

Ordinance and Curriculum / Syllabus
For
Four Year (Eight Semesters)
Bachelor of Optometry (B.Optom)

Based on Model Curriculum Handbook "Optometry"
Ministry of Health and Family Welfare, Allied Section 2015-16
Government of India



Faculty of Medicine

Gopal Narayan Singh University
Jamuhar, Sasaram



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02/01/24

Department of Optometry
Narayan Paramedical Institute & Allied Sciences

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Board of Studies Committee

Dated: 18.12.2023 | **Time:** 10:30 AM | **Venue:** Conference Room, GNSU

Name	Source	Signature
Dr. Y M Singh , Director, NPIAS	Chair Person & Internal Member	
Prof. (Dr.) Nageshwar Sharma Professor & HOD, Ophthalmology PMCH, Patna	External Member	
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ORDINANCES GOVERNING TO BACHELOR OF OPTOMETRY PROGRAMME

This Ordinance is prepared in the light of the Ministry of Health and Family Welfare Allied Health Section 2015-26, Model Curriculum Handbook OPTOMETRY regulations and measures for maintenance of standard in field of Higher Education. The ordinance fulfills the prescribed requirements in term of Admission Procedure, Examination System.

CHAPTER 1: INTRODUCTION TO THE HANDBOOK

The report 'From Paramedics to Allied Health Professionals: Landscaping the Journey and Way Forward' that was published in 2012, marked the variance in education and training practices for the allied and healthcare courses offered by institutions across the country. This prompted the Ministry of Health and Family Welfare to envisage the creation of national guidelines for education and career pathways of allied and healthcare professionals, with a structured curriculum based on skills and competencies. Thus, this handbook has been designed to familiarize universities, colleges, healthcare providers as well as educators offering allied and healthcare courses with these national standards.

Individually, created for different professional groups of allied and healthcare, this handbook aims to reduce the variation in education by comprising of a standardized curriculum, career pathways, nomenclature and other details for each profession. The change from a purely didactic approach will create better skilled professionals and improve the quality of overall patient care. In the absence of a national standard-setting authority, this handbook can also guide the thousands of young adults who choose healthcare as a profession – not as doctors or nurses but to play several other critical roles – on the appropriate course of action to enable them to be skilled allied and healthcare professionals of the future.

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) includes 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.

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. 1 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, though 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.² 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.

LEARNING GOALS AND OBJECTIVES FOR ALLIED AND HEALTHCARE PROFESSIONALS

The handbook has been designed with a focus on performance-based outcomes pertaining to different levels. The learning goals and objectives of the undergraduate and graduate education program will be based on the performance expectations. They will be articulated as learning goals (why we teach this) and learning objectives (what the students will learn). Using the framework, students will learn to integrate their knowledge, skills and abilities in a hands-on manner in a professional healthcare setting. These learning goals are divided into nine key areas, though the degree of required involvement may differ across various levels of qualification and professional cadres:

1. Clinical care
2. Communication
3. Membership of a multidisciplinary health team
4. Ethics and accountability at all levels (clinical, professional, personal and social)
5. Commitment to professional excellence
6. Leadership and mentorship
7. Social accountability and responsibility
8. Scientific attitude and scholarship (only at higher level- PhD)
9. Lifelong learning

1. CLINICAL CARE

Using a patient/family-centered approach and best evidence, each student will organize and implement the prescribed preventive, investigative and management plans; and will offer appropriate follow-up services. Program objectives should enable the students to:

- Apply the principles of basic science and evidence-based practice
- Use relevant investigations as needed
- Identify the indications for basic procedures and perform them in an appropriate manner
- Provide care to patients – efficiently and in a cost-effective way – in a range of settings, and maintain foremost the interests of individual patients
- Identify the influence of biological, psychosocial, economic, and spiritual factors on patients' well-being and act in an appropriate manner
- Incorporate strategies for health promotion and disease prevention with their patients

2. COMMUNICATION

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

- Provide sufficient information to ensure that the patient/client can participate as actively as possible and respond appropriately to the information
- Clearly discuss the diagnosis and options with the patient, and negotiate appropriate treatment plans in a sensitive manner that is in the patient's and society's best interests
- Explain the proposed healthcare service – its nature, purpose, possible positive and adverse consequences, its limitations, and reasonable alternatives wherever they exist
- Use effective communication skills to gather data and share information including attentive listening, open-ended inquiry, empathy and clarification to ensure understanding
- Appropriately communicate with, and provide relevant information to, other stakeholders including members of the healthcare team.
- Use communication effectively and flexibly in a manner that is appropriate for the reader or listener
- Explore and consider the influence that the patient's ideas, beliefs and expectations have during interactions with them, along with varying factors such as age, ethnicity, culture and socioeconomic background
- Develop efficient techniques for all forms of written and verbal communication including accurate and timely record keeping
- Assess their own communication skills, develop self-awareness and be able to improve their relationships with others
- Possess skills to counsel for lifestyle changes and advocate health promotion

3. MEMBERSHIP OF A MULTIDISCIPLINARY HEALTH TEAM

The student will put a high value on effective communication within the team, including transparency about aims, decisions, uncertainty and mistakes. Team-based health care is the provision of health services to individuals, families, and/or their communities by at least two health providers who work collaboratively to accomplish shared goals within and across settings to achieve coordinated, high quality care. Program objectives will aim at making the students being able to:

- Recognize, clearly articulate, understand and support shared goals in the team that reflect patient and family priorities
- Possess distinct roles within the team; to have clear expectations for each member's functions, responsibilities, and accountabilities, which in turn optimizes the team's efficiency and makes it possible for them to use division of labor advantageously, and accomplish more than the sum of its parts
- Develop mutual trust within the team to create strong norms of reciprocity and greater opportunities for shared achievement
- Communicate effectively so that the team prioritizes and continuously refines its communication channels creating an environment of general and specific understanding
- Recognize measurable processes and outcomes, so that the individual and team can agree on and implement reliable and timely feedback on successes and failures in both the team's functioning and the achievement of their goals. These can then be used to track and improve performance immediately and overtime.

4. ETHICS AND ACCOUNTABILITY

Students will understand core concepts of clinical ethics and law so that they may apply these to their practice as physicians. Program objectives should enable the students to:

- Describe and apply the basic concepts of clinical ethics to actual cases and situations
- Recognize the need to make health care resources available to patients fairly, equitably and without bias, discrimination or undue influence
- Demonstrate an understanding and application of basic legal concepts to the practice
- Employ professional accountability for the initiation, maintenance and termination of patient-provider relationships
- Demonstrate respect for each patient's individual rights of autonomy, privacy, and confidentiality

5. COMMITMENT TO PROFESSIONAL EXCELLENCE

The student will execute professionalism to reflect in his/her thought and action a range of attributes and characteristics that include technical competence, appearance, image, confidence level, empathy, compassion, understanding, patience, manners, verbal and non-verbal communication, an anti-discriminatory and non-judgmental attitude, and appropriate physical contact to ensure safe, effective and expected delivery of healthcare. Program objectives will aim at making the students being able to:

- Demonstrate distinctive, meritorious and high quality practice that leads to excellence and that depicts commitment to competence, standards, ethical principles and values, within the legal boundaries of practice
- Demonstrate the quality of being answerable for all actions and omissions to all, including service users, peers, employers, standard-setting/regulatory bodies or oneself
- Demonstrate humanity in the course of everyday practice by virtue of having respect (and dignity), compassion, empathy, honour and integrity

- Ensure that self-interest does not influence actions or omissions, and demonstrate regards for service-users and colleagues

6. LEADERSHIP AND MENTORSHIP

The student must take on a leadership role where needed in order to ensure clinical productivity and patient satisfaction. They must be able to respond in an autonomous and confident manner to planned and uncertain situations, and should be able to manage themselves and others effectively. They must create and maximize opportunities for the improvement of the health seeking experience and delivery of healthcare services. Program objectives should enable the students to:

- Act as agents of change and be leaders in quality improvement and service development, so that they contribute and enhance people's wellbeing and their healthcare experience
- Systematically evaluate care; ensure the use of these findings to help improve people's experience and care outcomes, and to shape clinical treatment protocols and services
- Identify priorities and effectively manage time and resources to ensure the maintenance or enhancement of the quality of care
- Recognize and be self-aware of the effect their own values, principles and assumptions may have on their practice. They must take charge of their own personal and professional development and should learn from experience (through supervision, feedback, reflection and evaluation)
- Facilitate themselves and others in the development of their competence, by using a range of professional and personal development skills
- Work independently and in teams. They must be able to take a leadership role to coordinate, delegate and supervise care safely, manage risk and remain accountable for the care given; actively involve and respect others' contributions to integrated person-centered care; yet work in an effective manner across professional and agency boundaries. They must know when and how to communicate with patients and refer them to other professionals and agencies, to respect the choices of service users and others, to promote shared decision-making, to deliver positive outcomes, and to coordinate smooth and effective transition within and between services and agencies.

7. SOCIAL ACCOUNTABILITY AND RESPONSIBILITY

The students will recognize that allied and healthcare professionals need to be advocates within the health care system, to judiciously manage resources and to acknowledge their social accountability.¹⁰ They have a mandate to serve the community, region and the nation and will hence direct all research and service activities towards addressing their priority health concerns. Program objectives should enable the students to:

- Demonstrate knowledge of the determinants of health at local, regional and national levels and respond to the population needs
- Establish and promote innovative practice patterns by providing evidence-based care and testing new models of practice that will translate the results of research into practice, and thus meet individual and community needs in a more effective manner
- Develop a shared vision of an evolving and sustainable health care system for the future by working in collaboration with and reinforcing partnerships with other stakeholders, including academic health center, governments, communities and other relevant professional and non-professional organizations
- Advocate for the services and resources needed for optimal patient care

8. SCIENTIFIC ATTITUDE AND SCHOLARSHIP

The student will utilize sound scientific and/or scholarly principles during interactions with patients and peers, educational endeavors, research activities and in all other aspects of their professional lives. Program objectives should enable the students to:

- Engage in ongoing self-assessment and structure their continuing professional education to address the specific needs of the population
- Practice evidence-based by applying principles of scientific methods
- Take responsibility for their educational experiences
- Acquire basic skills such as presentation skills, giving feedback, patient education and the design and dissemination of research knowledge; for their application to teaching encounters

9. LIFELONG LEARNING

The student should be committed to continuous improvement in skills and knowledge while harnessing modern tools and technology. Program objectives will aim at making the students being able to:

- Perform objective self-assessments of their knowledge and skills; learn and refine existing skills; and acquire new skills
- Apply newly gained knowledge or skills to patient care.
- Enhance their personal and professional growth and learning by constant introspection and utilizing experiences
- Search (including through electronic means), and critically evaluate medical literature to enable its application to patient care
- Develop a research question and be familiar with basic, clinical and translational research in its application to patient care
- Identify and select an appropriate, professionally rewarding and personally fulfilling career pathway

INTRODUCTION OF NEW ELEMENTS IN ALLIED AND HEALTHCARE EDUCATION COMPETENCY-BASED CURRICULUM

A significant skill gap has been observed in the professionals offering healthcare services irrespective of the hierarchy and level of responsibility in the healthcare settings. The large variation in the quality of services is due to the diverse methodologies opted for healthcare education and the difference in expectations from a graduate after completion of a course and at work. What one is expected 'to perform' at work is assumed to be learned during the course, however, the course design focuses on what one is expected 'to know'. The competency-based curriculum thus connects the dots between the 'know what' and 'do how'.

The efficiency and effectiveness of any educational programmed largely depends on the curriculum design that is being followed. With emerging medical and scientific knowledge, educators have realized that learning is no more limited to memorizing specific lists of facts and data; in fact, by the time the professional aims to practice in the healthcare setting, the acquired knowledge may stand outdated. Thus, competency-based education is the answer; a curricular concept designed to provide the skills that professionals need. A competency-based program is a mix of skills and competencies based on individual or population needs (such as clinical knowledge, patient care, or communications approaches), which is then developed to teach relevant content across a range of courses and settings. While the traditional system of education focuses on objectives, content, teacher-centric approach and summative

evaluation; competency-based education has a focus on competencies, outcomes, performance and accomplishments. In such a case, teaching activities are learner-centered, and evaluation is continuous and formative in structure. The competency-based credentials depend on the demonstration of a defined set of competencies which enables a professional to achieve targeted goals. Competency frameworks comprise of a clearly articulated statement of a person's abilities on the completion of the credential, which allows students, employers, and other stakeholders to set their expectations appropriately.

Considering the need of the present and future healthcare delivery system, the curriculum design depicted in this handbook thus will be based on skills and competencies.

PROMOTING SELF-DIRECTED LEARNING OF THE PROFESSIONALS

The shift in the focus from traditional to competency-based education has made it pertinent that the learning processes may also be revisited for suitable changes. It is a known fact that learning is no more restricted to the boundaries of a classroom or the lessons taught by a teacher. The new tools and technologies have widened the platform and introduced innovative modes of how students can learn and gain skills and knowledge. One of the innovative approaches is learner-centric and follows the concept of **Self-Directed Learning**.

Self-directed learning, in its broadest meaning, describes a process in which individuals take the initiative with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying resources for learning, choosing and implementing learning strategies and evaluating learning outcomes (Knowles, 1975).

In self-directed learning, learners themselves take the initiative to use resources rather than simply reacting to transmissions from resources, which helps them learn more in a better way. Lifelong, self-directed learning (SDL) has been identified as an important ability for medical graduates (Harvey, 2003) and so is applicable to other health professionals including AHPs. It has been proven through many studies worldwide that the self-directed method is better than the teacher-centric method of learning. Teacher-directed learning makes learners more dependent and the orientation to learning becomes subject-centered. If a teacher provides the learning material, the student is usually satisfied with the available material, whereas if a student is asked to work on the same assignment, he or she invariably has to explore extensive resources on the subject.

Thus the handbook promotes self-directed learning, apart from the usual classroom teaching and opens the platform for students who wish to engage in lifelong learning.

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. 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.

INTEGRATED STRUCTURE OF THE CURRICULUM

Vertical integration, in its truest sense, is the interweaving of teaching clinical skills and knowledge into the basic science years and, reinforcing and continuing to teach the applications of basic science concepts during the clinical years. (Many efforts called 'vertical integration' include only the first half of the process).

Horizontal integration is the identification of concepts or skills, especially those that are clinically relevant, that cut across (for example, the basic sciences), and then putting these to use as an integrated focus for presentations, clinical examples, and course materials. e.g. Integration of some of the basic science courses around organ systems, e.g., human anatomy, physiology, pathology; or incorporating ethics, legal issues, finance, political issues, humanities, culture and computer skills into different aspects of a course like the Clinical Continuum.

The aim of an integrated curriculum is to lead students to a level of scientific fluency that is beyond mere fact and concept acquisition, by the use of a common language of medical science, with which they can begin to think creatively about medical problems.

This innovative new curriculum has been structured in a way such that it facilitates horizontal and vertical integration between disciplines; and bridges the gaps between both theory & practice, and between hospital-based practice and community practice. The amount of time devoted to basic and laboratory sciences (integrated with their clinical relevance) would be the maximum in the first year, progressively decreasing in the second and third year of the training, making clinical exposure and learning more dominant. However it may differ from course to course depending on the professional group.

INTRODUCTION OF FOUNDATION COURSE IN THE CURRICULUM

The foundation course for allied and healthcare professions is an immersive programme designed to impart the required knowledge, skills and confidence for seamless transition to the second semester of a professional allied and healthcare course. Post admission, the foundation course is designed for a period of 6 months to prepare a student to study the respective allied and healthcare course effectively and to understand the basics of healthcare system. This aims to orient the student to national health systems and the basics of public health, medical ethics, medical terminologies, communication skills, basic life support, computer learning, infection prevention and control, environmental issues and disaster management, as well as orientation to the community with focus on issues such as gender sensitivity, disability, human rights, civil rights etc. Though the flexibility to the course designers have been provided in terms of – modifying the required numbers of hours for each foundation subject and appropriate placement of the subject across various semesters.

LEARNING METHODOLOGIES

With a focus on self-directed learning, the curriculum will include a foundation course that focuses on communication, basic clinical skills and professionalism; and will incorporate clinical training from the first year itself. It is recommended that the primary care level should have sufficient clinical exposure integrated with the learning of basic and laboratory sciences. There should also be an emphasis on the introduction of case scenarios for classroom

discussion/case-based learning.

Healthcare education and training is the backbone of an efficient healthcare system and India's education infrastructure is yet to gain from the ongoing international technological revolution. The report '*From Paramedics to Allied Health: Landscaping the Journey and way ahead*', indicates that teaching and learning of clinical skills occur at the patient's bedside or other clinical areas such as laboratories, augmented by didactic teaching in classrooms and lecture theatres. In addition to keeping up with the pace of technological advancement, there has been a paradigm shift to outcome-based education with the adoption of effective assessment patterns. However, the demand for demonstration of competence in institutions where it is currently limited needs to be promoted. The report also mentions some of the allied and healthcare schools in India that have instituted clinical skill centres, laboratories and high-fidelity simulation laboratories to enhance the practice and training for allied and healthcare students and professionals. The report reiterates the fact that simulation is the replication of part or all of a clinical encounter through the use of mannequins, computer-assisted resources and simulated patients. The use of simulators addresses many issues such as suboptimal use of resources and equipment, by adequately training the manpower on newer technologies, limitations for imparting practical training in real-life scenarios, and ineffective skills assessment methods among others.¹ The table mentioned below lists various modes of teaching and learning opportunities that harness advanced tools and technologies.

TABLE 1

CLINICAL LEARNING OPPORTUNITIES IMPARTED THROUGH THE USE OF ADVANCED TECHNIQUES

Teaching modality	Learning opportunity examples
Patients	Teach and assess in selected clinical scenarios
	Practice soft skills
	Practice physical examination
	Receive feedback on performance
Mannequins	Perform acquired techniques
	Practice basic procedural skills
	Apply basic science understanding to clinical problem solving
Simulators	Practice teamwork and leadership
	Perform cardiac and pulmonary care skills
	Apply basic science understanding to clinical problem solving
Task under trainers	As specific to Optometry related course

ASSESSMENT METHODS

Traditional assessment of students consists of the yearly system of assessments. In most institutions, assessments consist of internal and external assessments, and a theory examination at the end of the year or semester. This basically assesses knowledge instead of assessing skills or competencies. In competency-based training, the evaluation of the students is based on the performance of the skills as per their competencies. Hence, all the three attributes—knowledge, skills, and attitudes – are assessed as required for the particular competency. Several new methods and tools are now readily accessible, the use of which requires

special training. Some of these are given below:

- Objective Structured Clinical Examination(OSCE), Objective Structured Practical Examination (OSPE), Objective Structured Long Examination Record(OSLER)
- Mini Case Evaluation Exercise(CEX)
- Case-based discussion(CBD)
- Direct observation of procedures(DOPs)
- Portfolio
- Multi-source feedback
- Patient satisfaction questionnaire

An objective structured clinical examination (OSCE) is used these days in a number of allied and healthcare courses, e.g. Optometry, Physiotherapy, and Radiography. It tests the performance and competence in communication, clinical examination, and medical procedures/prescriptions. In physiotherapy, orthotics, and occupational therapy, it tests exercise prescription, joint mobilization/manipulation techniques; and in radiography it tests radiographic positioning, radiographic image evaluation, and interpretation of results. The basic essential elements consist of functional analysis of the occupational roles, translation of these roles ("competencies") into outcomes, and assessment of trainees' progress in these outcomes on the basis of demonstrated performance. Progress is defined solely by the competencies achieved and not the underlying processes or time served in formal educational settings. Most methods use predetermined, agreed assessment criteria (such as observation check-lists or rating scales for scoring) to emphasize on frequent assessment of learning outcomes. Hence, it is imperative for teachers to be aware of these developments and they should suitably adopt them in the allied and healthcare education system.

CHAPTER 2:

METHODOLOGY OF CURRICULUM DEVELOPMENT

With the release of the report 'From Paramedics to Allied Health: Landscaping the journey and the way ahead', the Ministry of Health and Family Welfare prioritized the key recommendations and concerns raised by various allied and healthcare professionals groups and experts as indicated in the report. One of the major recommendations in the report was the need for standardization of curriculum and pedagogic requirements for the major allied and healthcare professional courses.

The MoHFW has identified 12 priority professional streams in the phase-I for the purpose of standardization. The expertise of over 50 leading public and private allied and healthcare educational institutions for 12 different disciplines has been sought as part of this exercise. Additionally, international experts from Canada, Sweden, USA and UK are also being roped in to arrive at a comprehensive and globally acceptable set of educational standards based on a skills and competencies approach. The opinions were sought from experts for all the courses, though curricula for the following two professions were not redesigned as they fall under the ambit of regulatory body- Rehabilitation Council of India governed by Ministry of Social Justice and Empowerment –

- Audiology and Speech Pathology
- Orthotics and Prosthetics

The National Skills Development Agency has also developed the National Skills

Qualification Framework (NSQF). Under the aegis of the NSDA, the Healthcare Sector Skill Council (HSSC) has undertaken a similar process for a few entry level allied and healthcare courses (Certificate and Diploma level). The focus of Ministry of Health and Family Welfare is thus to pre-empt duplication of efforts and arrive at a comprehensive set of minimum standards for the allied and healthcare professions but for higher level professional qualifications. This would ensure that the key considerations and obligations of both the public and the private sector are adequately addressed.

In view of the above, the Ministry of Health and Family Welfare instituted 12 National Curricula Redesign Taskforce groups comprising of academicians and professionals from the best institutes and colleges across the country. These people served as subject experts and redesigned the curricula based on a standardized framework developed by the NIAHS TSU (National Initiative for Allied Health Sciences-Technical Support Unit), which is the technical arm supporting this project. The final curriculum has been reviewed and approved by the National Curricula Review Committee (NCRC), (constituted by the MoHFW), that consists of experts with versatile and immense experience in their respective streams, to assess the applicability of the curricula drafted in view of the healthcare system as a whole.

STEPS UNDERTAKEN IN THE CURRICULA REVIEW PROCESS-

1. Curricula were sought from various States and institutions across the country in response to which the NIAHS TSU reviewed-
 - a. 118 curricula of allied and healthcare courses (different levels and different professions) from 10 states across the country;
 - b. 133 curricula of various allied and healthcare courses collected during phase-I of the NIAHS project.
2. Literature review –a comprehensive literature review was undertaken resulting in a detailed curriculum of the allied and healthcare courses, which included competency and skills-based models followed nationally as well as internationally, methodologies of curriculum development, assessment protocols, and many such aspects of curriculum development. The literature review helped the TSU to develop a reference document that comprised of a standard framework for a competency-based curriculum to be followed for the curricula review and redesign. A detailed mapping of all the resources was undertaken and shared with the taskgroup experts via email.
3. Constitution of the National Curricula Redesign Taskforces for various professional groups – Specific taskforces were then instituted comprising of technical as well as subject experts who were engaged in the process of redesigning the curriculum.
4. Constitution of the National Curricula Review Committee (NCRC) – The NCRC comprising of experts with versatile and immense experiences of their respective domain, was then constituted for final review and approval on the curriculum drafted by the taskforce and NIAHS TSU.
5. National Curricula Redesign Taskforce Consultations– a series of consultations were conducted with subject experts including both regional and national taskgroup experts to develop a 'skill and competency' framework for education and career pathways. The consultations were facilitated by the NIAHS TSU members and were led by the chairperson of the group. Post this, the draft version and recommendations were compiled by the TSU members and sent to the experts for final review and consent.
6. Local consultations – These were also conducted in different hospitals and other

healthcare settings to get suggestions, feedbacks and ideas from the subject experts for their respective curricula.

7. Response draft – Comments and suggestions were received on the draft and a response draft curriculum was prepared, which was then re-circulated for final consent and validation by the taskgroup experts.
8. Submission and approval of draft curriculum – The final draft of the curriculum handbook was then submitted by the taskforce chairman to the National Curricula Review Committee for approval and final sign-off.
9. Public opinion–The handbook was uploaded to seek public opinion from national and international experts, students, faculty, and practitioners of the respective professional groups.
10. Final approval by the NCRC- The comments and suggestions by the public were then reviewed and considered for any possible modification by the taskforce group. The final approval and sign off for the overall structure was then sought from NCRC.
11. Dissemination- The final handbook (guidelines) is disseminated by the Ministry of Health and Family Welfare for further adoption and incorporation by institutes/universities as applicable to ensure standardization.



CHAPTER 3: BACKGROUND OF THE PROFESSION

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. About 85% of all vision impairment and 75% of blindness globally could be avoided, 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 (\$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.

RECOGNITION OF TITLE AND QUALIFICATION

The recommended title for this group of professionals stands as the 'Optometrist'.

It is a known fact that with the career advancement, the nomenclature will also vary and will also depend on the sector and profile of the professional. Considering the 10 NSQF levels designed by the NSDA, the following level progression table has been proposed by the taskforce to map the nomenclature, career pathways and progression in different sectors of professional practice for Optometrist.

The proposed progression is for further discussion and deliberation, the implementation time of the same may vary depending on the current system and regulations in place.

The table 2 below indicates the various channels of career progression in three distinct sectors such as clinical setting, academic and industry (management/sales or technical) route. It is envisaged that the Optometrist will have two entry pathways – students with diploma or baccalaureate. The level of responsibility will increase as the career progresses and will start with level four (4) for diploma holders and level five (5) for baccalaureate holders. The table also indicates the corresponding level of qualification with experience required by the professional to fulfil the requirements of each level. Considering the degree of patient dealing in case of Optometry and such other professions, government as well as the profession aims to phase out the Diploma by 2020. The self-regulatory body of optometry will close registration of diploma by 2020. It will aim to promote Bachelor and Master Degree courses.

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TABLE 2
NOMENCLATURE BASED ON CAREER PROGRESSION FOR OPTOMETRIST (PROPOSED)

LEVELS	NOMENCLATURE IN VARIOUS SECTORS			QUALIFICATION AND EXPERIENCE
	CLINICAL	ACADEMIC	INDUSTRY/ MANAGEMENT	
Level 4	Ophthalmic Assistant			<ul style="list-style-type: none"> Diploma with 0 - 5 years' experience post Diploma
Level 5	Junior optometrist	Clinical Instructor	Optometrist / Junior Manager	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> M. Optom / M Sc optom/ M Phil Optom/Equivalent (0-2 years' experience)
Level 7	Senior consultant Optometrist	Assistant Professor 2	Project officer / Manager	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> M Optom //M Sc optom/ M Phil Optom /Equivalent(11-14 years' experience, with PhDdesirable not mandatory) *
Level 10	Director	Principal/Dean/ Director	Director	<ul style="list-style-type: none"> 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 up gradation of degree may be considered as mandatory till the profession has enough numbers to fulfill the requirements.*

M.Optom/Equivalent will still remain to be mandatory requirement for academic positions.




DEFINITION OF OPTOMETRIST

"Optometrists are primary health care practitioners of the eye and visual system who provide comprehensive eye and vision care, which includes refraction and dispensing, detection/diagnosis and co-management of disease in the eye and the rehabilitation of conditions of the visual system"

Optometrist also means a person having-

- i. Graduate degree in optometry obtained after the completion of a full time course of 4 years(baccalaureate) which includes supervised clinical training from any university recognized by the University Grants Commission established under the University Grants Commission Act 1956; or
- ii. Post graduate degree in optometry after completion of a full time course of two years and /or PhD in the same.
- iii. Diploma in ophthalmic techniques/ Diploma in optometry will be considered as entry level until 2020. The program will be phased out and the diploma will be encouraged to upgrade to degree through lateral

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 are 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)

EDUCATION OF THE OPTOMETRY

When developing any education programme it is necessary that programme planning should be outcome-based, meeting local and national manpower requirements, personal satisfaction and career potential for the professionals with supporting pathway in the development of the profession. One of the major changes is the shift from a focus based on traditional theoretical knowledge and skills to competency based education and training. Optimal education/training requires that the student is able to integrate knowledge, skills and attitude in order to be able to perform a professional act adequately in a given situation.

Thus, the following curriculum aims to focus on skills and competencies based approach for learning and are designed accordingly. The curriculum is prescriptive and is designed with an aim to standardize the content across the nation. As stated above the focus of the profession is to create qualified and skill manpower in the field of Optometry through the following levels of higher education-

1. Bachelor of Optometry (B. Optom)

ENTRY REQUIREMENTS

As per the UGC guidelines it is recommended that the students entering the Optometry programme should have completed the recognized secondary school studies as the qualification stipulated for B. Optom is 10+2 with Sciences (Biology/Mathematics) or equivalent from a recognized university or board which will provide the foundation for and prepare them for higher

education studies.

Candidates who have completed diploma in ophthalmic techniques / diploma in optometry (after completion of 10+2 with science) can also join the undergraduate course. They would be eligible to join in 2nd year of optometry. The total education therefore would be (2 year diploma + 3 year of undergraduate studies). The third year of the program (lateral entry) would be internship.

COURSE DURATION

It is recommended that any programme developed from this curriculum should have a minimum of the following duration to qualify as an a professional course in optometry -

- **4 year programme (including 1 year of clinical training /internship)- Bachelor's degree level**

The emphasis initially should be on the academic content establishing a strong scientific basis and in the latter year on the application of theory to clinical/reflective practice. In Bachelor degree programme minimum one year should be devoted to clinical practice and this should be on a continuum of rotation from theory to practice over the programme. The aim of the 4 year degree programme is to enable the development of the Optometrist as a key member of the eye care team and to enable him/her to execute basic assessment/planning/delivery of eye care services.

TEACHING FACULTY AND INFRASTRUCTURE

The importance of providing an adequate learning environment for the students cannot be over emphasized. Both the physical infrastructure and the teaching staff must be adequate.

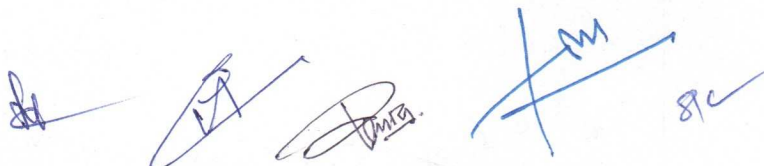
Teaching areas should facilitate different teaching methods. Where students may share didactic lectures with other disciplines large lecture theatres may be appropriate, but smaller teaching areas should also be provided for tutorial and problem/case-based learning approaches. In all venues where students are placed the health and safety standards must be adhered to.

It is recommended that a faculty and student ratio of **1:10** to be followed in clinical training and practical. The teaching load will be based on the UGC norms for the designated post.

JOB AVAILABILITY

As per ILO documentation, employers worldwide are looking for job applicants who not only have technical skills that can be applied in the workplace, but who also can communicate effectively, including with customers; can work in teams, with good interpersonal skills; can solve problems; have good ICT skills; are willing and able to learn; and are flexible in their approach to work.³⁶ Graduates can expect to be employed in hospitals and private practices as Optometrist. A career in research, following the completion of a higher degree such as a PhD, is an option chosen by some graduates. Also, graduates are eligible for employment overseas where their qualifications, training and experience are highly regarded. With further experience, graduates may also be employed by equipment manufacturers and developmentspecialists.

Graduates have good employment prospects, and will enter a field in which the demand for professionals has increased in recent years and will keep on increasing due to chronic conditions.



JOB OPPORTUNITIES:

The job sectors for optometrist can be divided into the following areas:

1. Corporate sector
2. Private practice
3. Work for an optical chain or under an optical store
4. Public health
5. Industries/companies
6. Eye care hospitals & institutions
7. Education sector
8. Scientific research
9. Basic research and integrated professional areas

CORPORATE SECTOR:

Optometrists are employed as professional service people under various lens manufacturing companies as well as contact lens companies. Some pharmaceuticals and surgical instrument companies (eye related) also employ them. Depending on performance there is a career path for the professional service staff and some optometrist have also risen to regional heads (Asia-Pacific head).

PRIVATE PRACTICE:

Optometrist upon graduation can open their optometry clinic with/without optical store. Currently many optometrists are practicing in their own clinic.

WORK FOR OPTICAL CHAIN:

The work environment and the responsibilities for working in a chain would be similar to that of a private practitioner.

PUBLIC HEALTH:

Optometrist can also enter into the public health domain as health care providers. They could be involved in epidemiological studies, in primary health centres (PHC) and in SHC. Optometrists can collaborate with NGO in service delivery of healthcare.

INDUSTRIES/ COMPANIES:

Optometrist can involve in pre-employment vision screening, periodic eye check-up for employees, set vision standards for various occupations, help in occupational health professional in developing eye safety policy of the company, advise on appropriate eye safety wear and can do awareness campaign among the employees especially on the usage of eye safety wear and protection.

EYE CARE HOSPITALS & INSTITUTIONS:

Optometrists can provide vision care services like prescribing glasses, contact lens, provide comprehensive low vision care services, advice on vision therapy etc. They can also provide extended role in various eye clinics like managing diagnostic services and co-manage patients in an eye care institutional set up or a hospital set up. Optometrist also acts as clinical trainer, researchers, administrators and clinical heads.



EDUCATIONAL SECTOR:

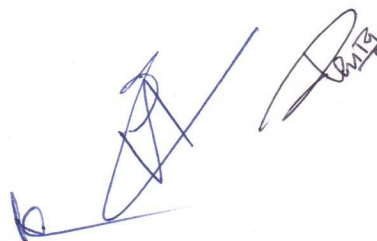
Optometrists can be employed as faculty depending on experience and qualification. Optometrists also can head optometry schools or college. Academics can also be combined with clinical practice.

RESEARCH:

Research areas in optometry are quite vast ranging from optics, contact lenses, binocular vision, glaucoma, retinal diagnostics, public health, low vision to primary eye and health care. Optometrists can involve himself in vision science researches, not restricted with any specific areas.

TRANSLATIONAL RESEARCH:

Vision scientists / optometrists with higher degree can involve in transformational research wherein the scientific discoveries arising from laboratory, clinical or population studies lead into clinical applications to reduce disease incidence, morbidity and mortality.



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CHAPTER 4: CURRICULUM

BACKGROUND

Human resource development for eye care is a crucial factor which will determine the success of *VISION 2020: The Right to Sight*. Given the enormous numbers of people in India who are blind and vision impaired as a result of uncorrected refractive error and other avoidable causes, the time is right for India to regulate the profession of optometry, and increase the numbers of skilled eye care providers who can provide vision care to the people at all levels and in all areas of the country.

The academic development of optometry in India is a crucial part of the development of effective vision care and blindness prevention system in India. Optometry in India could, over the next decade, become capable of combating its huge blindness and impaired vision problem by travelling down the academic, professional and legislative pathway to become an effective health care profession.

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

- Technically and clinically competent;
- Understand the theoretical basis for evidence based practice;
- Independently competent in vision care as defined;
- Effective members of the multidisciplinary team;
- Prepared to participate in or initiate research into practice;
- Can work according to registration requirements on the respective continents.

All aspects of Optometry have been considered in the development of this curriculum together with the identification of the roles expected for different levels of Optometrist based on their qualification and experience. The need for connecting the dots between the education and employment practices has been the road map for devising this curriculum.

The National Curriculum Taskforce on Optometry has successfully designed the career and qualification map indicating the growth opportunities for a professional in the career pathway. The career pathway framework has been adopted on the basis of the levels of responsibilities indicated in the National Skills Qualification Framework (NSQF). The career pathway indicates **level 4 as the entry level** after the completion of a minimum 2 years of diploma level programme on Ophthalmic Assistant (Diploma in Ophthalmic Assistant) or Diploma in Optometry, as well as **level 5 as the entry level** after completion of a minimum 4 years of Baccalaureate level programme on Optometry (Bachelor of Optometry- B. Optom). The component of the programmes starting from bachelor and above has been detailed out in the coming chapters.

Foundation course has also been designed to bring all the students at the same level of understanding with respect to basic healthcare related norms before the start of a career in a healthcare professional course. The foundation course is mandatory for all the allied and healthcare professional courses, given that if it has been done at least at one level of qualification. For example- if a diploma holder has completed the foundation course and is willing to pursue the degree course, the candidate will directly get entry for next semester, however a pre-qualifier skill test will have to be satisfactorily completed, if not, then the candidate will have to undergo the first semester of foundation course again.



BACHELOR OF OPTOMETRY

INTRODUCTION:

LEARNING OBJECTIVES: At the completion of this course, the student should -

1. Be able to develop skills to provide comprehensive eye examination
 - a. To acquire knowledge on ocular structures, its functions and pathological changes
 - b. To carryout ophthalmic investigations
 - c. To impart knowledge with regard to common eyediseases
 - d. To impart knowledge on treatment modalities from the perspective of counselling
 - e. To acquire knowledge about the referral guidelines for ocular and systemic conditions
2. Be able to correct refractive error and provide spectacle prescription
3. Be able to fit, evaluate, prescribe and dispense contact lenses for refractive correction and other ocular conditions
4. Be able to assess the low vision and provide comprehensive low vision care
5. Be able to have adequate knowledge to develop skill in manufacturing of spectacle lenses, contact lenses and low vision devices.
6. Be able to do complete binocular vision assessment, manage non-strabismic binocular vision anomalies and refer condition which warrants surgery
7. Be able to assess the visual demands for various occupations and match it to the visual capabilities. Also be able to advice on eye safety wear for various occupations.
8. Have knowledge and skill for early detection of various ocular conditions and pathologies – Refractive error, Strabismus, Cataract, Diabetic retinopathy, Glaucoma etc.
9. Have knowledge regarding organizations of eye banks and preservation of ocular tissues.
10. Have knowledge on sensory substitution and other rehabilitation measures for totally visually challenged.
11. Have knowledge of counselling on visual/ocular hygiene, nutritional and environmental modifications

EXPECTATION FROM THE FUTURE GRADUATES IN THE PROVIDING PATIENT CARE.

1. Optometrist will work independently or in conjunction with other eye/health care professionals.
2. The optometrist will be knowledgeable, skilful and analytical in diagnosis, treatment planning, management of visual defects & impairments and in co-managements of ocular conditions.
3. The optometrist can work in hospitals (both private and public sectors), optical outlets and/or work as independent practitioner
4. The course will lead to a basic degree in optometry, which is considered as the minimum essential for statutory registration of optometrists in countries where optometry has been brought under legislation.
5. Undertake public health optometry projects and vision screening eye camps in schools, colleges, urban slums, rural areas and also practice occupational optometry in industries.
6. Public education on ocular hygiene and related nutritional and environmental counselling.
7. Offer a helping hand and or efficiently manage and successfully run any ophthalmic clinic, optometry department in hospitals, optical shops, and offer product expertise in ophthalmic industry & trade.



ELIGIBILITY FOR ADMISSION:

SELECTION PROCEDURE:

1. 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 (45%) in physics, chemistry, and biology/mathematics and provided the candidate has passed in English. 5% Relaxation for Reserve Category.

OR

Diploma in Optometry after completing 12th class/ 10 +2 of CBSE or equivalent with minimum aggregate of 45 % marks in physics, chemistry and biology/mathematics provided the candidate has passed in English. 5% Relaxation for Reserve Category.

2. 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.
3. 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.
 - a. English, Physics, Chemistry, Botany, Zoology
 - b. English, Physics, Chemistry, Biology/Mathematics and any other language
4. He/she has attained the age of 17 years as on 31st December of the year of admission.
5. 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.
6. 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 Mathematics, 15% in Chemistry, 10% in English (Language & Comprehension) and 10% in General Awareness about health related methods.

- a. 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 Mathematics, 15% in Chemistry, 10% in English (Language & Comprehension) and 10% in General Awareness about health related methods.
- b. 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.
- c. 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.
- d. Candidate who fails 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.
- e. 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.

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TOTAL NO OF SEAT AVAILABLE FOR ADMISSION

There shall be 60 seat for admission in the course

DURATION OF THE COURSE

The B Optom undergraduate degree program is of four years duration (3+1) including one year of compulsory internship.

TOTAL HOURS -3075 (didactics+ practical +internship) (300 additional hours to be spent on research project)

SEMESTERS - An academic year consists of two semesters Odd Semester: June/July to November/December Even Semester: November/December to April/May

MEDIUM OF INSTRUCTION:

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

ATTENDANCE:

A candidate has to secure minimum-

1. 75% attendance in theoretical
2. 80% in Skills training (practical) for qualifying to appear for the final examination.

ASSESSMENT:

Assessments should be completed by the academic staff, based on the compilation of the student's theoretical & clinical performance throughout the training programme. To achieve this, all assessment forms and feedback should be included and evaluated.

COMMENCEMENT OF EXAMINATION -

University examination will be conducted at the end of each semester.

WORKING DAYS DURING THE SEMESTER -

Each semester shall consist not less than 90 working days excluding examination days.

PROMOTION CRITERIA

In connection to promotion to the next year shall be recommended that students may be permitted to next year only if the number of failed subject is two or less than two and Student must clear these subjects before appearing for the final examination of next year.

For example failed subjects of I year must be cleared before appearing for 4th Semester examination and before the 6th Semester examination in case of failed subjects of II year and so on. Only after passing all the subjects in all semesters he/she will be allowed to undergo internship.

RE-ADMISSION AFTER BREAK OF STUDY -

1. Candidates having a break of study of five years and above from the date of admission and more than two spells of break will not be considered for readmission
2. The five years period of break of study shall be calculated from the date of first admission of the candidate to the course for the subsequent spells of break of study
3. Candidates having break of study shall be considered for re admission provided that they are not subjected to any disciplinary action and no charges are pending or contemplated against them.
4. All re admissions of candidates are subjected to the approval of the Vice Chancellor.



5. The candidates having a break of study up to five years shall apply for readmission to the Registrar of this University. The candidates shall be granted exemption in the subjects they have already passed.

MAXIMUM DURATION OF THE PROGRAM -

Candidates should complete the course within a period of eight years from the date of joining in the course.

DISCHARGE FROM THE PROGRAM -

1. "If a student admitted to a course of study in an University and for any reason not able to complete the course or qualify for the degree by passing the examinations prescribed within a period comprising twice the duration prescribed in the Regulations for the concerned course, he/she will be discharged from the said course, his/her name will be taken off the rolls of the University and he/she will not be permitted to attend classes or appear for any examination conducted by the University thereafter."
2. "In respect of courses where internship is prescribed and if a student is for any reason not able to complete the internship within a period comprising twice the duration prescribed in the Regulations for the concerned course, such cases will be placed before a Committee to be constituted by the Vice-Chancellor for making appropriate decision on a case to case basis, based on individual merits."
3. "The course of study shall mean and include all the undergraduate, post graduate diploma/degree broad and super specialty courses in medical and all the other Faculties of the University".
4. The above Regulations shall be applicable to all students already admitted and to be admitted to a course of study in an University."
5. "Notwithstanding anything contained in the foregoing, the students who fall in the category clause I above and who are in the final year of the respective courses be given one more last and final chance to appear for the University Examination with a condition that if they do not pass the examination even in their last chance, they shall be discharged from the course. The Controller of Examinations will admit such candidate to the University examinations only after their producing an undertaking (as per format given in students manual) to this effect."

MIGRATION/TRANSFER OF CANDIDATES -

The Vice Chancellor shall have the powers to place any migration/transfer he deems fit in the Board of Management and get approval for grant of permission for migration/transfer to candidates undergoing course of study in another University as prescribed by university

VACATION -

The Head of the Institution may declare 45 days of vacation in an academic year to the students without a semester break. The period(s) of vacation can be decided by the Head of the Institution.

The bottom of the page features several handwritten signatures and initials in blue ink. From left to right, there is a large 'A', a signature that appears to be 'B', a signature that appears to be 'C', a signature that appears to be 'D', a signature that appears to be 'E', and a signature that appears to be 'F'. There are also some initials and marks scattered around these signatures.

CLASSIFICATION OF SUCCESSFUL CANDIDATES -

A successful candidate

1. Who secures 75% and above in the aggregate marks shall be declared to have secured 'FIRST CLASS WITH DISTINCTION' provided he/she passes the whole examination in the FIRST ATTEMPT;
2. Who secures above 60% and less than 75% in the aggregate marks and completes the course within the stipulated course period shall be declared to have passed the examinations in the 'FIRST CLASS, provide he/she passes the whole examination in the FIRST ATTEMPT';
3. Who secures above 50% and less than 60% in the aggregate marks and completes the course within the stipulated course period shall be declared to have passed the examinations in the 'SECOND CLASS'; and

All other successful candidates shall be declared to have PASSED the examinations.

MARKS QUALIFYING FOR PASS -

Assessments should be completed by the academic staff, based on the compilation of the student's theoretical & clinical performance throughout the training programme. To achieve this, all assessment forms and feedback should be included and evaluated. Student must **attain at least 50%** marks in each Theory, Internal assessment and Practical independently / separately for each individual subject.

INTERNAL ASSESSMENT (100 Marks):

Class Test-I	Class Test -II	Class Test -III	Attendance	Assignment / Work book assignments & Viva	Total
Best Two of Three CTs					
15	15	15	20	50	100

INTERNAL ASSESSMENT (50 Marks):

Class Test-I	Class Test -II	Class Test -III	Attendance	Assignment / Work book assignments & Viva	Total
Best Two of Three CTs					
10	10	10	10	20	50

INTERNAL ASSESSMENT (30 Marks):

Class Test-I	Class Test -II	Class Test -III	Attendance	Assignment / Work book assignments & Viva	Total
Best Two of Three CTs					
5	5	5	5	15	30

DURATION OF EXAMINATIONS:

INTERNAL		EXTERNAL
Up to 50 Marks	Up to 100 Marks	
1.5 Hrs	3 Hrs	
		3 Hrs

ASSESSMENT of PRACTICALS (20 Marks):

Experiments	Viva Voce	Total Internal
10 Marks	10 Marks	20 Marks

ASSESSMENT of PRACTICALS (50 Marks):

Experiments	Viva Voce	Total Internal
30 Marks	20 Marks	50 Marks

ASSESSMENT of PRACTICALS (100 Marks):

Experiments	Viva Voce	Total Internal
60 Marks	40 Marks	100 Marks

ASSESSMENT OF INTERNSHIP:

The Internee shall maintain the record of work, which is to be verified and certified by the Technologist followed by HoD under whom he/she works. Apart from scrutiny of record of work, assessments and evaluation of training shall be undertaken by an objective approach using situation tests in knowledge, skill and attitude during & at the end of training. Based on the record of work and date of evaluation The Director/ Principal shall issue certificate for satisfactory completion of training following which the University shall award the degree.

The Satisfactory completion shall be determined on the basis of following.

- Proficiency of knowledge required for each Imaging Technique or Procedures
- The Competency and Skills expected to manage each radiographic technique.
- Responsibility, Punctuality, workup of radiographic techniques, involvement in special procedures and preparation of reports.
- Capacity to work in team (behavior with colleagues, nursing staff and relationship with medical and paramedical staffs)
- Initiating, participating in discussions and developing research aptitude.

LOGBOOK OF INTERNSHIP

Duly signed and completed Internship logbook is compulsory to submit in the departments/college to obtain internship completion letter.

NOTE:

Evaluation of the Internship of the both semester shall be done as per **annexure-I** separately for each semester. The reports are forwarded by the Dean of the faculty with the recommendation letter must be submitted to the Controller of examinations office within 15 working days after completion of the Internship.

COMPETENCY STANDARDS

Classification Units of Competency Skills at Entry level for optometrists

- Communication Skills
- Professional Conduct
- Patient Examination and management.
- Optical Dispensing
- Documentation

FOR DETAILS REFER TO IELOCS DOCUMENT DEVELOPED BY ASCO INDIA

CREDIT DETAILS:

1 hour lecture/tutorial per week	1 credit
2 hours of laboratory/practical per week	1 credit
2 hours of clinics per week	1 credit
2 hours of Research project per week	1 credit

In a semester: 15 weeks. For example,

CREDIT COURSE =

15 hours of lectures per semester 3 credits course = 45 hours of lectures per semester.

CREDIT COURSE = 15 hours of practical/laboratory per week

Bachelor of Optometry Curriculum Bifurcation

FIRST SEMESTER

Sl. No.	Course Titles	Credits/Week			Hours/semester			IA*	UE**	Practical/ Viva Voce	Total (IA+ UE)
		L	P	C	L	T/P	Total				
BOP111	General Anatomy	2	1	3	30	15	45	50	50	-	100
BOP112	General Physiology	2	1	3	30	15	45	30	50	20	100
BOP113	General Biochemistry	2	1	3	30	15	45	50	50	0	100
BOP114	Geometrical Optics-I	3	1	4	45	15	60	30	50	20	100
BOP115	Nutrition	1	0	1	15	0	15	50	50	-	100
BOP116	English and Communication	1	0	1	15	0	15	50	50		100
BOP226	Introduction to Quality & Patient safety	2		2	30		30	100	0	-	100
BOP126	Basics of Computers		1	1		15	15	0	0	100	100
TOTAL		13	5	18	195	75	225	260	300	40	800

SECOND SEMESTER

Sl. No.	Course Titles	Credits/weeks			Hours/semester			IA*	UE**	Practical/ Viva Voce	Total (IA+ UE)
		L	P	C	L	T/P	Total				
BOP121	Ocular Anatomy	3	1	4	45	15	60	50	50	0	100
BOP122	Ocular Physiology	3	1	4	45	15	60	30	50	20	100
BOP123	Ocular Biochemistry	1	1	2	15	15	30	30	50	20	100
BOP124	Physical Optics	3	1	4	45	15	60	30	50	20	100
BOP125	Geometrical Optics-II	3	1	4	45	15	60	30	50	20	100
BOP127	Clinical Optometry-I		1	1		15	15	0	0	100	100
TOTAL		13	6	19	210	90	300	170	250	280	600

THIRD SEMESTER

Sl. No.	Course Titles	Credits/weeks			Hours/ semester			IA*	UE**	Practical/ Viva Voce	Total (IA+ UE)
		L	P	C	L	T/P	Total				
BOP211	Ocular Microbiology	1		1	15		15	50	50	-	100
BOP212	Visual optics -I	1		1	15		15	50	50	-	100
BOP213	Optometric optics-I	3		3	45		45	50	50	-	100
BOP214	Optometric Instruments	2	1	3	30		30	50	50	-	100
BOP215	Ocular Disease -I	3		3	45		45	50	50	-	100
BOP216	Clinical examination of visual system	2		2	30		30	50	50	-	100
BOP217	Indian Medicine and Telemedicine	1		1	15		15	100	-	-	100
BOP218	Clinical Optometry-II		3	3	0	45	45	50	-	50	100
BOP224	Pathology	1		1	15		15	50	50	-	100
TOTAL		14	5	18	210	45	255	450	300	50	900

FOURTH SEMESTER

Sl. No.	Course Titles	Credits /weeks			Hours / semester			IA*	UE**	Practical/ Viva Voce	Total (IA+ UE)
		L	P	C	L	T/P	Total				
BOP221	Optometric optics - II & Dispensing Optics	3		3	45		45	50	50	-	100
BOP222	Visual Optics- II	2		2	30		30	100		-	100
BOP223	Ocular Disease -II and glaucoma	3		3	45		45	50	50	-	100
BOP225	Basic and Ocular Pharmacology	3		3	45		45	50	50	-	100
BOP227	Medical Psychology	1		1	15		15	50	50		100
BOP228	Clinical optometry-III		3	3		45	45	50	-	50	100
TOTAL		13	3	15	225	45	270	500	250	50	600








FIFTH SEMESTER

Sl. No.	Course Titles	Credits /weeks			Hours / semester			IA*	UE**	Practical/ Viva Voce	Total (IA+ UE)
		L	P	C	L	T/P	Total				
BOP311	Contact lens -I	2	1	3	30	30	60	30	50	20	100
BOP312	Low Vision care	1	1	2	15	15	30	30	50	20	100
BOP313	Geriatric Optometry & Pediatric Optometry	3		3	45		45	50	50	-	100
BOP314	Binocular Vision-I	2	1	3	30		30	50	50	-	100
BOP315	Systemic Disease	3		3	45		45	50	50	-	100
BOP317	Clinical Optometry-IV		3	3		45	45	50	-	50	100
TOTAL		11	6	17	195	90	285	310	300	90	600

SIXTH SEMESTER

Sl. No.	Course Titles	Credits /weeks			Hours /semester			IA*	UE**	Practical/ Viva Voce	Total (IA+ UE)
		L	P	C	L	T/P	Total				
BOP321	Contact Lens -II	2	1	3	30	30	60	30	50	20	100
BOP322	Binocular Vision -II	2	1	3	30	15	45	30	50	20	100
BOP323	Public Health & Community Optometry	2		2	30		30	50	50	-	100
BOP324	Practice Management	1		1	15		15	50	50	-	100
BOP325	Occupational optometry	1		1	15		15	50	50	-	100
BOP327	Research Project - I			2		30	30	100			100
BOP328	Clinical Optometry-V		3	3		45	45	50		50	100
BOP326	Medical Law and Ethics	1		1	15		15	50	50		100
BOP316	Research Methodology & Biostatistics	2		2	30		30	50	50	-	100
TOTAL		10	5	18	135	120	255	410	300	90	900





SEVENTH SEMESTER

Sl. No.	Course Titles	Credits /week			Hours/ semester			IA*	UE**	Viva Voce	Total (IA+ UE)
		L/T	P/C/RP	L/T	C/P/ RP	Total					
BOP411	B Optometry Internship-I	2	20	30	720	750	50	-	-	50	100
BOP412	Research Project - I	-	4	-	-	150	100	-	-	-	100
		-	-	-	-	900	150	-	-	50	200

- Internship-I is for 6 months (July-December)
- Total number of days (after deducting for national holidays & Sundays + Examination): 125 days (6 days / week; 6 hours / day) = 750 hours or minimum of 9 weeks /semester (108 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.
- The Evaluation of Internship done as per Annexure-I

EIGHTH SEMESTER

Sl. No.	Course Titles	Credits /week			Hours/ semester			IA*	UE**	Viva Voce	Total (IA+ UE)
		L/T	P/C/RP	L/T	C/P/ RP	Total					
BOP421	B Optometry Internship-II	2	20	30	720	750	50	-	-	50	100
BOP422	Research Project -III	-	4	-	-	150	100	-	-	-	100
						900	150	-	-	100	200

Internship-II is for 6 months (January - June)

- Total number of days (after deducting for national holidays & Sundays + Examination): 125 days (6 days / week; 6 hours / day) = 750 hours or minimum of 9 weeks /semester (108 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
- The Evaluation of Internship done as per Annexure-I.




FIRST SEMESTER

BOP-111

GENERAL ANATOMY

INSTRUCTOR IN CHARGE: Anatomist with appropriate qualification.

COURSE DESCRIPTION:

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

OBJECTIVES:

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

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

TEXT BOOKS:-

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

REFERENCE BOOKS:-

1. PETER L. WILLIAMS AND ROGER WARWICK: - Gray's Anatomy - Descriptive and Applied, 36th Ed., 1980, Churchill Livingstone.
2. T.S. RANGANATHAN: Text book of Human Anatomy, 1982, S. Chand & Co., New Delhi 110 055.
3. INDERBIR SINGH: Human Embryology, 3rd Ed., Macmillan India, 1981.
4. R. KANAGASUNTHARAM, P. SIVANANDA-SINGHAM & A. KRISHNAMURTI: Anatomy- Regional, Functional, & Clinical, P.G. Publisher, Singapore 1987.

PREREQUISITES: Higher secondary level biology or remedial biology

COURSE PLAN:

Sl. No.	Topics	No. of hrs.
1	Introduction to Human Anatomy: Anatomy: Definition and its relevance in medicine and optometry Planes of the body, relationship of structures, organ system.	1
2	Skeleton System	3
3	Tissues of the Body: Epithelium, connective tissue, bone and cartilage, Embryology, histology, different types of each of them, types of cells, cellular differentiation and arrangements in different tissues.	3

4	Muscles: Different types of muscles, their functional differentiation, their relationship with different structures, their neural supply.	3
5	Blood vessels: Differentiation between arteries and veins, embryology, histology of both arteries and veins, Functional differences between the two, anatomical differences at different locations	3
6	Skin and appendages: Embryology, anatomical differences in different areas, functional and protective variations, innervations, relationship with muscles and nerves	3
7	Lymphatic system: Embryology, functions, relationship with blood vessels and organs	1
8	Glands: Embryology, different types of glands (exocrine and endocrine), functional differences, neural control of glands	2
9	Nervous system: Parts of Nervous system, cell types of nervous system, Blood-brain barrier, Reflex arc, Peripheral Nerves, Spinal nerves, Nerve fibers, Autonomic Nervous system	5
10	Brain and Cranial nerves: Major parts of Brain, Protective coverings of the Brain, Cerebrospinal Fluid, Brain stem, Cerebellum, Diencephalon, Cerebrum, Cranial nerves.	6
Total Number of Hours		30

PRACTICAL (15 Hours):

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

INSTRUCTOR IN CHARGE: Physiologist with Master's Degree

COURSE DESCRIPTION:

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

OBJECTIVES:

At the end of the course the student will be able to: • Explain the normal functioning of various organ systems of the body and their interactions. • Elucidate the physiological aspects of normal growth and development. • Describe the physiological response and adaptations to environmental stresses. • Know the physiological principles underlying pathogenesis of disease.

TEXT BOOKS:-

1. L Prakasam reddy, Fundamentals of Medical Physiology, 4th Edition, Paras medical Publisher, Hyderabad, 2008
2. Sujit K. Chaudhuri, Concise Medical Physiology, 6th edition, New Central Book Agency, Kolkata, 2008

REFERENCE BOOKS:-

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

PREREQUISITES: Higher secondary level biology or remedial biology

COURSE PLAN:

Sl. No.	Topics	No. of hrs.
1	<u>CELL STRUCTURE & ORGANIZATION</u> Tissue organization Epithelium, Connective tissue –Collagen fibers –Elastic fibers – Areolar fibers Cartilage –Bone, Contractile tissue –striated –skeletal –cardiac –non striated –plain –myoepithelial General principles of cell physiology, Physiology of skeletal muscle	4
2	<u>BLOOD:</u> Composition Volume measurement & variations Plasma proteins – classification & functions Red blood cells–development, morphology & measurements–functions & dysfunctions. White blood cells–development–classification, morphology – functions & dysfunctions Platelets –morphology –development, functions & dysfunctions Clotting – factors –	4

	mechanism – anti - coagulants dysfunctions Blood grouping – classification – importance in transfusion, Rh factor & incompatibility. Suspension stability Osmotic stability. Reticulo endothelial system.			
	<table><tr><td><ul style="list-style-type: none">○ Spleen○ lymphatic tissue○ Thymus○ bone marrow</td><td><ul style="list-style-type: none">○ immune system○ cellular○ Humoral○ Autoimmune</td></tr></table>	<ul style="list-style-type: none">○ Spleen○ lymphatic tissue○ Thymus○ bone marrow	<ul style="list-style-type: none">○ immune system○ cellular○ Humoral○ Autoimmune	4
<ul style="list-style-type: none">○ Spleen○ lymphatic tissue○ Thymus○ bone marrow	<ul style="list-style-type: none">○ immune system○ cellular○ Humoral○ Autoimmune			
3	<u>DIGESTION:</u> General arrangement Salivary digestion –functions & regulations Gastric digestion –functions & regulations Pancreatic digestion –functions & regulations Intestinal digestion –functions & regulations Liver & bile, Absorption Motility Deglutition Vomiting Defecation, Functions of large intestine, Neurohumoral regulations of alimentary functions, summary	2		
4	<u>EXCRETION:</u> Body fluids –distribution, measurement & exchange, Kidney –structure of nephron –mechanism of urine formation –composition of the urine and abnormal constituents –urinary bladder & micturition	2		
5	<u>ENDOCRINES:</u> Hormone mechanism –negative feed backs –tropic action –permissive action – cellular action, hypothalamic regulation Thyroid – hormones, actions, regulations Adrenal cortex - hormones, actions, regulations Adrenal medulla –hormones, actions, regulations Parathyroid – hormones, actions, regulations Islets of pancreas –hormones, actions, regulations Miscellaneous _ hormones, actions, regulations Common clinical disorders	3		
6	<u>REPRODUCTION:</u> Male reproductive system –control & regulation, Female reproductive system –uterus –ovaries –menstrual cycle –regulation – pregnancy & delivery –breast –family planning	1		
7	<u>RESPIRATION:</u> Mechanics of respiration –pulmonary function tests –transport of respiratory gases- neural and chemical regulation of respiration –hypoxia, cyanosis, dyspnoea- asphyxia.	1		
8	<u>CIRCULATION:</u> General principles, Heart: myocardium –innervation –transmission of cardiac impulse- Events during cardiac cycle –cardiac output. Peripheral circulation: peripheral resistances –arterial blood pressure –measurements –factors regulation variations – capillary circulation – venous circulation. Special circulation: coronary cerebral – miscellaneous	4		
9	<u>ENVIRONMENTAL PHYSIOLOGY</u> Body temperature regulation (including skin Physiology). Exposure to low and high atmospheric pressure	2		

10	<u>NERVOUS SYSTEM:</u> Neuron –Conduction of impulse –synapse –receptor. Sensory organization –pathways and perception, Reflexes –cerebral cortex –functions. Thalamus –Basal ganglia Cerebellum. , Hypothalamus. Autonomic nervous system –motor control of movements, posture and equilibrium, –conditioned reflex, eye hand co-ordination	5
11	<u>SPECIAL SENSES</u> –(Elementary) Olfaction –Taste –Hearing	2
Total Number of Hours		30

PRACTICAL (Total: 15 hours)

1. Blood test: Microscope, Haemocytometer, Blood, RBC count, Hb, WBC count, Differential Count, Haematocrit demonstration, ESR, Blood group & Rh. type, Bleeding time and clotting time
2. Digestion: Test salivary digestions
3. Excretion: Examination of Urine, Specific gravity, Albumin, Sugar, Microscopic examination for cells and cysts
4. Endocrinology and Reproduction: Dry experiments in the form of cases showing different endocrine disorders.
5. Respiratory System: Clinical examination of respiratory system, Spirometry, Breath holding test
6. Cardio Vascular System: Clinical examination of circulatory system, Measurement of blood pressure and pulse rate, Effect of exercise on blood pressure and pulse rate
7. Central Nervous System: Sensory system, Motor system, Cranial system, Superficial and deep reflexes

27
P11

B

CA

DMB

8/15

INSTRUCTOR IN CHARGE:

A post-graduate, a Ph D or MD in biochemistry, with adequate exposure to the profession of optometry and ophthalmology

COURSE DESCRIPTION:

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

OBJECTIVES:

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

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

TEXTBOOK:

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

REFERENCE BOOKS:

1. S. Ramakrishnan, K G Prasannan and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990
2. D.R. Whitehart: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003

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

COURSE PLAN

Sl. No.	Topics	No of hrs
1	Carbohydrates: Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function)	6
2	Proteins: Amino acids, peptides, and proteins (general properties & tests with a few examples like glycine, tryptophan, glutathione, albumin, hemoglobin, collagen)	6
3	Lipids: Fatty acids, saturated and unsaturated, cholesterol and triacylglycerol, phospholipids and plasma membrane	6
4	Vitamins: General with emphasis on A, B ₂ , C, E and inositol (requirements, assimilation and properties)	6
5	Minerals: Na, K, Ca, P, Fe, Cu and Se. (requirements, availability and properties)	6
Total Number of Hours		30

PRACTICAL (Total: 15 hours)

1. Reactions of monosaccharides, disaccharides and starch: Glucose Fructose, Galactose, Maltose, lactose, Sucrose, Starch
2. Analysis of Unknown Sugars Estimation: Photometry Biofluid of choice – blood, plasma, serum, Standard graphs, Glucose, Proteins Urea, Creatinine, Bilirubin

INSTRUCTOR IN CHARGE :

A post-graduate, preferably a Ph D, in physics, with adequate exposure to the profession of optometry as evidenced by previous teaching experience or publications in optometry journals/magazines OR An optometrist with a post-graduate degree, preferably a Ph D OR An optometrist with an undergraduatedegree.

COURSE DESCRIPTION:

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

OBJECTIVES:

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

TEXT BOOK:

1. 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:

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

PREREQUISITES: Higher secondary level mathematics and physics.

COURSE PLAN

No.	Topics	No of hrs.
1.	Nature of light –light as electromagnetic oscillation; ideas of sinusoidal oscillations; amplitude and phase; speed of light in vacuum and other media; refractive index.	2
2.	Wavefronts–spherical, elliptical and plane; Curvature and vergence; rays; convergence and divergence in terms of rays and vergence; vergence at a distance	2
3.	Refractive index; its dependence on wavelength	1
4.	Fermat's and Huygen's Principle –Derivation of laws of reflection and refraction (Snell's law) from these principles	3
5.	Plane mirrors –height of the mirror; rotation of the mirror	1
6.	Reflection by a spherical mirror –paraxial approximation; sign convention; derivation of vergence equation	1
7.	Imaging by concave mirror, convex mirror	2

8.	Reflectivity; transmissivity; Snell's Law, Refraction at a plane surface	2
9.	Glass slab; displacement without deviation; displacement without dispersion	2
10.	Thick prisms; angle of prism; deviation produced by a prism; refractive index of the prism	2
11.	Prisms; angular dispersion; dispersive power; Abbe's number.	1
12.	Definition of crown and flint glasses; materials of high refractive index	1
13.	Thin prism –definition; definition of Prism diopter; deviation produced by a thin prism; its dependence on refractive index	2
14.	Refraction by a spherical surface; sign convention; introduction to spherical aberration using image formed by a spherical surface of a distant object; sag formula	3
15.	Paraxial approximation; derivation of vergence equation	1
16.	Imaging by a positive powered surface and negative powered surface	1
17.	Vergence at a distance formula; effectivity of a refracting surface	1
18.	Definition of a lens as a combination of two surfaces; different types of lens shapes.	1
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	3
20.	Newton's formula; linear magnification; angular magnification	2
21.	Nodal Planes	1
22.	Thin lens as a special case of thick lens; review of sign convention	1
23.	Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions	2
24.	Imaging by a thin concave lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions	2
25.	Prentice's Rule	1
26.	System of two thin lenses; review of front and back vertex powers and equivalent power, review of six cardinal points.	2
27.	System of more than two thin lenses; calculation of equivalent power using magnification formula	2
Total number of Lectures		45

PRACTICAL (Total: 15 hours)

1. Thick Prism – determination of prism angle and dispersive power; calculation of the refractive index
2. Thin Prism – measurement of deviation; calculation of the prism diopter
3. Image formation by spherical mirrors
4. Convex lens - power determination using lens gauge, power determination using distant object method; power determination using the vergence formula
5. Concave lens – in combination with a convex lens – power determination.

INSTRUCTOR IN CHARGE: Nutritionist with Masters/ Doctorate

COURSE DESCRIPTION:

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

OBJECTIVES:

At the end of the course student would have gained the knowledge of the following:

- Balanced diet.
- Protein, carbohydrates, vitamins, Minerals, carotenoids and eye.
- Nutrition and Ocular aging
- Adverse effects of ocular nutritional supplements.

TEXT BOOK:

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

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

PREREQUISITES: Nil

COURSE PLAN (Total: 15 hours)

1. Introduction.

History of Nutrition
Nutrition as a science
Food groups, RDA
Balanced diet, diet planning.
Assessment
of nutritional status

2. Energy

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

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.

4. Fats

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

5. Minerals

General functions and sources
Macro and micro minerals associated with the eye.
Deficiencies and excess –ophthalmic complications (e.g. iron, calcium, iodine etc.)

6. Vitamins

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

7. Essential amino acids.

8. Miscellaneous: Measles and associated eye disorders, low birthweight



INSTRUCTOR IN CHARGE

Masters in English preferable.

COURSE DESCRIPTION:

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

OBJECTIVES:

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

TEXT BOOK:

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

REFERENCE BOOKS: Faculty may decide.

PREREQUISITES: BASIC ENGLISH EQUIVALENT TO 10TH STANDARD OF THE STUDY.

COURSE PLAN

Functional English	Topics	Hours
Unit 1 Basics of Grammar	Vocabulary, Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words	2
Unit II Basics of Grammar – Part II	Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms	1
Unit III Writing Skills	Letter Writing, Email, Essay, Articles, Memos, one word, substitutes, note making and Comprehension	2
Unit IV Writing and Reading	Summary writing, Creative writing, newspaper reading	1
Unit V Practical Exercise	Formal speech, Phonetics, semantics and pronunciation	1
Communication		
Introduction	<ul style="list-style-type: none"> o Communication process,, o Elements of communication, o Barriers of communication and how to overcome them,, o Nuances for communicating with patients and their attenders in hospitals 	1
Speaking	<ul style="list-style-type: none"> o Importance of speaking efficiently, o Voice culture,, o Preparation of speech 	2

	<ul style="list-style-type: none"> ○ Secrets of good delivery, ○ Audience psychology, handling ○ Presentation skills., ○ Individual feedback for each student, ○ Conference/Interview technique 	
Listening	<ul style="list-style-type: none"> ○ Importance of listening, ○ Self-assessment, ○ Action plan execution. ○ Barriers in listening., ○ Good and persuasive listening 	2
Reading	<ul style="list-style-type: none"> ○ What is efficient and fast reading, ○ Awareness of existing reading habits, ○ Tested techniques for improving speed, ○ Improving concentration and comprehension through systematic study. 	1
Non Verbal Communication	<ul style="list-style-type: none"> ○ Basics of non-verbal communication, ○ Rapport building skills using neuro- linguistic programming (NLP) 	1
Communication in Optometry practice		1
Total		15

BOP-226 INTRODUCTION TO QUALITY AND PATIENT SAFETY

INSTRUCTOR INCHARGE:

Qualified personnel to handle the subject, preferably who have experience in handling such scenarios practically or at least experience in teaching.

COURSE DESCRIPTION:

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

OBJECTIVES:

At the end of the course, students have gained introductory knowledge about quality and patient safety aspects from Indian perspectives.

COURSE PLAN: (Total: 30 hours)

1. Quality assurance and management
2. Basics of emergency care and life support skills
3. Biomedical waste management and environment safety
4. Infection and prevention control
5. Antibiotic resistance
6. Disaster preparedness and management



INSTRUCTOR IN CHARGE:

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

COURSE DESCRIPTION:

The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation.

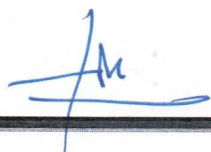
OBJECTIVES:

The students will be able to appreciate the role of computer technology and some extent able to gain hand-on experience in using computers.

COURSE PLAN: (Total: 15 hours) –

Students will be given hand-on practical sessions and reading materials (softcopy). Some of the topics will be demonstration.

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



SECOND SEMESTER

BOP-121

OCULAR ANATOMY

INSTRUCTOR IN CHARGE:

Anatomist, Optometrist or Ophthalmologist who have adequate experience in teaching anatomy.

COURSE DESCRIPTION:

This course deals with detailed anatomy of the orbit, eyeball and cranial nerves associated with ocular functions.

OBJECTIVES:

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

1. Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa.
2. Identify the microscopic structures of various tissues in the eye and correlate the structure with the functions.
3. Comprehend the basic structure and connections between the various parts of the central nervous system and the eye so as to understand the neural connections and distribution.
4. To understand the basic principles of ocular embryology.

TEXTBOOK:

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

REFERENCE BOOKS:

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

PREREQUISITES: General anatomy.

COURSE PLAN (Total: 45 hours)

1. Central nervous system: Spinal cord and brain stem, Cerebellum, Cerebrum.
2. Orbit, Eye, Sclera, Cornea, Choroid, Ciliary body, Iris, Retina
3. Refractory media-Aqueous humor, Anterior chamber, Posterior chamber, Lens, Vitreous body
4. Eyelids
5. Conjunctiva
6. Embryology

PRACTICAL (Total: 15 hours)

1. Eye: Practical dissection of bull's eye
2. Orbit: Practical demonstration of orbital structures.



INSTRUCTOR IN CHARGE:

Physiologist, Optometrist or Ophthalmologist with experience in teaching ocular physiology.

COURSE DESCRIPTION:

Ocular physiology deals with the physiological functions of each part of the eye.

OBJECTIVES:

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

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

TEXT BOOK:

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

REFERENCE BOOKS:

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

PREREQUISITES: GENERAL PHYSIOLOGY**COURSE PLAN: (Total: 45 hours)**

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

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

PRACTICAL: Total: 15 hours.

1. Lid movements
2. Tests for lacrimation tests
3. Extra ocular movements
4. Break up time
5. Pupillary reflexes
6. Applanation tonometry
7. Schiotz tonometry.
8. Measurement of accommodation and convergence
9. Visual acuity measurement.
10. Direct ophthalmoscopy
11. Indirect ophthalmoscopy
12. Retinoscopy
13. Light and dark adaptation.
14. Binocular vision (Stereopsis)

BOP-123

OCULAR BIOCHEMISTRY

INSTRUCTOR IN CHARGE: Masters or Ph D in Biochemistry

COURSE DESCRIPTION:

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

OBJECTIVES:

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

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

TEXTBOOK:

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

REFERENCE BOOKS:

1. S. Ramakrishnan, K G Prasanna and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990
2. D R Whitehart: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003

PREREQUISITES:

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

COURSE PLAN: (Total: 15 hours)

1. Hormones basic concepts in metabolic regulation with examples say insulin.
2. Metabolism: General whole body metabolism (carbohydrates, proteins, lipids)
3. Ocular Biochemistry: Various aspects of the eye, viz., cornea, lens aqueous, vitreous, retina and pigment rhodopsin. (The important chemicals in each and their roles.)
Immunology of anterior segment
4. Technique: Colloidal state, sol. Gel. Emulsion, dialysis, electrophoresis. pH buffers mode of action, molar and percentage solutions, photometer, colorimeter and spectrometry. Radio isotopes: application in medicine and basic research.
5. Clinical Biochemistry: Blood sugar, urea, creatinine and bilirubin significance of their estimation.

PRACTICAL (Total: 15 hours)

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

BOP-124**PHYSICAL OPTICS****INSTRUCTOR IN CHARGE:**

A post-graduate, preferably a Ph D, in physics, with adequate exposure to the profession of optometry as evidenced by previous teaching experience or publications in optometry journals/magazines OR An optometrist with a post-graduate degree, preferably a Ph D OR An optometrist with an undergraduate degree

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.

OBJECTIVES:

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

TEXT BOOK:

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

REFERENCE BOOKS:

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

PREREQUISITES: Higher secondary level mathematics and physics.

COURSE PLAN

No.	Topics	No of hrs.
1.	Nature of light –light as electromagnetic oscillation –wave equation; ideas of sinusoidal oscillations –simple harmonic oscillation; transverse nature of oscillation; concepts of frequency, wavelength, amplitude and phase.	7
2.	Sources of light; Electromagnetic Spectrum.	3
3.	Polarized light; linearly polarized light; and circularly polarized light.	3
4.	Intensity of polarized light; Malus' Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle.	2
5.	Birefringence; ordinary and extraordinary rays.	2
6.	Relationship between amplitude and intensity.	1
7.	Coherence; interference; constructive interference, destructive interference; fringes; fringe width.	2
8.	Double slits, multiple slits, gratings.	2
9.	Diffraction; diffraction by a circular aperture; Airy's disc	2
10.	Resolution of an instrument (telescope, for example); Raleigh's criterion	2
11.	Scattering; Raleigh's scattering; Tyndall effect.	2
12.	Fluorescence and Phosphorescence	2
13.	Basics of Lasers –coherence; population inversion; spontaneous emission; Einstein's theory of lasers.	5
14.	Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units	4
15.	Inverse square law of photometry; Lambert's law.	3
16.	Other units of light measurement; retinal illumination; Trolands	3
Total number of Lectures		45

PRACTICAL: Total : 15 hours

Each practical session could be evaluated for 10 marks and the total could be added to the final evaluations. These practical could be customized as per the university requirements and spaced apart conveniently. The practical to be done include the following:

1. Gratings – determination of grating constant using Sodium vapour lamp; determination of wavelengths of light from Mercury vapour lamp
2. Circular Apertures – measurements of Airy's disc for apertures of various sizes
3. Verification of Malus' Law using a polarizer – analyzer combination
4. Demonstration of birefringence using Calcite crystals
5. Measurement of the resolving power of telescopes.
6. Newton's rings
7. Demonstration of fluorescence and phosphorescence using crystals and paints

INSTRUCTOR IN CHARGE :

A post-graduate, preferably a Ph D, in physics, with adequate exposure to the profession of optometry as evidenced by previous teaching experience or publications in optometry journals/magazines OR An optometrist with a post-graduate degree, preferably a Ph D OR An optometrist with an undergraduatedegree.

COURSE DESCRIPTION:

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

OBJECTIVES:

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

TEXT BOOK:

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

REFERENCE BOOKS:

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

PREREQUISITES: Higher secondary level mathematics and physics.

COURSE PLAN: Total: 45 hours

1. Vergence and vergence techniques revised.
2. Gullstrand's schematic eyes, visual acuity, StileCrawford
3. Emmetropia and ametropia
4. Blur retinal Imaginary
5. Correction of spherical ammetropia, vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptric power, angular magnification of spectacles in aphakic
6. Thin lens model of the eye -angular magnification -spectacle and relative spectacle magnification.
7. Aperture stops- entrance and exit pupils.
8. Astigmatism. - To calculate the position of the line image in a spherocylindrical lens.
9. Accommodation -Accommodation formulae and calculations.

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

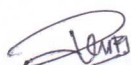
PRACTICAL: Total: 15 hours

1. Construction of a tabletop telescope – all three types of telescopes.
2. Construction of a tabletop microscope
3. Imaging by a cylindrical lens – relationship between cylinder axis and image orientation
4. 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
5. Imaging by a sphero-cylindrical 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

BOP-126

CLINICAL OPTOMETRY I (STUDENTSHIP): Total: 15 hours

Students will observe the basic operations of the optometry clinic while interacting with the multidisciplinary team members involved in providing optimal care to patients. The student will be introduced to optical terminology, equipment, and techniques used for treatment.



THIRD SEMESTER

BOP-211

OCULAR MICROBIOLOGY

INSTRUCTOR IN CHARGE: Microbiologist with Masters or Ph D qualification.

COURSE DESCRIPTION

This course covers the basic biological, biochemical and pathogenic characteristics of pathogenic organisms.

OBJECTIVES

The objectives of the course are:

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

TEXT BOOK:

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

REFERENCE BOOKS:

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

PREREQUISITES: Higher secondary Biology

COURSE PLAN: (Total: 15 hours)

1. Morphology and principles of cultivating bacteria
2. Sterilization and disinfections used in laboratory and hospital practice
3. Common bacterial infections of the eye.
4. Common fungal infections of the eye
5. Common viral infections of the eye.
6. Common parasitic infections of the eye.



BOP-212 VISUAL OPTICS I

INSTRUCTOR IN CHARGE:

Optometrist with optics teaching experience. Preferably postgraduate or undergraduate with more than 2 years of teaching experience.

COURSE DESCRIPTION:

This course deals with the concept of eye as an optical instrument and thereby covers various optical components of eye, types of refractive errors, clinical approach in diagnosis and management of various types of refractive errors.

OBJECTIVES:

Upon completion of the course, the 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.

TEXT BOOK:

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

REFERENCE BOOKS:

1. M P Keating: Geometric, Physical and Visual optics, 2nd edition, Butterworth-Heinemann, USA, 2002
2. HL Rubin: Optics for clinicians, 2nd edition, Triad publishing company. Florida, 1974.
3. H Obstfeld: Optic in Vision- Foundations of visual optics & associated computations, 2nd edition, Butterworth, UK, 1982.
4. WJ Benjamin: Borish's clinical refraction, 2nd edition, Butterworth Heinemann, Missouri, USA, 2006
5. T Grosvenor: Primary Care Optometry, 4th edition, Butterworth -heinneman, USA, 2002

PREREQUISITES: GEOMETRICAL OPTICS, PHYSICAL OPTICS, OCULAR PHYSIOLOGY

COURSE PLAN (Total: 15 hours)

1. Review of Geometrical Optics: Vergence and power,
Conjugacy, object space and image space,
Sign convention,
Spherical refracting surface,
1.5 Spherical mirror; catoptric power,
Cardinal points
Magnification,
Light and visual function,
Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Bi-refringence, Dichroism,
Aberration and application Spherical and Chromatic
2. Optics of Ocular Structure



Cornea and aqueous

Crystalline lens

Vitreous

Schematic and reduced eye

3. Measurements of Optical Constants of the Eye

Corneal curvature and thickness

Keratometry

Curvature of the lens and ophthalmophakometry

Axial and axis of the eye

Basic Aspects of Vision.

Visual Acuity

Light and Dark Adaptation

Color Vision

Spatial and Temporal Resolution

Science of Measuring visual performance and application to Clinical Optometry

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

BOP-213

OPTOMETRIC OPTICS I

INSTRUCTOR IN CHARGE: Optometrist - B optom / M Optom/ Ph D / FBDO

COURSE DESCRIPTION:

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

OBJECTIVES: Skills/knowledge to be acquired at the end of 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, planoconvex, periscopic, etc.)
3. Knowledge to select the tool power for grinding process.
4. Measurement of surface powers using lens measure.
5. Method of laying off the lens for glazing process.
6. Ophthalmic prism knowledge –effects, units, base-apex notation, compounding and resolving prisms.
7. Knowledge of prism and decentration in ophthalmic lenses
8. Knowledge of different types of materials used to make lenses and its characteristics
9. Knowledge lens designs –single vision, bifocals, progressive lenses
10. Knowledge on tinted and protective lenses
11. Knowledge on special lenses like isekonic, spectacle magnifiers.

12. Knowledge on spectacle frames –manufacture, materials

TEXT BOOK:

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

REFERENCE BOOKS:

1. David Wilson: Practical Optical Dispensing, OTEN- DE, NSW TAFE Commission, 1999
2. C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth-Heinemann, USA, 1996

COURSE PLAN (Total: 45 hours)

1. Introduction –Light, Mirror, Reflection, Refraction and Absorption
2. Prisms –Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel's prisms, rotary prisms
3. Lenses –Definition, units, terminology used to describe, form of lenses
4. Vertex distance and vertex power, Effectivity calculations
5. Lens shape, size and types i.e. Spherical, cylindrical and Sphero-cylindrical
6. Transpositions –Simple, Toric and Spherical equivalent
7. Prismatic effect, centration, decentration and Prentice rule, Prismatic effect of Plano-cylinder and Sphero-cylinder lenses
8. Spherometer & Sag formula, Edge thickness calculations
9. Magnification in high plus lenses, Minification in high minus lenses
10. Tilt induced power in spectacles
11. Aberration in Ophthalmic Lenses

BOP-214**OPTOMETRIC INSTRUMENTS****INSTRUCTOR IN CHARGE:**

Optometrist with experience in teaching instrument course (B Optom/M Optom/ Ph D) or Bioengineer with experience in teaching

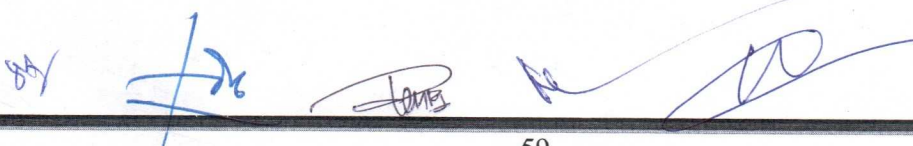
COURSE DESCRIPTION:

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

OBJECTIVES:

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

- | | |
|-----------------------------|----------------------------------|
| 1. Visual Acuity chart/drum | 10. Tonometer:Applanation |
| 2. Retinoscope | Tonometer |
| 3. Trail Box | 11. Keratometer |
| 4. Jackson Cross cylinder | 12. Perimeter |
| 5. Direct ophthalmoscope | 13. Electrodiagnostic instrument |
| 6. Slit lamp Biomicroscope | (ERG, VEP, EOG) |
| 7. Slit lamp Ophthalmoscopy | 14. A –Scan Ultrasound |
| 8. (+90, 78 D) | 15. Lensometer |
| 9. Gonioscope | |



TEXT BOOK:

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

REFERENCE BOOKS:

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

PRACTICALS:15 Hours**PREREQUISITES:****COURSE PLAN (Total: 30 hours)**

1. Refractive instruments,
Optotypes and MTF, Spatial Frequency,
Test charts standards,
Choice of test charts,
Trial case lenses,
Refractor(phoropter) headunits,
Optical considerations of refractor units,
Trial frame design,
Near vision difficulties with units and trial frames,
Retinoscope – types available,
 2. Ophthalmoscopes and related devices,
Design of ophthalmoscopes – illumination,
Design of ophthalmoscopes- viewing,
Ophthalmoscope disc,
Filters for ophthalmoscopy,
Indirect ophthalmoscope
 3. Lensometer, Lens gauges or clock
 4. Slit lamp
 5. Tonometers
 6. Keratometer and corneal topography
 7. Refractometer
 8. Orthoptic Instruments (Synaptophore Only)
 9. Color Vision Testing Devices
 10. Fields of Vision And Screening Devices
 11. Scans
 12. ERG
- New Instruments
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, Abberometer

INSTRUCTOR IN CHARGE:

Ophthalmologist or Optometrist with teaching experience (B Optom/ M Optom/ Ph D)

COURSE DESCRIPTION:

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

OBJECTIVES:

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

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

TEXT BOOK:

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

REFERENCE BOOKS:

1. Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990
2. Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007

PREREQUISITES: Ocular anatomy and Ocular Physiology, Ocular Biochemistry and Microbiology, Pharmacology

COURSE PLAN (Total: 45 hours)**1. Orbit**

Applied Anatomy

Proptosis (Classification, Causes, Investigations)

Enophthalmos

Developmental Anomalies (craniosynostosis, Craniofacial Dysostosis, Hypertelorism, Median facial cleft syndrome)

Orbital Inflammations (Preseptal cellulites, Orbital cellulitis Orbital Periostitis, cavernous sinus Thrombosis)

Grave's Ophthalmopathy

Orbital tumors(Dermoids, capillary haemangioma, Optic nerve glioma)

Orbital blowout fractures

Orbital surgery (Orbitotomy)

Orbital tumors

Orbital trauma

Approach to a patient with proptosis

2. Lids

Applied Anatomy

Congenital anomalies (Ptosis, Coloboma, Epicanthus, Distichiasis, Cryptophthalmos)

Oedema of the eyelids (Inflammatory, Solid, Passive oedema)

Inflammatory disorders (Blepharitis, External Hordeolum, Chalazion, Internal hordeolum, Molluscum Contagiosum).

Anomalies in the position of the lashes and Lid Margin (Trichiasis, Ectropion, Entropion, Symblepharon, Blepharophimosis, Lagophthalmos, Blepharospasm, Ptosis).

Tumors (Papillomas, Xanthelasma, Haemangioma, Basal carcinoma, Squamous cell carcinoma, sebaceous gland melanoma)

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)

4. Conjunctiva

Applied Anatomy

Inflammations of conjunctiva (Infective conjunctivitis – bacterial, chlamydial, viral , Allergic conjunctivitis, Granulomatous conjunctivitis)

Degenerative conditions (Pinguecula, Pterygium, Concretions)

Symptomatic conditions (Hyperaemia, Chemosis, Ecchymosis, Xerosis, Discoloration)

Cysts and Tumors

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, Arcus senilis, Vogt's white limbal girdle, Hassall-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



6. Uveal Tract and Sclera

Applied Anatomy,
Classification of uveitis
Etiology
Pathology
Anterior Uveitis
Posterior Uveitis
Purulent Uveitis
Endophthalmitis

Panophthalmitis
6.10 Pars Planitis
Tumors of uveal tract (Melanoma)
Episcleritis and scleritis
Clinical examination of Uveitis and
Scleritis



INSTRUCTOR IN CHARGE:

B Optom or higher optometry degree or Ophthalmologist can teach this course

COURSE DESCRIPTION:

This course covers various clinical optometry procedures involving external examination, anterior segment and posterior segment examination, neuroophthalmic examination, paediatric optometry examination, and Glaucoma evaluation.

OBJECTIVES:

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

TEXT BOOK:

T Grosvenor: Primary Care Optometry, 5th edition, Butterworth –Heinemann, USA, 2007.

REFERENCE BOOKS:

1. A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international(p) Ltd. Publishers, New Delhi, 2007
2. D B. Elliott :Clinical Procedures in Primary Eye Care, 3rd edition, Butterworth-Heinemann, 2007
3. Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth-Heinemann, 2007
4. J.B Eskridge, J F. Amos, J D. Bartlett: Clinical Procedures in Optometry, Lippincott Williams and Wilkins, 1991
5. N B. Carlson , D I Kurtz: Clinical Procedures for Ocular Examination , 3rd edition, McGraw-Hill Medical, 2003

PREREQUISITES: Optometric Instruments**COURSE PLAN (Total: 30 hours)**

- | | |
|---|--|
| 1. History taking | 10. Color Vision |
| 2. Visual acuity estimation | 11. Stereopsis |
| 3. Extraocular motility, Cover test, Alternating cover test | 12. Confrontation test |
| 4. Hirschberg test, Modified Krimsky | 13. Photostress test |
| 5. Pupils Examination | 14. Slit lamp biomicroscopy |
| 6. Maddox Rod | 15. Ophthalmoscopy |
| 7. Van Herrick | 16. Tonometry |
| 8. External examination of the eye, Lid Eversion | 17. ROPLAS |
| 9. Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer), | 18. Amsler test |
| | 19. Contrast sensitivity function test |
| | 20. Saccades and pursuit test. |

PRACTICALS

1. History taking
2. Visual acuity estimation
3. Extraocular motility, Cover test, Alternating cover test
4. Hirschberg test, Modified Krimsky
5. Pupils Examination
6. Maddox Rod
7. Van Herrick
8. External examination of the eye, Lid Eversion
9. Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer),
10. Color Vision
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12. Confrontation test
13. Photostress test
14. Slit lamp biomicroscopy
15. Ophthalmoscopy
16. Tonometry
17. ROPLAS
18. Amsler test
19. Contrast sensitivity function test
20. Saccades and pursuit test.



INSTRUCTOR IN CHARGE:

Public health professional or optometrist who have knowledge in National health care system.

COURSE DESCRIPTION:

This course insight into existing healthcare system in India.

OBJECTIVES:

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

TEXT BOOK:

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

REFERENCE BOOKS: Faculty may decide.

COURSE PLAN: (Total: 15 hours)

Topics to be covered under the subject are as follows:

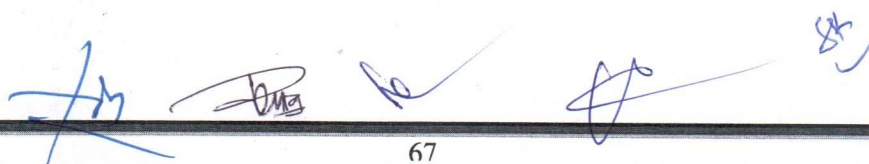
1. Introduction to healthcare delivery system
 - Healthcare delivery system in India at primary, secondary and tertiary care
 - Community participation in healthcare delivery system
 - Health system in developed countries.
 - Private Sector
 - National Health Mission
 - National Health Policy
 - Issues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

<ul style="list-style-type: none"> Introduction to Ayurveda. Yoga and Naturopathy Unani Siddha 	<ul style="list-style-type: none"> Homeopathy Need for integration of various system of Medicine
--	--
4. Health scenario of India- past, present and future
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
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.

BOP-218 CLINICAL OPTOMETRY II (STUDENTSHIP) Total: 45 hours

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a registered optometrist. Students are tested on intermediate clinical optometry skills. The practical aspects of the dispensing optics(hand-on in optical), optometric instruments, clinical examination of visual system(Hands-on under supervision) and ocular diseases (Slides and case discussion) will be given to the students during their clinical training.



BOP-224 PATHOLOGY

COURSE DESCRIPTION:

This course describes basic aspects of disease processes with reference to specific entities relevant in optometry/ophthalmology.

OBJECTIVES

At the end of the course students will acquire knowledge in the following aspects:

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

TEXT BOOK

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

REFERENCE BOOKS:

1. CORTON KUMAR AND ROBINS: Pathological Basis of the Disease, 7th Edition, Elsevier, New Delhi, 2004.
2. S R Lakhani Susan AD & Caroline JF: Basic Pathology: An introduction to the mechanism of disease, 1993.

PREREQUISITES:

Higher Secondary Biology, General and Ocular Anatomy, General and Ocular Physiology

COURSE PLAN (Total: 15 hours)

1. Inflammation and repair
2. Infection in general
3. Specific infections
Tuberculosis
Leprosy
Syphilis
Fungal infection
Viral chlamydial infection
4. Neoplasia
5. Haematology
Anemia
Leukemia
Bleeding disorders
6. Circulatory disturbances
Thrombosis
Infarction
Embolism
7. Clinical pathology
Interpretation of urine report
Interpretation of blood smears.
8. Immune system
9. Shock, Anaphylaxis.
10. Allergy

FOURTH SEMESTER

BOP-221

OPTOMETRIC OPTICS II & DISPENSING OPTICS

OPTOMETRIC OPTICS II

INSTRUCTOR INCHARGE:

Optometrist (M.Optom/Ph D). Practicing Optometrists with experience in Optical Dispensing & Optical Laboratory In-charge

COURSE DESCRIPTION:

This course deals with understanding the theory behind spectacle lenses and frames, their materials, types, advantages and disadvantages, calculations involved, when and how to prescribe. It will impart construction, design application and development of lenses, particularly of the methods of calculating their power and effect. In addition deals with role of optometrists in optical set-up.

OBJECTIVES:

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

1. To select the tool power for grinding process
2. Different types of materials used to make lenses and its characteristics
3. Lens designs-Bifocals, progressive lens
4. Tinted, Protective & Special lenses
5. Spectacle frames -manufacture process & materials
6. Art and science of dispensing spectacle lens and frames based on the glass prescription.
7. Reading of spectacle prescription. Counselling the patient
8. Lens edge thickness calculation
9. Frame & lens measurements and selection
10. Writing spectacle lens order
11. Facial measurements - Interpupillary distance measurement and measuring heights (single vision, multifocal, progressives)
12. Lens verification and axis marking and fitting of all lens types
13. Final checking of finished spectacle with frame adjustments
14. Delivery and follow-up
15. Troubleshooting complaints and handling patient's questions

TEXT BOOK/REFERENCE BOOKS:

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

PREREQUISITES: Geometrical Optics, Physical Optics & Ocular Physiology, Optometric Optics - I
COURSE PLAN

Sl. No	Topics	No. of Hrs
1.	Spectacle Lenses - II: <ul style="list-style-type: none"> • 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) 	5
2.	<ul style="list-style-type: none"> • 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 	5
3.	<ul style="list-style-type: none"> • Tinted & Protective Lenses • Characteristics of tinted lenses Absorptive Glasses • Polarizing Filters, Photochromic & Reflecting filters • Safety lenses-Toughened lenses, Laminated Lenses, CR 39, Polycarbonate lenses 	5
4.	<ul style="list-style-type: none"> • Multifocal Lenses: • Introduction, history and development, types • Bifocal lenses, Trifocal & Progressive addition lenses 	3
5.	<ul style="list-style-type: none"> • 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 	2
6.	<ul style="list-style-type: none"> • Miscellaneous Spectacle: • Iseikonic lenses • Spectacle magnifiers • Recumbent prisms • Fresnel prism and lenses • Lenticular & Aspherical lenses • High Refractive index glasses 	5
Total number of hours		25

DISPENSING OPTICS:

Sl. No.	Topic	No. of Lectures
1	Components of spectacle prescription & interpretation, transposition, Add and near power relation	1
2	Frame selection –based on spectacle prescription, professional requirements, age group, face shape	4
3	Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height	1
4	Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments –facial wrap, pantoscopic tilt	1
5	Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements)	1
6	Neutralization –Hand & lensometer, axis marking, prism marking	3
7	Faults in spectacles (lens fitting, frame fitting, patients complaints, description, detection and correction)	2
8	Final checking & dispensing of spectacles to customers, counseling on wearing & maintaining of spectacles, Accessories –Bands, chains, boxes, slevets, cleaners, screwdriver kit	2
9	Spectacle repairs –tools, methods, soldering, riveting, frame adjustments	1
10	Special types of spectacle frames <ul style="list-style-type: none"> > Monocles > Ptosis crutches > Industrial safety glasses > Welding glasses 	1
12	Frame availability in Indian market	1
13	FAQ's by customers and their ideal answers	2
Total number of Hours		20

BOP-222 VISUAL OPTICS II:**INSTRUCTOR INCHARGE:** Optometrist (M.Optom/Ph D)**COURSE DESCRIPTION: 3**

This course deals with the concept of eye as an optical instrument and thereby covers different optical components of eye, types of refractive errors, clinical approach in diagnosis and management of various types of refractive errors.

OBJECTIVES:

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

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

TEXT BOOK/REFERENCE BOOKS:

2. Theodore Grosvenor: Primary Care Optometry, 5th edition, Butterworth -Heinemann, 2007
3. Duke -Elder's practice of Refraction
4. Al Lens: Optics, Retinoscopy, and Refractometry: 2nd edition, SLACK Incorporated (p) Ltd, 2006
5. George K. Hans, Kenneth Cuiffreda: Models of the visual system, Kluwer Academic, NY, 2002
6. Leonard Werner, Leonard J. Press: Clinical Pearls in Refractive Care, Butterworth - Heinemann, 2002
7. David B. Elliot: Clinical Procedures in Primary Eye care, 3rd edition, Butterworth - Heinemann, 2007
8. WJ Benjamin: Borish's clinical refraction, 2nd edition, Butterworth Heinemann, Missouri, USA, 2006

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

COURSE PLAN

Sl. No	Topics	No. of Hrs
1.	Accommodation & Presbyopia <ul style="list-style-type: none">• 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	6
2.	Convergence: <ul style="list-style-type: none">• Type, Measurement and Anomalies• Relationship between accommodation and convergence-AC/A ratio	3

3.	<p>Objective Refraction (Static & Dynamic)</p> <ul style="list-style-type: none"> • Streak retinoscopy • Principle, Procedure, Difficulties and interpretation of findings • Transposition and spherical equivalent • Dynamic retinoscopy various methods • Radical retinoscopy and near retinoscopy • Cycloplegic refraction 	8
4.	<p>Subjective Refraction:</p> <ul style="list-style-type: none"> • Principle and fogging • Fixed astigmatic dial (Clock dial), Combination of fixed and rotator dial (Fan and block test), J.C.C • Duochrome test <ul style="list-style-type: none"> ○ Binocular balancing- alternate occlusion, prism dissociation, dissociate Duochrome balance, Borish dissociated fogging ○ Binocular refraction-Various techniques 	8
5.	<p>Effective Power & Magnification :</p> <p>Ocular refraction vs. Spectacle refraction</p> <p>Spectacle magnification vs. Relative spectacle magnification</p> <p>Axial vs. Refractive ametropia, Knapp's law</p> <p>Ocular accommodation vs. Spectacle accommodation</p> <p>Retinal image blur-Depth of focus and depth of field</p>	5
Total number of hours		30

INSTRUCTOR INCHARGE: Ophthalmologist

CO-INSTRUCTORS: Optometrist (Minimum UG in Optometry)

COURSE DESCRIPTION:

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

OBJECTIVES:

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

- | | |
|----------------------------|-----------------------------|
| 1. Etiology | disease |
| 2. Epidemiology | 6. Diagnostic approach, and |
| 3. Symptoms | Management of the |
| 4. Signs | Ocular Diseases. |
| 5. Course sequel of ocular | |

TEXT BOOK:

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

REFERENCE BOOKS:

1. Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990
2. Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth- Heinemann, 2007

PREREQUISITES:

Ocular anatomy and Ocular Physiology, Ocular Biochemistry and Microbiology, Ocular Disease - I

COURSE PLAN

Sl. No	Topics	No. of Hrs
1.	Retina and Vitreous: <ul style="list-style-type: none"> • 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 	12

2.	<p>Ocular Injuries: Terminology : Closed globe injury (contusion, lamellar laceration)Open globe injury (rupture, laceration, penetrating injury, perforating injury)</p> <ul style="list-style-type: none"> • Mechanical injuries (Extraocular foreign body, blunt trauma, perforating injury,sympathetic ophthalmitis) • Non Mechanical Injuries (Chemical injuries, Thermal, Electrical, Radiational) • Clinical approach towards ocular injury patients 	3
3.	<p>Lens</p> <ul style="list-style-type: none"> • 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; preoperativeevaluation, Types of surgeries,) • Complications of cataract surgery • Displacement of lens: Subluxation, Displacement • Lens coloboma, Lenticonus, Microsperophakia. 	10
4.	<p>Clinical Neuro-ophthalmology</p> <ul style="list-style-type: none"> • Anatomy of visual pathway • Lesions of the visual pathway • Pupillary reflexes and abnormalities (Amaurotic light reflex, Efferent pathway defect, Wernicke's hemianopic pupil, Marcus gunn pupil. Argyll Robertson pupil, Adie's tonic pupil) • Optic neuritis, Anterior Ischemic optic neuropathy, Pappilloedema, optic atrophy • Cortical blindness • Malingering • Nystagmus • Clinical examination 	12
5.	<p>Glaucoma</p> <ul style="list-style-type: none"> • Applied anatomy and physiology of anterior segment • Clinical Examination • Definitions and classification of glaucoma • Pathogenesis of glaucomatous ocular damage • Congenital glaucoma's • Primary open angle glaucoma • Ocular hypertension • Normal Tension Glaucoma • Primary angle closure glaucoma (Primary angle closure suspect, Intermittentglaucoma, acute congestive, chronic angle closure) • Secondary Glaucoma's • Management : common medications, laser intervention and surgical techniques 	8
Total number of hours		45

INSTRUCTOR INCHARGE: Pharmacologist/Ophthalmologist**COURSE DESCRIPTION:**

This course covers the actions, uses, adverse effects and mode of administration of drugs, especially related to eyes.

OBJECTIVES:

At the end of the course the students will acquire knowledge in the following aspects-

1. Basic principle of pharmacokinetics & Pharmacodynamics
2. Commonly used ocular drugs, mechanism, indications, contraindications, drug dosage and adverse effects.

TEXT BOOK/REFERENCE BOOKS:

1. K D Tripathi: Essentials of Medical Pharmacology. 5th edition, Jaypee, New Delhi, 2004
2. Ashok Garg: Manual of Ocular Therapeutics, Jaypee, New Delhi, 1996
3. T J Zimmerman, K S Kooner : Text Book of Ocular Pharmacology, Lippincott-Raven, 1997

PREREQUISITES: General Physiology & Biochemistry**COURSE PLAN**

Sl. No	Topics	No. of Hrs
1.	General Pharmacology: Introduction & sources of drugs, Routes of drug administration, Pharmacokinetics (emphasis on ocular pharmacokinetics), Pharmacodynamics & factors modifying drug actions	10
2.	Systemic Pharmacology: Autonomic nervous system: Drugs affecting pupillary size and light reflex, Intraocular tension, Accommodation; Cardiovascular system: Anti-hypertensive and drugs useful in Angina; Diuretics: Drugs used in ocular disorders; Central Nervous System: Alcohol, sedative hypnotics, General & local anaesthetics, Opioids & non-opioids; Chemotherapy : Introduction on general chemotherapy, Specific chemotherapy –Antiviral, antifungal, antibiotics; Hormones : Corticosteroids, Antidiabetics; Blood Coagulants	10
3.	Ocular Pharmacology: Ocular preparations, formulations and requirements of an ideal agent; Ocular Pharmacokinetics, methods of drug administration & Special drug delivery system; Ocular Toxicology	10
4.	Diagnostic & Therapeutic applications of drugs used in Ophthalmology: Diagnostic Drugs & biological agents used in ocular surgery, Anaesthetics used in ophthalmic procedures, Anti-glaucoma drugs; Pharmacotherapy of ocular infections –Bacterial, viral, fungal & chlamydial; Drugs used in allergic, inflammatory & degenerative conditions of the eye; Immune modulators in Ophthalmic practice, Wetting agents & tear substitutes, Antioxidants	15
Total number of hours		45

INSTRUCTOR INCHARGE: Clinical Psychologist (Post Graduate/M.Phil/ PhD)

COURSE DESCRIPTION:

This course covers various aspects of medical psychology essential for the optometrist.

OBJECTIVES:

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

TEXT BOOK:

Patricia Barkway. Psychology for health professionals, 2nd edition, Elsevier, 2013

REFERENCE BOOKS:

Faculty may decide.

PREREQUISITES: Basic clinical knowledge.

COURSE PLAN Total : 15 hours

1. Introduction to Psychology
2. Intelligence Learning, Memory, Personality, Motivation
3. Body Integrity – one's body image
4. The patient in his Milieu
5. The self-concept of the therapist, Therapist-patient relationship – some guidelines
6. Illness, its impact on the patient
7. Maladies of the eye and their impact on the patient's own and others concept of his body image
8. Adapting changes in Vision
9. Why Medical Psychology demands commitment?

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

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

COURSE PLAN (Total: 15 hours)

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

1. Medical ethics - Definition - Goal - Scope
2. Introduction to Code of conduct
3. Basic principles of medical ethics - Confidentiality
4. Malpractice and negligence - Rational and irrational drug therapy
5. Autonomy and informed consent - Right of patients
6. Care of the terminally ill - Euthanasia
7. Organ transplantation
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.
9. Professional Indemnity insurance policy
10. Development of standardized protocol to avoid near miss or sentinel events
11. Obtaining an informed consent.

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

FIFTH SEMESTER

BOP-311

CONTACT LENSES I

INSTRUCTOR INCHARGE: B.Optom or optometrists with higher qualification.

COURSE DESCRIPTION:

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

COURSE OBJECTIVES:

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

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

TEXT BOOKS:

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

PREREQUISITES:

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

COURSE PLAN (Total: 30 hours)

1. Introduction to Contact lenses
Definition
Classification / Types
2. History of Contact Lenses
3. Optics of Contact Lenses
Magnification & Visual field
Accommodation & Convergence
Back & Front Vertex Power / Vertex distance calculation
4. Review of Anatomy & Physiology of
Tear film
Cornea
Lids & Conjunctiva
5. Introduction to CL materials
Monomers, Polymers
6. Properties of CL materials
Physiological (Dk, Ionicity, Water content)
Physical (Elasticity, Tensile strength, Rigidity)
Optical (Transmission, Refractive index)

7. Indications and contraindications
8. Parameters / Designs of Contact Lenses & Terminology
9. RGP Contact Lens materials
10. Manufacturing Rigid and Soft Contact Lenses– various methods
11. Pre-Fitting examination–steps,significance,recording of results
12. Correction of Astigmatism with RGP lens
13. Types of fit – Steep, Flat, Optimum – on spherical cornea with spherical lenses
14. Types of fit – Steep, Flat, Optimum – on Toric cornea with spherical lenses
15. Calculation and finalising Contact lens parameters
16. Ordering Rigid Contact Lenses – writing a prescription to the Laboratory
17. Checking and verifying Contact lenses from Laboratory
18. Modifications possible with Rigid lenses
19. Common Handling Instructions
 - 19.1 Insertion & Removal Techniques
 - 19.2 Do's and Don'ts
20. Care and Maintenance of Rigid lenses
 - 20.1 Cleaning agents & Importance
 - 20.2 Rinsing agents & Importance
 - 20.3 Disinfecting agents & importance
 - 20.4 Lubricating & Enzymatic cleaners
21. Follow up visit examination
22. Complications of RGP lenses

PRACTICAL (Total: 30 hours)

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

INSTRUCTOR INCHARGE:

Optometrist with Low vision clinical experience

COURSE DESCRIPTION:

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

COURSE OBJECTIVES:

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

COURSE PLAN: (Total: 15 hours)

- | | |
|--|--|
| 1. Definitions & classification of Low vision | 6. Optics of low vision aids |
| 2. Epidemiology of low vision | 7. Clinical evaluation – assessment of visual acuity, visual field, selection of low vision aids, instruction & training |
| 3. Model of low vision service | 8. Pediatric Low Vision care |
| 4. Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psycho-social impact of low vision | 9. Low vision aids – dispensing & prescribing aspects |
| 5. Types of low vision aids – optical aids, non-optical aids & electronic devices | 10. Visual rehabilitation & counseling |
| | 11. Legal aspects of Low vision in India |
| | 12. Case Analysis |

PRACTICALS (Total: 15 hours)

1. Practical 1: Attending in low vision care clinic and history taking.
2. Practical 2:
Determining the type of telescope and its magnification (Direct comparison method & calculated method)
Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers.
3. Practical 3:
Inducing visual impairment and prescribing magnification.
Determining reading speed with different types of low vision aids with same magnification.
Determining reading speed with a low vision aid of different magnifications.

INSTRUCTOR INCHARGE:

B.Optom/ M Optom/ Ph D with adequate experience in handling geriatric patients or Ophthalmologists.

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.

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.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. OP Sharma: Geriatric Care –A textbook of geriatrics and Gerontology, viva books, New Delhi, 2005
2. VS Natarajan: An update on Geriatrics, Sakthi Pathipagam, Chennai, 1998
3. DE Rosenblatt, VS Natarajan: Primer on geriatric Care A clinical approach to the older patient, Printers Castle, Cochin, 2002

PREREQUISITES: Ocular anatomy, Physiology, Ocular Disease

COURSE PLAN (Total: 20 hours)

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

PAEDIATRIC OPTOMETRY**INSTRUCTOR INCHARGE: Paediatric Ophthalmologist / Optometrist****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 paediatric 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:

1. Have a knowledge of the principal theories of childhood development, and visual development
2. Have the ability to take a thorough paediatric history which encompasses the relevant developmental, visual, medical and educational issues
3. 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
4. Be familiar with the aetiology, clinical presentation and treatment of amblyopia, comitant strabismus and commonly presenting incomitant strabismus
5. Have a knowledge of the epidemiology of eye disease in children, the assessment techniques available for examining visual function of children of all ages and an understanding varied management concepts of paediatric vision disorders
6. Have knowledge of the art of dispensing contact lens, low vision aids and referral to the surgeon or other specialists at the appropriate timing.
7. Have a capacity for highly evolved communication and co-management with other professionals involved in paediatric assessment and care

TEXT BOOKS:

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

REFERENCE BOOKS:

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

PREREQUISITES: Ocular anatomy, Physiology, Ocular Disease

COURSE PLAN (Total: 25 hours)

1. The Development of Eye and Vision
2. History taking Paediatric subjects
3. Assessment of visual acuity
4. Normal appearance, pathology and structural anomalies of
Orbit, Eye lids, Lacrimal system,
Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil
Lens, vitreous, Fundus Oculomotor system
5. Refractive Examination
6. Determining binocular status
7. Determining sensory motor adaptability
8. Compensatory treatment and remedial therapy for : Myopia, Pseudomyopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia
9. Remedial and Compensatory treatment of Strabismus and Nystagmus
10. Paediatric eye disorders : Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics
11. Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism
12. Spectacle dispensing for children
13. Paediatric contact lenses
14. Low vision assessment in children

INSTRUCTOR INCHARGE:

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

COURSE DESCRIPTION:

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

COURSE OBJECTIVES:

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

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.

TEXT BOOKS:

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

PREREQUISITES: Ocular anatomy, Physiology

COURSE PLAN (Total: 30 hours)

- | | |
|---|--|
| 1. Binocular Vision and Space perception. | |
| 1.1 Relative subjective Visual direction. | 1.8 Physiological Diplopia and Suppression |
| Retino motor value | Stereopsis, Panum's area, BSV. |
| Grades of BSV | Stereopsis and monocular clues-significance. |
| SMP and Cyclopean Eye | Egocentric location, clinical applications. |
| Correspondence, | Theories of Binocular vision. |
| Fusion, Diplopia, Retinal rivalry | |
| Horopter | |
| 2. Anatomy of Extra Ocular Muscles. | |
| Rectii and Obliques, LPS. | 2.2 Innervation & Blood Supply. |
| 3. Physiology of Ocular movements. | |
| Center of rotation, Axes of Fick. | 3.2 Action of individual muscle. |
| 4. Laws of ocular motility | |
| Donder's and Listing's law | Hering's law |
| Sherrington's law | |
| 5. Uniocular & Binocular movements - fixation, saccadic & pursuits. | |
| Version & Vergence. | 5.2 Fixation & field of fixation |

6. Near Vision Complex Accommodation

Definition and mechanism
(process).

Methods of measurement.

Stimulus and innervation.

6.6 and management.

Types of accommodation.

Anomalies of accommodation

aetiology

7. Convergence

Definition and mechanism.

Methods of measurement.

Types and components of convergence - Tonic, accommodative, fusional, proximal.

Anomalies of Convergence – aetiology and management.

8. Sensory adaptations

Confusion

9. Suppression

Investigations

Management

9.3 Blind spot syndrome

10. Abnormal Retinal Correspondence

10.1 Investigation and management

10.2 Blind spot syndrome

11. Eccentric Fixation

11.1 Investigation and management

12. Amblyopia

Classification

12.2 Aetiology

Investigation

12.4 Management

INSTRUCTOR INCHARGE: General Medicine professional

COURSE DESCRIPTION:

This course deals with definition, classification, clinical diagnosis, complications and management of various systemic diseases. In indicated cases ocular manifestations also will be discussed.

COURSE OBJECTIVES:

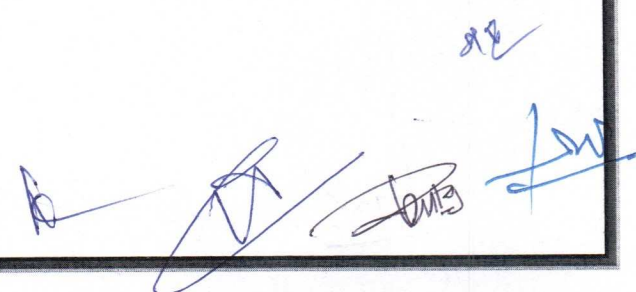
At the end of the course, students should get acquainted with the following:

1. Common Systemic conditions: Definition, diagnostic approach, complications and management options
2. Ocular findings of the systemic conditions
3. First Aid knowledge

TEXT BOOKS:

1. C Haslett, E R Chilvers, N A boon, N R Coledge, J A A Hunter: Davidson's Principles and Practice of Medicine, Ed. John Macleod, 19th Ed., ELBS/Churchill Livingstone. (PPM), 2002
2. Basic and clinical Science course: Update on General Medicine, American Academy of Ophthalmology, Section 1, 1999

COURSE PLAN (Total:45 hours)

1. Hypertension
Definition, classification, Epidemiology, clinical examination, complications, and management.
Hypertensive retinopathy
 2. Diabetes Mellitus
Classification, pathophysiology, clinical presentations, diagnosis, and management, Complications.
Diabetic Retinopathy
 3. Thyroid Disease
Physiology, testing for thyroid disease, Hyperthyroidism, Hypothyroidism, Thyroiditis, Thyroid tumors.
Grave's Ophthalmopathy
 4. Acquired Heart Disease
Ischemic Heart Disease, Congestive heart failure, Disorders of cardiac rhythm
Ophthalmic considerations
 5. Cancer :
Incidence
Etiology
Therapy
Ophthalmologic considerations
 6. Connective Tissue Disease
Rheumatic arthritis
Systemic lupus erythematosus
Scleroderma
Polymyositis and dermatomyositis
Sjogren syndrome
Behcet's syndrome
Eye and connective tissue disease
- 

7. Tuberculosis
Aetiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complications, treatment tuberculosis and the eye.
8. Herpes virus (Herpes simplex, Varicella Zoster, Cytomegalovirus, Epstein Barr Virus)
Herpes and the eye
9. Hepatitis (Hepatitis A, B, C)
10. Acquired Immunodeficiency Syndrome
11. Anemia (Diagnosis, clinical evaluation, consequences, Sickle cell disease, treatment, Ophthalmologic considerations)
12. Common Tropical Medical Ailments
 - 12.1 Malaria
 - 12.2 Typhoid
 - 12.3 Dengue
 - 12.4 Filariases
 - 12.5 Onchocerciasis
 - 12.6 Cysticercosis
 - 12.7 Leprosy
13. Nutritional and Metabolic disorders:
 - 13.1 Obesity
 - 13.2 Hyperlipidaemias
 - 13.3 Kwashiorkor
 - 13.4 Vitamin A Deficiency
 - 13.5 Vitamin D Deficiency
 - 13.6 Vitamin E Deficiency
 - 13.7 Vitamin K Deficiency
 - 13.8 Vitamin B1, B2, Deficiency
 - 13.9 Vitamin C Deficiency
14. Myasthenia Gravis
15. First Aid
General Medical Emergencies
Preoperative precautions in ocular surgeries
16. Psychiatry
Basic knowledge of psychiatric condition and Patient Management
17. Genetics
Introduction to genetics 17.2 Organisation of the cell 17.3 Chromosome structure and cell division
17.4 Gene structure and basic principles of Genetics.
17.5 Genetic disorders and their diagnosis.
Genes and the eye
Genetic counseling and genetic engineering.

The course provides students the opportunity to continue to develop confidence and increased skill in diagnosis and treatment delivery. Students will demonstrate competence in basic, intermediate and advance procedure in those areas. Students will participate in advance and specialized diagnostic and management procedure. Students will get practical experience of the knowledge acquired from geriatric and paediatric optometry courses. Hands-on experience under supervision will be provided in various outreach programmes namely, school vision screening, glaucoma and diabetic retinopathy screening etc., Students also get hand-on practical sessions on the following courses namely, contact lens, low vision care, geriatric optometry and paediatric optometry.



SIXTH SEMESTER

BOP-321

CONTACT LENSES II

INSTRUCTOR INCHARGE :

B.Optom or optometrists with higher qualification

COURSE DESCRIPTION:

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

COURSE OBJECTIVES:

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

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

TEXT BOOKS:

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

PREREQUISITES:

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

COURSE PLAN: Total : 30 hours

1. SCL Materials & Review of manufacturing techniques
2. Comparison of RGP vs. SCL
3. Pre-fitting considerations for SCL
4. Fitting philosophies for SCL
5. Fit assessment in Soft Contact Lenses: Types of fit – Steep, Flat, Optimum
6. Calculation and finalising SCL parameters
Disposable lenses 6.2 Advantages and availability
7. Soft Toric CL
Stabilization techniques 7.3 Fitting assessment
Parameter selection
8. Common Handling Instructions
Insertion & Removal Techniques 8.2 Do's and Dont's importance
9. Care and Maintenance of Soft lenses
Cleaning agents & Importance 9.4 Lubricating & Enzymatic
Rinsing agents & Importance
Disinfecting agents & cleaners
10. Follow up visit examination
11. Complications of Soft lenses
12. Therapeutic contact lenses

12.1 Indications

12.2 Fitting consideration

13. Specialty fitting

Aphakia

Post refractive surgery

13.2 Pediatric

14. Management of Presbyopia with Contact lenses

PRACTICAL (Total: 30 hours)

1. Examination of old soft Lens
2. RGP Lens fitting
3. RGP Lens Fit Assessment and fluorescein pattern
4. Special RGP fitting (Aphakia, pseudo phakia & Keratoconus)
5. RGP over refraction and Lens flexure
6. Examination of old RGP Lens
7. RGP Lens parameters
8. Fitting Cosmetic Contact Lens
9. Slit lamp examination of Contact Lens wearers
10. Fitting Toric Contact Lens
11. Bandage Contact Lens
12. SPM & Pachymetry at SN During Clinics
13. Specialty Contact Lens fitting (at SN during clinics)

INSTRUCTOR INCHARGE:

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

COURSE DESCRIPTION:

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

COURSE OBJECTIVES:

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

TEXT BOOKS:

1. Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.
2. Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
3. Gunter K. Von Noorden: BURIAN- VON NOORDEN'S Binocular vision and ocular motility theory and management of strabismus, Missouri, Second edition, 1980, C.V. Mosby Company
4. Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoria, Accommodative, and Eye Movement Disorders, 2008, Lippincott Williams & Wilkins publishers

PREREQUISITES: Ocular Anatomy, Ocular Physiology, Binocular Vision –I.

COURSE PLAN: (Total: 30 hours)

- | | |
|---|-------------------------------------|
| 1. Neuro-muscular anomalies | |
| Classification and etiological factors | |
| 2. History – recording and significance. | |
| 3. Convergent strabismus | |
| Accommodative convergent squint | Non accommodative Convergent squint |
| Classification | Classification |
| Investigation and Management | Investigation and Management |
| 4. Divergent Strabismus | |
| Classification | |
| A& V phenomenon | 4.3 Investigation and Management |
| 5. Vertical strabismus | |
| Classification | |
| Investigation and Management | |
| 6. Paralytic Strabismus | |
| 6.1 Acquired and Congenital | 6.2 Clinical Characteristics |
| 7. Distinction from comitant and restrictive Squint | |
| 8. Investigations | |
| History and symptoms | PBCT |
| Head Posture | Nine directions |
| Diplopia Charting | Binocular field of vision |
| Hess chart | |

9. Amblyopia and Treatment of Amblyopia
10. Nystagmus
11. Non-surgical Management of Squint
12. Restrictive Strabismus
 - 12.1 Features
 - 12.2 Musculo-fascical anomalies
 - 12.3 Duane's Retraction syndrome
 - 12.4 Clinical features and management
13. Surgical management

Brown's Superior oblique
sheath syndrome
Strabismus fixus
12.7 Congenital muscle fibrosis

PRACTICAL (Total: 15 hours):

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

INSTRUCTOR INCHARGE:

Public Health professional or optometrist with public health and community optometry experience

COURSE DESCRIPTION:

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

COURSE OBJECTIVES:

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

PREREQUISITES:

Ocular Disease, Visual optics, Optometric Instruments, Clinical Examination of Visual System

COURSE PLAN (Total: 30 hours)

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

INSTRUCTOR INCHARGE:

Management professional with masters' qualification in Management or Optometrist with experience of running private clinical services

COURSE DESCRIPTION:

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

COURSE OBJECTIVES:

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

TEXT BOOKS:

Faculty to recommend

REFERENCE BOOKS:

Faculty to recommend

PREREQUISITES: Basic Clinical experience

COURSE PLAN (Total: 15 hours)

1. Business Management:

Practice establishment and development

Stock control and costing

Staffing and staff relations

Business computerization

2. Accounting Principles

Sources of finance

Bookkeeping and cash flow

3. Taxation and taxation planning

4. Professionalism and Values

Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality.

Personal values- ethical or moral values

Attitude and behaviour- professional behaviour, treating people equally

Code of conduct, professional accountability and responsibility, misconduct

Differences between professions and importance of team efforts

Cultural issues in the healthcare environment

INSTRUCTOR INCHARGE:

Biostatistician/Epidemiologist or Higher optometry holder with experience in biostatistics and research methodology

COURSE OBJECTIVES:

The objective of this module is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings.

TEXT BOOKS:

1. Mausner & Bahn: Epidemiology-An Introductory text, 2nd Ed., W. B. Saunders Co.
2. Richard F. Morton & J. Richard Hebd: A study guide to Epidemiology and Biostatistics, 2nd Ed., University Park Press, Baltimore.
3. Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4th edition, Springs, 2015

COURSE PLAN (Total: 30 hours) Research Methodology

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

Biostatistics

1. Basics of Biostatistics

Introduction of Biostatistics

Measures of Morality

Sampling

Statistical significance

Correlation

Sample size determination.

Statistics -Collection of Data - presentation including classification and diagrammatic representation -frequency distribution. Measures of central tendency; measures of dispersion.

Theoretical distributions.

Binomial

Normal

Sampling -necessity of methods and techniques.

Chi. Square test (2 x 2)

2. Hospital Statistics

3. Use of computerized software for statistics

INSTRUCTOR INCHARGE:

Occupational Health professional and /or Optometrist with experience in occupational eye health

COURSE DESCRIPTION:

This course deals with general aspects of occupational health, Visual demand in various job task analysing 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:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. G W Good: Occupational Vision Manual available in the following website: www.aoa.org
2. N.A. Smith: Lighting for Occupational Optometry, HHSC Handbook Series, Safchem Services, 1999
3. J Anshel: Visual Ergonomics Handbook, CRC Press, 2005
4. G Carson, S Doshi, W Harvey: Eye Essentials: Environmental & Occupational Optometry, Butterworth-Heinemann, 2008

COURSE PLAN: (Total: 15 hours)

1. Introduction to Occupational health, hygiene and safety, international bodies like ILO, WHO, National bodies etc.
Acts and Rules - Factories Act, WCA, ESI Act.
2. Electromagnetic Radiation and its effects on Eye
3. Light - Definitions and units, Sources, advantages and disadvantages, standards
4. Color - Definition, Color theory, Color coding, Color defects, Color Vision tests
5. Occupational hazards and preventive/protective methods
6. Task Analysis
7. Industrial Vision Screening - Modified clinical method and Industrial Vision test
8. Vision Standards - Railways, Roadways, Airlines
9. Visual Display Units
10. Contact lens and work

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

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

COURSE PLAN (Total: 15 hours)

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

1. Medical ethics - Definition - Goal - Scope
2. Introduction to Code of conduct
3. Basic principles of medical ethics - Confidentiality
4. Malpractice and negligence - Rational and irrational drug therapy
5. Autonomy and informed consent - Right of patients
6. Care of the terminally ill - Euthanasia
7. Organ transplantation
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.
9. Professional Indemnity insurance policy
10. Development of standardized protocol to avoid near miss or sentinel events obtaining an informed consent.

BOP-327

RESEARCH PROJECT/DISSERTATION

Total: 30 hours

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

Project is spread through sixth to eighth semester.

BOP-328

CLINICAL OPTOMETRY V (STUDENTSHIP)

Total: 45hours

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

INTERNSHIP APPRAISAL FORM

NAME OF THE STUDENT :

SESSION :

ROLL NO:

UNIVERSITY REGISTRATION NO :

PERIOD OF TRAINING :

FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
1.	Proficiency of Knowledge in Technique and Procedures				
2.	Competency & Skill in Optometry				
3.	Recent Advances Learning				
4.	Responsibility, Punctuality, workup of Optometric techniques, involvement in special procedures and preparation of reports.				
5.	Self Directed Learning				
6.	Interpersonal relationship i.e. Team work, behavior with colleagues, nursing staff and relationship with medical and paramedical staffs				
7.	External & Outreach activities i.e. Seminar, Symposium, Workshop etc				
8	Logbook Maintenance				
9	Research Aptitude				

REMARKS* _____

***REMARKS:**

- Any significant positive or negative attributes of a student to be mentioned.
- For score less than 4 in any category, remediation must be suggested.
- Individual feedback to student is strongly recommended.

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SIGNATURE of ASSESSEE.....
SIGNATURE OF HOD.....
SIGNATURE OF DEAN

SKILLS BASED OUTCOMES AND MONITORABLE INDICATORS FOR OPTOMETRIST

First year:

1. Role play
2. Clinical Observations
3. Vision Check
4. Basic Lensometry

Second year:

1. History taking
2. CEVS practical
3. Refraction Hands On including optical dispensing
4. Clinical Observations
5. Vision screening camps






Third year:

1. Clinical Observation
2. Hands-on under senior optometrists
3. Case reporting
4. Case discussion
5. Vision screening camps
6. Diagnostic interpretations

Internship:

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

Semester	Procedures	Minimum Number	Comments
I year (2nd Semester) CLINIC - I	Role Play (Patient- Optometrist)	3 cases	
	Clinical Observation and Report writing	6 cases	
	Vision Check (Snellen's Chart) – Distance + Near	12 cases	
	Lensometry (Spherical lenses)		
II year (1st Semester) CLINIC - II	History taking-General, Specific, Conditions	9 cases	Can practice on the following complaints : Blurred Vision, Headache, Pain, redness, Watery, Flashes, Floaters, Black spots
	Lensometry	100 cases	Simple Sphere, Simple cylinder, Sphero-cylinder (90, 180, Oblique degrees), Bifocals, PAL
	Vision Check (log MAR)	100 cases	Simulation, especially to show and ask the students to interpret the findings.
	Pinhole acuity		
	Extraocular Motility	10 cases	
	Cover test	10 cases	Video output Simulation of various conditions
	Alternate Cover test	10 cases	Video output Simulation of various conditions
	Hirschberg test	10 cases	Video output Simulation of various conditions
	Modified Krimsky test	3 cases	Video output Simulation of various conditions
	Push up test (Amplitude of Accommodation)	10 cases	
		(1 case in presbyopic age)	
	Push up test (Near point of Convergence)	10 cases	
	Stereopsis test	10 cases	
	Tear Break up time	10 cases	
	Amsler's Grid test	10 cases (simulate)	Simulation of various conditions
	Photostress test	10 cases (Normals)	
	Color vision test	10 cases	
	Schirmer's test	10 cases	
	Confrontation test	10 cases	
	Slit lamp illumination	3 cases	
	Slit lamp examination	10 cases	

    	Finger tension	10 cases (Normals)	
	Schiotz Tonometry	10 cases (Normals)	
	Applanation Tonometry	10 cases (Normals)	
	Negative Relative Accommodation	10 cases	
	Positive Relative Accommodation	10 cases	
	von Herick Grading of Anterior chamber depth	10 cases	
	Accommodative facility(± 2.00 D)	10 cases	
	Corneal Sensitivity test	10 cases	
	IPD	10 cases	
	Proptosis evaluation	1 demo	Video demonstration of cases
	Ptosis evaluation	1 demo	Video demonstration of cases
	Pupillary evaluation -Direct-Consensual -RAPD	10 cases	
	HVID	10 cases	
	Maddox rod (Phoria)	10 cases	
	Negative Fusional vergence	10 cases	
	Positive Fusional Vergence	10 cases	
II year (2nd semester) CLINIC-III	Retinoscopy- Static, Dynamic and Cycloplegic Retinoscopy	25 + 25 +25 cases	Model eye for retinoscopy.
	Keratometry	25 cases	
	Subjective Refraction JCC Clock Dial Duochrome	25 cases	
	Borish Delayed Addition calculation	25 cases	Give more simulated problems and discuss on it
III year (1st semester) CLINIC IV	Direct ophthalmoscope	10 cases (Normals)	Show slides of various commonly seen retinal conditions
	Visual Field chart interpretation	10 cases- discussion	Both kinetic and Static
	B scan Interpretation	10 cases- discussion	
	A scan chart Interpretation	10 cases- discussion	Discussion having different types of wave patterns
III year	Case Analysis	10 cases	
	+90 D lens	10 cases (Normals)	Slides of various Cup: Disc ratios can be shown
	Gonioscopy	5 cases (Normals)	Slides of abnormal angles

(2nd semester) CLINIC V	Posting in optometry clinics	5+5+5+5+10 cases	Pediatric/contact lens / Low vision / Orthoptics / GOPD	
			School screening, Cataract	
IV year CLINICAL INTERNSHIP	IDO (on each other)	10 cases(Normals)	Slides of abnormal fundus	
	Case Analysis -	5+ 5+ 5+ 5 cases	Pathology Binocular Vision Clinical Refraction Dispensing optics	
	General OPD (History taking -DO)	500 cases	Weekly 1 case report submission	
	Contact Lens	20 cases (5 RGP+ 5 Soft + 5 toric)	Totally 3 different case reports submission at the end of the postings	
	Opticals	100 cases	Weekly 1 case report submission	
	Low Vision care Clinic	10 cases	Totally 3 different case reports submission at the end of the postings	
	Binocular Vision clinic	10 cases	Totally 3 different case reports submission at the end of the postings	
	Ophthalmology clinic (Common eye conditions)	50 cases	Totally 3 different case reports submission at the end of the postings	
	Camps	10 camps	Camp report submission	

Choice of Electives in the programs

- Electives: The choice of electives and option to choose specialties like eye banking , ocular prosthesis , ocular imaging, electrophysiology , vision therapy, refractive surgery etc. will be time to time added as per the changing trends.