses and definition of basic terminologies used (Unit 8)
**CLO 9 -** After completion of this unit students will be able to know about detailed composition and properties of RGP contact lenses (Unit 9)
**CLO 10** - After completion of this unit students will be able to know about various methods to manufacture rigid and soft contact lenses (Unit 10)
**CLO 11 -**After completion of this unit students will be able to know about various steps involved in pre-fitting examination as well as recording of results. The students will also explain the significance of the pre- fitting examination (Unit 11)
**CLO 12 -** After completion of this unit students will be able to know about detailed management of correction of astigmatism by the help of RGP lenses (Unit 12)
**CLO 13 -** After completion of this unit students will be able to know about types of fitting (steep, flat, optimum) on spherical cornea with spherical lenses (Unit 13)
**CLO 14 -** After completion of this unit students will be able to know about types of fitting (steep, flat, optimum) on toric cornea with spherical lenses (Unit 14)
**CLO 15 -** After completion of this unit students will be able to know about calculation and finalising Contact lens parameters (Unit 15)
**CLO 16 -** After completion of this unit students will be able to know about writing prescription for ordering of rigid contact lenses (Unit 16)
**CLO 17 -** After completion of this unit students will be able to know about how to check and verify contact lenses (Unit 17)
**CLO 18 -** After completion of this unit students will be able to know about modifications that are possible with rigid lenses according to the patient situations (Unit 17)
**CLO 19 -** After completion of this unit students will be able to know about the handling of the contact lens; how to insert the lens and what are the possible do's and don'ts that the patient should be aware of (Unit 19)
**CLO 20 -** After completion of this unit students will be able to know about how to take care of rigid lenses and maintenance of the lens with regard to cleaning agents & their importance, rinsing agents & their importance, disinfecting agents & their importance, lubricating & enzymatic cleaners (Unit 20)
**CLO 21 -** After completion of this unit students will be able to know about the detailed procedure of patient follow-up and examination (Unit 21)
**CLO 22 -** After completion of this unit students will be able to know about the complications associated with RGP lenses and their management (Unit 22)
**CLO 23 -** After completion of this unit students will be able to know about the detailed composition of SCL Materials and the different techniques involved in manufacture of these materials (Unit 23)
**CLO 24 -** After completion of this unit students will be able to know about the differences and similarities between RGP and SCL (Unit 24)
**CLO 25 -** After completion of this unit students will be able to know about what are the basic and advance considerations that they have to keep in mind when working with pre fitting of SCL (Unit 25)
**CLO 26 -** After completion of this unit students will be able to know about the different philosophies given for dealing with SCL (Unit 26)
**CLO 27 -** After completion of this unit students will be able to know about how to perform the detailed assessment for soft contact lenses and the different types of fit (steep, flat, optimum) (Unit 27)

**CLO 28 -** After completion of this unit students will be able to know about the calculations to be done for SCL parameters and how to finalize it. They should also know about disposable lenses - their advantages and availability (Unit 28)
**CLO 29 -** After completion of this unit students will be able to know about the soft toric contact lenses in terms of stabilization techniques, parameter selection and fitting assessment (Unit 29)
**CLO 30 -** After completion of this unit students will be able to know about common handling instructions for insertion and removal of lenses and do's and don'ts with that (Unit 30)
**CLO 31 -** After completion of this unit students will be able to know about how to take care of soft lenses and maintenance of the lens with regard to cleaning agents & their importance, rinsing agents & their importance, disinfecting agents & their importance, lubricating & enzymatic cleaners (Unit 31)
**CLO 32 -** After completion of this unit students will be able to know about the detailed procedure of patient follow-up and examination in case of soft lenses (Unit 32)
**CLO 33 -** After completion of this unit students will be able to know about the complications associated with soft lens and their management (Unit 33)
**CLO 34 -** After completion of this unit students will be able to know about the therapeutic contact lenses - their indications and fitting considerations (Unit 34)
**CLO 35 -** After completion of this unit students will be able to know about lens fitting in aphakia, pediatric and post refractive surgery patients (Unit 35)
**CLO 36 -** After completion of this unit students will be able to know about detailed management of Presbyopia with contact lenses (Unit 36)

**TEXT BOOKS:**

IACLE modules 1 - 10
CLAO Volumes 1, 2, 3

**REFERENCE BOOKS:**

Anthony J. Phillips : Contact Lenses, 5thedition, 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

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**

a. https://guides.lib.uw.edu

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, Final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP - 302
# Course name: LOW VISION CARE
# Course credit hours: 03
# Total contact hour: 90

**COURSE OBJECTIVES:**

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

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

**COURSE DESCRIPTION:**

This course deals 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 CONTENT:**

**UNIT 1-**
Definitions & classification of Low vision

**UNIT 2 –**
Epidemiology of low vision

**UNIT 3 –**
Model of low vision service

**UNIT 4 –**
Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psycho-social impact of low vision

**UNIT 5 –**
Types of low vision aids – optical aids, non-optical aids & electronic devices

**UNIT 6 –**
Optics of low vision aids

**UNIT 7 –**
Clinical evaluation – assessment of visual acuity, visual field, selection of low vision aids, instruction & training

**UNIT 8 –**
Pediatric Low Vision care

**UNIT 9 –**
Low vision aids – dispensing & prescribing aspects

**UNIT 10 –**

Visual rehabilitation & counseling

**UNIT 11 –**
Legal aspects of Low vision in India

**UNIT 12 –**
Case Analysis

**PRACTICALS**

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

Practical 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.

Practical 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.

**COURSE LEARNING OUTCOMES:**

**CLO 1 -** After completion of this unit students will be able to know about the detailed definition of low vision and different types of low vision (Unit 1)
**CLO 2 -** After completion of this unit students will be able to know about epidemiology of low vision (Unit 2)
**CLO 3 -** After completion of this unit students will be able to know about different models for the service of low vision (Unit 3)
**CLO 4 -** After completion of this unit students will be able to know about the clinical evaluation of low vision patients along with prognostic and psychological factors associated with low vision. They will also know about the psycho-social impact of low vision on patients (Unit 4)
**CLO 5 -** After completion of this unit students will be able to know about the detailed aids available for low vision patients including optical aids, non-optical aids and electronic devices (Unit 5)
**CLO 6 -** After completion of this unit students will be able to know about detailed optics of low vision aids. (Unit 6)
**CLO 7 -** After completion of this unit students will be able to know about clinical evaluation of low vision in terms of assessment of visual acuity, visual field, selection of low vision aids, instruction and training (Unit 7)
**CLO 8 -** After completion of this unit students will be able to know about the management and care given to pediatric low vision patients (Unit 8)
**CLO 9 -** After completion of this unit students will be able to know about the detailed prescribing and dispensing aspects for low vision aids. (Unit 9)
**CLO 10 -** After completion of this unit students will be able to know about the rehabilitation and counselling that should be done for low vision patients (Unit 10)
**CLO 11 -** After completion of this unit students will be able to know about the legal aspects of low vision in India (Unit 11)
**CLO 12 -** After completion of this unit students will be able to know about case analysis in detail (Unit 12)

**TEXT BOOKS:**

Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth-

Heinemann, 1998
Sarika G, Sailaja MVSE Vaithilingam: practice of Low vision –A guide book, Medical Research Foundation, 2015.

**REFERENCE BOOKS:**

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

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**
https://guides.lib.uw.edu

**ASSESSMENT METHOD:**
(Continue Internal Assessment=25, Final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP 303
# Course name: OCULAR DISEASE AND GLAUCOMA
# Course credit hours: 05
# Total contact hour: 150

**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.

**COURSE OBJECTIVES:**

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

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

**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 cellulitis, Orbital cellulitis Orbital Periostitis, cavernous sinus Thrombosis)
Grave's Ophthalmopathy
Orbital tumors (Dermoid, capillary hemangioma, Optic nerve glioma)
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 (Papilloma, Xanthelasma, Haemangioma, Basal carcinoma, Squamous cell carcinoma, sebaceous gland melanoma)

**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)

**UNIT 4**

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

**UNIT 5**
**Cornea**
Applied Anatomy and Physiology
Congenital Anomalies (Megalocornea, Microcornea, Cornea plana, Congenital cloudy cornea)
Inflammations of the cornea (Topographical classifications: Ulcerative keratitis and Non ulcerative Etiological classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic))
Degenerations (classifications, Arcussenilis, Vogt's white limbal girdle, Hassal-henle bodies, Lipoid Keratopathy, Band shaped keratopathy, Salzmann's nodular degeneration, Droplet keratopathy, Pellucid Marginal degeneration)
Dystrophies (Reis Buckler dystrophy, Recurrent corneal erosion syndrome, Granular dystrophy, Lattice dystrophy, Macular dystrophy, cornea guttata, Fuch's epithelial endothelial dystrophy, Congenital hereditary endothelial dystrophy)
Keratoconus, Keratoglobus
Corneal oedema, Corneal opacity, Corneal vascularisation
Penetrating Keratoplasty

**UNIT 6**
**Uveal Tract and Sclera**
Applied Anatomy,
Classification of uveitis
Etiology
Pathology
Anterior Uveitis
Posterior Uveitis
Purulent Uveitis
Endophthalmitis
Panophthalmitis
Pars Planitis
Tumors of uveal tract (Melanoma)
Episcleritis and scleritis
Clinical examination of Uveitis and Scleritis

**UNIT 7**
**Retina and Vitreous:**
Applied Anatomy

Congenital and Developmental Disorders (Optic Disc: Coloboma, Drusen, Hypoplasia, Medullated nerve fibers; Persistent Hyaloid Artery)
Inflammatory disorders (Retinitis: Acute purulent, Bacterial, Virus, mycotic) Retinal Vasculitis (Eales's)
Retinal Artery Occlusion (Central retinal Artery occlusion)
Retinal Vein occlusion (Ischaemic, Non Ischaemic , Branch retinal vein occlusion)
Retinal degenerations: Retinitis Pigmentosa, Lattice degenerations
Macular disorders: Solar retinopathy, central serous retinopathy, cystoid macular edema, Age related macular degeneration.
Retinal Detachment: Rhegmatogenous, Tractional, Exudative)
Retinoblastoma Diabetic retinopathy

**UNIT 8**
**Ocular Injuries:**
Terminology: Closed globe injury (contusion, lamellar laceration) Open globe injury (rupture, laceration, penetrating injury, perforating injury)
Mechanical injuries (Extraocular foreign body, blunt trauma, perforating injury, sympathetic ophthalmitis)
Non-Mechanical Injuries (Chemical injuries, Thermal, Electrical, Radiational)
Clinical approach towards ocular injury patient

**UNIT 9**
**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 10**

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

**UNIT 11**
**Glaucoma**
Applied anatomy and physiology of anterior segment
Clinical Examination Definitions and classification of glaucoma
Pathogenesis of glaucomatous ocular damage
Congenital glaucoma
Primary open angle glaucoma
Ocular hypertension
Normal Tension Glaucoma
Primary angle closure glaucoma (Primary angle closure suspect, Intermittent glaucoma, acute congestive,

chronic angle closure)
Secondary Glaucoma's Management: common medications, laser intervention and surgical techniques

**COURSE LEARNING OUTCOMES:**

**CLO 1**. By the end of this unit students should be able to know and understand in detail about the orbit with respect to its anatomy, physiology, anomalies, tumors, trauma, and approach to such patients (Unit 1)
**CLO 2.** By the end of this unit students should be able to know and understand in detail about lids with respect to its anatomy, physiology, anomalies, tumors, trauma, and approach to such patients (Unit 2)
**CLO 3.** By the end of this unit students should be able to know and understand the lacrimal system with respect to its anatomy, physiology. anomalies and their etiology, tumors, trauma, and approach to such patients (Unit 3)
**CLO 4**. By the end of this unit students should be able to know and understand conjunctiva with respect to its anatomy, physiology. anomalies and their etiology, tumors, trauma, and approach to such patients (Unit 4)
**CLO 5**. By the end of this unit students should be able to know and understand cornea with respect to its anatomy, physiology. anomalies and their etiology, tumors, trauma, and approach to such patients (Unit 5)
**CLO 6**. By the end of this unit students should be able to know and understand uveal tract and sclera with respect to its anatomy, physiology. anomalies and their etiology, tumors, trauma, and approach to such patients (Unit 6)
**CLO 7.** By the end of this unit students should be able to know and understand retina and vitreous with respect to its anatomy, physiology. anomalies and their etiology, tumors, trauma, and approach to such patients (Unit 7)
**CLO 8.** By the end of this unit students should be able to know and understand in detail about the ocular injuries and their management (Unit 8)
**CLO 9.** By the end of this unit students should be able to know and understand the lens with respect to its anatomy, physiology. anomalies and their etiology, tumors, trauma, and approach to such patients (Unit 9)
**CLO 10.** By the end of this unit students should be able to know and understand in detail about the neuro ophthalmology with regards to different anomalies present in such patients and their management (Unit 10)
**CLO 11**. By the end of this unit students should be able to know and understand in detail about glaucoma with regards to its anatomy, physiology, classification, etiology and management (Unit 11)

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

**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

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**
https://guides.lib.uw.edu

**ASSESSMENT METHOD:**
(Continue Internal Assessment=25, Final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP 304
# Course name: CLINICAL EXAMINATION OF VISUAL SYSTEMS
# Course credit hours: 02
# Total contact hour: 60

**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.

**COURSE OBJECTIVES:**
At the end of the course the students will be skilled in knowing the purpose, setup 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 procedure

**COURSE CONTENT:**
History taking
Visual acuity estimation
Extraocular motility, Cover test, Alternating cover test
Hirschberg test, Modified Krimsky
Pupils Examination
Maddox Rod
Van Herrick
External examination of the eye, Lid Eversion
Schirmer's, TBUT, tear meniscus level, NITBUT (keratometry),
Color Vision
Stereopsis
Confrontation test
Photo stress test
Slit lamp biomicroscope
Ophthalmoscopy
Tonometry
ROPLAS
Amsler test
Contrast sensitivity function test
Saccades and pursuit test

**COURSE LEARNING OUTCOMES:**
**CLO 1.** By the end of this subject the students should know in detail about the assessment and examination of the visual system in detail. They should know the different methods and approaches for the same.

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

**REFERENCE BOOKS:**
A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international(p) Ltd. Publishers, New Delhi, 2007
D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007
Jack J. Kanski Clinical Ophthalmology: A Systematic Approach,6th edition, ButterworthHeinemann, 2007

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**

https://guides.lib.uw.edu

**ASSESSMENT METHOD:**
(Continue Internal Assessment=25, Final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP 305
# Course name: INDIAN MEDICINE AND TELEMEDICINE
# Course credit hours: 02
# Total contact hour: 60

**COURSE DESCRIPTION**:
This course insight into the existing healthcare system in India.

**COURSE OBJECTIVES:**
At the end of the course students 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.

**COURSE CONTENT:**

**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 systems in developed countries.
Private Sector
National Health Mission
National Health Policy
Issues in Health Care Delivery System in India

**UNIT 2**
**National Health Programme**
Background objectives, action plan, targets, operations, achievements and constraints in various National Health Programme.

**UNIT 3**
**Introduction to AYUSH system of medicine**
Introduction to Ayurveda.
Yoga and Naturopathy
Unani
Siddha
Homeopathy
Need for integration of various systems of medicine

**UNIT 4**
**Health scenario of India**
Past, present and future

**UNIT 5**
**Demography & Vital Statistics**
Demography – its concept
Vital events of life & its impact on demography
Significance and recording of vital statistics
Census & its impact on health policy

**UNIT 6**
**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.

**COURSE LEARNING OBJECTIVES:**

**CLO 1.** Students should know about the healthcare delivery system in India and developed countries with regards to community participation. They should also know about national health mission, policy and issues faced during delivering healthcare (Unit 1)
**CLO 2.** Students should know in detail about the national health programs (Unit 2)
**CLO 3.** Students should know in detail about the AYUSH with regards to ayurveda, yoga, naturopathy, unani, siddha, homeopathy and its need (Unit 3)
**CLO 4.** Students should know in detail about the scenario of the health system in India (Unit 4)
**CLO 5.** Students should know about the demography and vital statistics in detail with regards to its concepts, vital events, their impact, significance and census (Unit 5)
**CLO 6.** Students should know in detail about epidemiology with regard to principle, natural history, methods as well as epidemiology of communicable and non-communicable diseases (Unit 6)

**TEXT BOOK:**
Margie Lovett Scott, Faith Prather. Global health systems comparing strategies for delivering health services. Joney & Bartlett learning, 2014

**REFERENCE:**
1. TELEMEDICINE FOR AYURVEDA, SIDDHA & UNANI PRACTITIONERS
2. TELEMEDICINE FOR DOCTORS

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**
https://guides.lib.uw.edu

**ASSESSMENT METHOD:**
(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP 306
# Course name: OPTOMETRIC OPTICS
# Course credit hours: 03
# Total contact hour: 90

**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.

**COURSE OBJECTIVES:**

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

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

**COURSE PLAN:**

**UNIT 1**
Introduction –Light, Mirror, Reflection, Refraction and Absorption

**UNIT 2**
Prisms –Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel's prisms, rotary prisms

**UNIT 3**
Lenses –Definition, units, terminology used to describe, form of lenses

**UNIT 4**
Vertex distance and vertex power, Effectivity calculations

**UNIT 5**
Lens shape, size and types i.e., Spherical, cylindrical and Sphero-cylindrical

**UNIT 6**
Transpositions –Simple, Toric and Spherical equivalent

UNIT 7
Prismatic effect, centration, decentration and Prentice rule, Prismatic effect of Plano Cylinder and Spherocylindrical Lenses

**UNIT 8**

Spherometer & Sag formula, Edge thickness calculations

**UNIT 9**
Magnification in high plus lenses, Magnification in high minus lenses

**UNIT 10**
Tilt induced power in spectacles

**UNIT 11**
Aberration in Ophthalmic Lenses

**UNIT 12**
Spectacle Lenses - 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)

**UNIT 13**
Spectacle Frames: Types and parts; Classification of spectacle frames-material, weight, temple position, Coloration; Frame construction; Frame selection Size, shape, mounting and field of view of ophthalmic lenses.

**UNIT 14**
Tinted & Protective Lenses Characteristics of tinted lenses Absorptive Glasses Polarizing Filters, Photochromic & Reflecting filters Safety Lenses -Toughened lenses, Laminated Lenses, CR 39, Polycarbonate lenses

**UNIT 15**
Multifocal Lenses: Introduction, history and development, types Bifocal lenses, Trifocal & Progressive addition lenses

**UNIT 16**
Reflection from spectacle lens surface & lens coatings: Reflection from spectacle lenses - ghost images- Reflections in bifocals at the dividing line Antireflection coating, Mirror coating, Hard Multi Coating [HMC], Hydrophobic coating

**UNIT 17**
Miscellaneous Spectacle: Isokonic lenses Spectacle magnifiers Recumbent prisms Fresnel prism and lenses Lenticular Vs Aspherical Lenses High Refractive index glasses.

**COURSE LEARNING OUTCOMES:**

**CLO 1 -** By the end of this unit students should know and understand the definition, classification and working principles (Unit 1)
**CLO 2 -** By the end of this unit students should know and understand the definition, key terms, principle of working, properties, classification of prisms (Unit 2)
**CLO 3 -** By the end of this unit students should know and understand the definition, key terms, principle of working, properties, classification of lens (Unit 3)
**CLO 4 -** By the end of this unit students should know and understand the definition, key terms, principle of working, properties, classification, calculation of vertex distance and power (Unit 4)
**CLO 5 -** By the end of this unit students should know and understand the lens type, shapes and forms (Unit 5)
**CLO 6 -** By the end of this unit students should know and understand the definition, classification and working principles of transpositions (Unit 6)

**CLO 7 -** By the end of this unit students should know and understand the prismatic effects in detail (Unit 7)
**CLO 8 -** By the end of this unit students should know and understand definition, key terms, principle of working, properties, classification, calculation of spherometer (Unit 8)
**CLO 9 -**By the end of this unit students should know and understand the concept and calculation of magnification in lens (Unit 9)
**CLO 10 -** By the end of this unit students should know and understand the tilt induced power in spectacles (Unit 10)
**CLO 11 -** By the end of this unit students should know and understand the aberration in Ophthalmic Lenses (Unit 11)
**CLO 12 -** By the end of this unit students should know and understand the definition, key terms, principle of working, properties, classification, faults in spectacle lens (Unit 12)
**CLO 13 -** By the end of this unit students should know and understand the definition, key terms, principle of working, properties, classification, calculation of spectacle frames (Unit 13)
**CLO 14 -** By the end of this unit students should know and understand the definition, properties, filters and safety of tinted and protective lens (Unit 14)
**CLO 15 -** By the end of this unit students should know and understand the definition, history, properties, classification and working principles of multifocal lenses (Unit 15)
**CLO 16 -** By the end of this unit students should know and understand the definition, classification and working principles of reflection from spectacle lens surface & lens coatings (Unit 16)
**CLO 17 -** By the end of this unit students should know and understand the definition, classification and working principles of miscellaneous spectacles (Unit 17)

**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 Commission,1999
C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth Heinemann, USA, 1996

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**
https://guides.lib.uw.edu

**ASSESSMENT METHOD:**
(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP 307
# Course name: INTRODUCTION TO QUALITY AND PATIENT SAFETY
# Course credit hours: 01
# Total contact hour: 30

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

**COURSE 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

**UNIT 5**
Antibiotic resistance

**UNIT 6**
Disaster preparedness and management

**COURSE LEARNING OUTCOMES:**
**CLO 1 -** By the end of this unit students should know and understand definition, key terms, principles, components, process, models, levels of evaluation, approaches, barriers and role in quality assurance and management (Unit 1)
**CLO 2 -** By the end of this unit students should know and understand goals, objectives, aims, components, equipment, techniques, key concepts and responsibilities during emergency care and life support (Unit 2)
**CLO 3 -** By the end of this unit students should know and understand the definition, causes, classification, sources, effects, disposal and management (Unit 3)
**CLO 4 -** By the end of this unit students should know and understand the concepts, importance, goals and routine of prevention (Unit 4)
**CLO 5 -** By the end of this unit students should know and understand the concepts, classification, causes, sources and management of antibiotic resistance (Unit 5)
**CLO 6 -** By the end of this unit students should know and understand the concepts, risk factors, aims, classification, why and how to get prepare, plan, approaches, management and agencies for disaster preparedness and management (Unit 6)

**TEXTBOOK:**

Textbook of Patient Safety and Clinical Risk Management Editors: Donaldson, L., Ricciardi, W., Sheridan, S., tartaglia, r. (Eds.)

**REFERENCE:**

Handbook of Healthcare Quality & Patient Safety 2nd Edition 2017

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**

https://guides.lib.uw.edu

**ASSESSMENT METHOD:**

(Continue Internal Assessment=25, Final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP 308
# Course name: MEDICAL PSYCHOLOGY
# Course credit hours: 01
# Total contact hour: 30

**COURSE DESCRIPTION:**
This course covers various aspects of medical psychology essential for the optometrist.

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

**COURSE PLAN**:

**UNIT 1**
Introduction to Psychology

**UNIT 2**
Intelligence Learning, Memory, Personality, Motivation

**UNIT 3**
Body Integrity – one's body image

**UNIT 4**
The patient in his Milen

**UNIT 5**
The self-concept of the therapist, Therapist-patient relationship – some guidelines

**UNIT 6**
Illness, its impact on the patient

**UNIT 7**
Maladies of the age and their impact on the patient's own and others' concept of his body image

**UNIT 8**
Adapting changes in Vision

**UNIT 9**
Why does Medical Psychology demand commitment?

**COURSE LEARNING OUTCOMES:**
**CLO 1-** Describe various Branches of Psychology and its importance (Unit 1)
**CLO 2 -** Describe Motivation, learning, intelligence, memory and personality and their different theories (Unit 2).
**CLO 3-** Discuss Growth and Development (Unit 3)
**CLO 4-** Describe patient and his milen (Unit 4)
**CLO 5-** Discuss self-concept of therapist, their relationship with patients (Unit 5)
**CLO 6-** Discuss illness and its impact on patients (Unit 6)
**CLO 7-**Describe in detail about aging and its impact on patients' health and body image (Unit 7)
**CLO 8-** Describe adaptation in detail (Unit 8)
**CLO 9-** Discuss medical psychology and its commitment (Unit 9)

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

**REFERENCE BOOKS:**
Psychology for Physiotherapists by Dibyendu Narayan Bid, Thangamani Ramalingam
Psychologically Informed Physiotherapy 1st Edition Embedding psychosocial perspectives within clinical management

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**
https://guides.lib.uw.edu

**ASSESSMENT METHOD:**
(Continue Internal Assessment=25, Final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP 309
# Course name: MEDICAL LAWS AND ETHICS
# Course credit hours: 02
# Total contact hour: 60

**COURSE OBJECTIVES:**
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.

**COURSE DESCRIPTION:**
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 CONTENT:**

**UNIT 1-**
Medical ethics - Definition - Goal - Scope

**UNIT 2 –**
Introduction to Code of conduct

**UNIT 3 –**
Basic principles of medical ethics –Confidentiality

**UNIT 4 –**
Malpractice and negligence - Rational and irrational drug therapy

**UNIT 5 –**
Autonomy and informed consent - Right of patients

**UNIT 6 –**
Care of the terminally ill- Euthanasia

**UNIT 7 –**
Organ transplantation

**UNIT 8 –**
Medico legal aspects of medical records –Medico legal case and type- Records and documents related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.

**UNIT 9 –**
Professional Indemnity insurance policy

**UNIT 10 –**
Development of standardized protocol to avoid near miss or sentinel events

**UNIT 11 –**
Obtaining an informed consent

**COURSE LEARNING OUTCOMES:**
**CLO 1 -** After completion of this unit students will be able to know about the medical ethics its definition, goal and scope (Unit 1)
**CLO 2 -** After completion of this unit students will be able to know about the code of conduct (Unit 2)
**CLO 3 -** After completion of this unit students will be able to know about what are the basic principles of ethics in detail (Unit 3)
**CLO 4 -** After completion of this unit students will be able to know about the meaning and objectives of malpractice and negligence (Unit 4)
**CLO 5 -** After completion of this unit students will be able to know about the rights and responsibilities of patients (Unit 5)
**CLO 6 -** After completion of this unit students will be able to know about the care for critically ill patient (Unit 6)
**CLO 7 -** After completion of this unit students will be able to know about the rules and regulations for organ transplantation (Unit 7)
**CLO 8 -** After completion of this unit students will be able to know about what are the medico legal aspects of a medical record, its types, ownership, confidentiality, privilege, communication and release of information (Unit 8)
**CLO 9 -** After completion of this unit students will be able to know about different insurance policies in detail (Unit 9)
**CLO 10 -** After completion of this unit students will be able to know about how to develop standardized protocol to avoid near miss or sentinel events (Unit 10)
**CLO 11 -** After completion of this unit students will be able to know about how to obtain informed consent from the population (Unit 11)

**TEXT BOOKS:**
Medical Law and Ethics by Bonnie F. Fremgen

**REFERENCE BOOKS:**
Leadership Roles and Management Functions in Nursing with Access Code: Theory and Application by Bessie L Marquis, RN, Cnaa, Msn, Carol J Huston, Msn, Mpa, Dpa

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**
https://guides.lib.uw.edu

**ASSESSMENT METHOD**:

(Continue Internal Assessment=25, final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP 310
# Course name: GERIATRIC OPTOMETRY PEDIATRIC OPTOMETRY AND OCCUPATIONAL OPTOMETRY
# Course credit hours: 05
# Total contact hour: 150

**COURSE OBJECTIVES:**

The student on taking this course should

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

**COURSE DESCRIPTION:**

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

**GERIATRIC OPTOMETRY**

**COURSE CONTENT:**

**UNIT 1-**
Structural, and morphological changes of eye in elderly

**UNIT 2 –**
Physiological changes in the eye in the course of aging.

**UNIT 3 –**
Introduction to geriatric medicine – epidemiology, need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebrovascular disease, Diabetes, COPD)

**UNIT 4 –**
Optometric Examination of the Older Adult

**UNIT 5 –**
Ocular diseases common in old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye

**UNIT 6 –**
Contact lenses in elderly

**UNIT 7 –**
Pharmacological aspects of aging

**UNIT 8 –**
Low vision causes, management and rehabilitation in geriatrics.

**UNIT 9 –**
Spectacle dispensing in elderly – Considerations of spectacle lenses and frames

**COURSE LEARNING OUTCOMES:**

**CLO 1 -** After completion of this unit students will be able to know about the detailed structural and

morphological changes that occur in the eyes of elderly (Unit 1)
**CLO 2 -** After completion of this unit students will be able to know about detailed physiological changes that occur in the eyes of elderly (Unit 2)
**CLO 3 -** After completion of this unit students will be able to know about the definition, classification, epidemiology, prevalence, incidence, pathophysiology, signs and symptoms, clinical presentation, laboratory investigations, medical and surgical management, precautions, complications and need for optometry care in diseases like Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebrovascular disease, Diabetes, COPD in elderly population (Unit 3)
**CLO 4 -** After completion of this unit students will be able to know about the detailed optometric examination in elderly patients (Unit 4)
**CLO 5 -** After completion of this unit students will be able to know about the ocular diseases common in old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye - their definition, classification, epidemiology, prevalence, incidence, pathophysiology, signs and symptoms, clinical presentation, laboratory investigations, medical and surgical management, precautions, complications and need for optometry care (Unit 5)
**CLO 6 -** After completion of this unit students will be able to know about the need, advantages and disadvantages and complications of contact lenses in elderly (Unit 6)
**CLO 7 -** After completion of this unit students will be able to know about the pharmacological management of various diseases in elderly (Unit 7)
**CLO 8 -** After completion of this unit students will be able to know about the etiological factors responsible for low vision in elderly; their management and rehabilitation (Unit 8)
**CLO 9 -** After completion of this unit students will be able to know about the spectacle dispensing in elderly with regards to considerations of spectacle lenses and frames (Unit 9)

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

**REFERENCE BOOKS:**
OP Sharma: 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

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**
https://guides.lib.uw.edu

**PEDIATRIC OPTOMETRY**

**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 the pediatric population. Also, it will inculcate the skill of transferring / communicating the medical information to the attender / patient by the students. The scope of this subject is to train the optometrists to develop a systematic way of dealing with children below 12, so as to implement primary eye care and have better, specialized management of anomalies.

**COURSE OBJECTIVES**:
At the end of the course the student is expected to:
Have a knowledge of the principal theories of childhood development, and visual development
Have the ability to take a thorough pediatric 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 etiology, clinical presentation and treatment of amblyopia, combatant strabismus and commonly presenting incitant 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 pediatric 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 other professionals involved in pediatric assessment and care

**COURSE CONTENT:**

**UNIT 1-**
The Development of Eye and Vision

**UNIT 2 –**
History taking Pediatric subjects

**UNIT 3 –**
Assessment of visual acuity

**UNIT 4 –**
Normal appearance, pathology and structural anomalies of
Orbit, Eyelids, Lacrimal system,
Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil
Lens, vitreous, Fundus Oculomotor system
**UNIT 5 –**
Refractive Examination

**UNIT 6 –**
Determining binocular status

**UNIT 7 –**
Determining sensory motor adaptability

**UNIT 8 –**
Compensatory treatment and remedial therapy for: Myopia, Pseudo myopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia

**UNIT 9 –**
Remedial and Compensatory treatment of Strabismus and Nystagmus

**UNIT 10 –**
Pediatric eye disorders: Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics

**UNIT 11 –**
Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism

**UNIT 12 –**
Spectacle dispensing for children

**UNIT 13 –**
Pediatric contact lenses

**UNIT 14 –**
Low vision assessment in children

**COURSE LEARNING OUTCOMES:**

**CLO 1 -** After completion of this unit students will be able to know about the development of eye and vision in pediatric population (Unit 1)
**CLO 2 -** After completion of this unit students will be able to know about the how to take history of pediatric population (Unit 2)
**CLO 3 -** After completion of this unit students will be able to know about how to take detailed assessment of visual acuity (Unit 3)
**CLO 4 -** After completion of this unit students will be able to know about normal appearance, pathology and structural anomalies with regard to orbit, eyelids, lacrimal system, conjunctiva, cornea, sclera anterior chamber, uveal tract, pupil, lens, vitreous and fundus Oculomotor system (Unit 4)
**CLO 5 -** After completion of this unit students will be able to know about the refractive examination (Unit 5)
**CLO 6 -** After completion of this unit students will be able to know about how to determine the binocular status in pediatric population (Unit 6)
**CLO 7 -** After completion of this unit students will be able to know about sensory and motor adaptability in pediatric (Unit 7)
**CLO 8 -** After completion of this unit students will be able to know about conventional, medical and surgical treatment as well as preventive measures for Myopia, Pseudo myopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia (Unit 8)
**CLO 9 -** After completion of this unit students will be able to know about conventional, medical and surgical treatment as well as preventive measures for Strabismus and Nystagmus (Unit 9)
**CLO 10 -** After completion of this unit students will be able to know about the definition, classification, epidemiology, prevalence, incidence, pathophysiology, signs and symptoms, clinical presentation, laboratory investigations, medical and surgical management, precautions, complications and need for optometry care in pediatric eye disorders like Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetic diseases (Unit 10)
**CLO 11 -** After completion of this unit students will be able to know about the definition, classification, epidemiology, prevalence, incidence, pathophysiology, signs and symptoms, clinical presentation, laboratory investigations, medical and surgical management, precautions, complications and need for optometry care in Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma and Albinism (Unit 11)
**CLO 12 -** After completion of this unit students will be able to know about the spectacle dispensing for children (Unit 12)
**CLO 13 -** After completion of this unit students will be able to know about the measurements, insertion, removal, advantages, disadvantages and precautions for contact lenses in pediatric (Unit 13)
**CLO 14 -** After completion of this unit students will be able to know about the detailed assessment of children with low vision (Unit 14)

**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, 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.
Clinical pediatric optometry. LJ Press, BD Moore, Butterworth- Heinemann, 1993

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**
https://guides.lib.uw.edu

## OCCUPATIONAL OPTOMETRY

**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: To identify occupational causes of visual and eye problems;
To be able to prescribe suitable corrective lenses and eye protective wear
To set visual requirements, standards for different jobs.

**COURSE CONTENT:**

**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

**UNIT 3 –**
Light – Definitions and units, Sources, advantages and disadvantages, standards

**UNIT 4 –**
Color – Definition, Color theory, Color coding, Color defects, Color Vision tests

**UNIT 5 –**
Occupational hazards and preventive/protective methods

**UNIT 6 –**
Task Analysis

**UNIT 7 –**
Industrial Vision Screening – Modified clinical method and Industrial Vision test

**UNIT 8 –**
Vision Standards – Railways, Roadways, Airlines

**UNIT 9 –**
Visual Display Units

**UNIT 10 –**
Contact lens and work

**COURSE LEARNING OUTCOMES:**

**CLO 1 -** After completion of this unit students will be able to know about the introduction to occupational health, hygiene and safety, and international bodies like ILO, WHO, National bodies etc their rules and acts for occupational health (Unit 1)
**CLO 2 -** After completion of this unit students will be able to know about what are the electromagnetic radiations and what are their therapeutic and harmful results (Unit 2)
**CLO 3 -** After completion of this unit students will be able to know about the definitions, units, sources, advantages and disadvantages of light (Unit 3)
**CLO 4 -** After completion of this unit students will be able to know about the color with regard to its definition, color theory, color coding, color defects and color vision tests (Unit 4)
**CLO 5 -** After completion of this unit students will be able to know about what are the different types of occupational hazards and different protective and preventive mechanisms for them (Unit 5)
**CLO 6 -** After completion of this unit students will be able to know about how to perform task analysis. (Unit 6)
**CLO 7 -** After completion of this unit students will be able to know about how to perform industrial vision screening especially modified clinical methods and industrial vision tests (Unit 7)
**CLO 8** - After completion of this unit students will be able to know about what are the vision standards according to railways, roadways and airways administration (Unit 8)
**CLO 9 -** After completion of this unit students will be able to know about the visual display units (Unit 9)
**CLO 10 -** After completion of this unit students will be able to know about working of the contact lenses (Unit 10)

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

**REFERENCE BOOKS:**
G W Good: Occupational Vision Manual available in the following website: www.aoa.org
N.A. Smith: Lighting for Occupational Optometry, HHSC 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

**ONLINE LINK FOR STUDY AND REFERENCE MATERIALS:**
https://guides.lib.uw.edu

**ASSESSMENT METHOD:**

(Continue Internal Assessment=25, Final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

# Course code: BOP 311
# Course name: RESEARCH METHODOLOGY AND BIOSTATISTICS
# Course credit hours: 03
# Total contact hour: 90

**COURSE DESCRIPTIONS:**

This course involves a description of principles for conducting research. The goal of the research is to Describe or define a particular phenomenon. In this case, descriptive research would be an appropriate strategy. A descriptive may, for example, aim to describe a pattern. Descriptive research has many useful applications, and you probably rely on findings from descriptive research without Even being aware that that is what you are doing.

**COURSE OBJECTIVES**

1. Identify and discuss the role and importance of research in the social sciences.
2. Identify and discuss the issues and concepts salient to the research process.
3. Identify and discuss the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project.
4. Identify and discuss the concepts Identify and discuss the complex issues inherent in selecting a research problem,
5. Selecting an appropriate research design, and implementing a research project. Identify and discuss the concepts and procedures of sampling, data collection, analysis, and reporting.
6. To familiarize participants with the basics of research and the research process.
7. To enable the participants in conducting research work and formulating research Synopsis and report.
8. To familiarize participants with Statistical packages such as SPSS/EXCEL.
9. To impart knowledge for enabling students to develop data analytics skills

**COURSE CONTENT:**

**RESEARCH METHODOLOGY**

**UNIT 1:**

**Introduction to Research methodology**

Meaning of research, objectives of the research, Motivation in research, Types of research & research approaches, Research methods vs methodology, Criteria for good research, Problems encountered by researchers in India.

**UNIT 2:**

**Research problem**

Statement of the research problem, Statement of purpose and objectives of the research problem, Necessity of defining the problem

**UNIT 3:**

**Research design**

Meaning of research design, need for research design, Features for good design, Different research designs, Basic principles of research design

**UNIT 4:**

**Sampling Design**

Criteria for selecting sampling procedure, Implications for sample design, steps in sampling design, characteristics of good sample design, Different types of sample design

**UNIT 5:**

**Measurement & scaling techniques**

Measurement in research - Measurement scales, sources of error in measurement, Technique of developing measurement tools, Meaning of scaling, its classification. Important scaling techniques.

**UNIT 6:**

**Methods of data collection**

Collection of primary data, collection data through questionnaires & schedules, Difference between questionnaires & schedules.

**UNIT 7:**

**Sampling fundamentals**

Need for sampling & some fundamental definitions, important sampling distributions.

**UNIT 8:**

**Processing & analysis of data**

Processing operations, problems in processing, Types of analysis, Statistics in research, Measures of central tendency, Dispersion, Asymmetry, relationship.

**UNIT 9:**

**Testing of hypothesis**

What is a hypothesis? Basic concepts concerning testing of hypothesis, Procedure of hypothesis testing, measuring the power of hypothesis test, Tests of hypothesis, limitations of the tests of hypothesis

**Unit 10:**

**Computer technology**

Introduction to Computers, computer application in research, computers & researcher

**BIOSTATISTICS**

**UNIT 1:**

**Introduction**

Meaning, definition, characteristics of statistics., Importance of the study of statistics, Branches of statistics, Statistics and health science including physiotherapy, Parameters and Estimates, Descriptive and inferential statistics, Variables and their types, Measurement scales.

**UNIT 2:**

**Tabulation of Data**

Basic principles of graphical representation, Types of diagrams – histograms, frequency polygons, smooth frequency polygon, cumulative frequency curve, Normal probability curve.

**UNIT 3:**

**The measure of Central Tendency**

Need for measures of central Tendency, Definition, and calculation of mean – ungrouped and grouped, Meaning, interpretation and calculation of median ungrouped and grouped., Meaning and calculation of mode, Comparison of the mean, median, and mode, Guidelines for the use of various measures of central tendency.

**UNIT 4:**

**Probability and Standard Distributions**

Meaning of probability of standard distribution, the binomial distribution, the normal distribution, Divergence from normality – skewness, kurtosis.

Sampling techniques: Need for sampling

Criteria for good samples, Application of sampling in community, Procedures of sampling and sampling design errors, Sampling variation, and tests of significance.

**UNIT 5:**

**Analysis of variance & covariance**

Analysis of variance (ANOVA), what is ANOVA? The basic principle of ANOVA, ANOVA technique, Analysis of Covariance (ANCOVA).

**UNIT 6:**

**Format of scientific documents**

Structure of protocols, formats reporting in scientific journals, systematic reviews, and meta-analysis

**COURSE LEARNING OUTCOMES:**

Students who successfully complete this course will be able to:

**CLO 1.** Explain key research concepts and issues (UNIT1), (UNIT 2,3)
**CLO 2**. Read, comprehend, and explain research articles in their academic discipline. (UNIT 4)
**CLO 3.** Develop an understanding of various kinds of research, objectives of doing research, Research process, research designs, and sampling. (UNIT5)
**CLO 4.** They have basic knowledge of qualitative research techniques (UNIT8)
**CLO 5.** They have adequate knowledge of measurement & scaling techniques as well as quantitative data analysis (UNIT7)
**CLO 6.** Have a basic awareness of data analysis and hypothesis testing procedures. (UNIT9)
**CLO 7.** Basics knowledge of Analysis of variance & covariance. (UNIT6)

**TEXTBOOKS:**

Handbook Of Research In Physical Therapy. CE Bork

**REFERENCE BOOKS:**

Physical Therapy Research: Principles And Application. E Domholdt Research Methodology For Physical Therapists. C Hicks.
Kothari, C.R. Research Methodology (Methods and Techniques), New Age Publisher. Fundamentals of modern statistical methods by Rand R.wilcox

**WEB LINKS:**
https://scholar.google.com/ https://pubmed.ncbi.nlm.nih./ https://www.researchgate.com

**ASSESSMENT METHOD:**

(Continue Internal Assessment=25, Final Examination=75)

| | |
|---|---|
| Internal exams | 10 |
| Assignments | 05 |
| Extra-curricular activities | 05 |
| Attendance | 05 |
| Total Internal Assessment | 25 |

## RESEARCH PROJECT/DISSERTATION

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

## CLINICAL OPTOMETRY

The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. Practical aspects of contact lens, low vision care, geriatric optometry, pediatric optometry and occupational optometry will be covered under the studentship.

# NOMENCLATURE BASED ON CAREER PROGRESSION FOR OPTOMETRIST (PROPOSED)

| Levels | Nomenclature in various sectors | | | Qualification and experience |
|---|---|---|---|---|
| | Clinical | Academic | Industry/ Management | |
| Level 4 | Ophthalmic Assistant | | | Diploma with 0 - 5 years' experience post Diploma |
| Level 5 | Junior optometrist | Clinical Instructor | Optometrist / Junior Manager | B. Optom (or equivalent). With more than 5 years of experience based on the performance of the individual as evaluated by the head of the department, promotion to the next one level possible. |
| Level 6 | Consultant Optometrist | Assistant Professor 1 | Skill development officer/Manager | M. Optom /M Sc Optom/ M Phil Optom/Equivalent (0-2 years' experience) |
| Level 7 | Senior consultant Optometrist | Assistant Professor 2 | Project officer/Manager | M. Optom/M Sc Optom/ M Phil Optom/Equivalent (3-6 years' experience) |
| Level 8 | Chief consultant Optometrist | Associate Professor | Project Manager/Chief Optometry Manager | M Optom/M Sc Optom/ M Phil Optom/Equivalent (7- 10 years' experience, PhD desirable/not mandatory) |
| Level 9 | Associate Director | Professor Senior | Project Manager | M Optom/M Sc Optom/ M Phil Optom/Equivalent (11-14 years' experience, with PhD desirable not mandatory) * |
| Level 10 | Director | Principal/ Dean/ Director | Director | M. Optom//M Sc Optom/ M Phil Optom/Equivalent (15 years or more of experience) with PhD * |

Clinical cadre needs clinical experience, academic needs teaching experience and industry can have either clinical/teaching experience with managerial skills based on the need.

* In absence of PhD or desirable experience post qualifications specified, the rules can be relaxed for initial 10 years. On Job upgradation of degree may be considered as mandatory till the profession has enough numbers to fulfil the requirements.

Optom/Equivalent will still remain to be a mandatory requirement for academic positions. According to International standard classification of Occupations ( ISCO -08, Volume I, International Labour Office, Geneva, 2012, Page 13,14 ), optometry is classified under occupations ( Major Group : Professionals(2); Sub Major Group : Health Professionals(22); Minor Group : Other Health professionals (226) ; Unit Group : Optometrist ( ISC code-2267))at Skill Level 4 typically involving the performance of tasks that require complex problem-solving, decision making and creatively based on an extensive body of theoretical and factual knowledge in a specialised field.

Such skill is usually obtained as the result of study at a higher educational institution for a period of 3-6 years leading to the award of a first degree or higher qualification (ISCED-97 Level 5a or higher)