GURU KASHI UNIVERSITY

Bachelor of Science of Optometry (BOPT)
Single Major (Annexure- III)

Session: 2025-26
Faculty of Health and Allied Science

Graduate Attributes of the Programme: - Bachelor of Science of Optometry

Type of learning outcomes	**The Learning Outcomes Descriptors**
Graduates should be able to demonstrate the acquisition of:	
Learning outcomes that are specific to disciplinary/interdisciplinary areas of learning	Demonstrate understanding of ocular anatomy, physiology, and biochemistry in relation to visual function.
	Apply principles of geometrical, physical, and physiological optics to understand vision and refraction.
	Conduct comprehensive eye examinations, including history taking, visual acuity testing, and refraction.
	Provide low vision rehabilitation for patients with visual impairment, including prescribing optical and non-optical aids.
Generic learning outcomes	Analyze and interpret clinical findings to diagnose and manage visual and ocular conditions.
	Engage in lifelong learning and continuing education to stay updated with advancements in optometry.
	Contribute to advancements in vision science and optometry through research and innovation.
	Use diagnostic tools like slit lamps, tonometers, and automated perimeters for ocular assessment.
	Make appropriate referrals to ophthalmologists or other healthcare professionals when necessary.

Programme learning outcomes: An Undergraduate Certificate is awarded to students who have demonstrated the achievement of the outcomes located at level 4.5:

Element of the Descriptor	**Programme learning out comes relating to Undergraduate Certificate**
The graduates should be able to demonstrate the acquisition of:	
Knowledge and understanding	Knowledge of the visual system: Students should have a thorough understanding of the anatomy, physiology, and pathology of the eye and visual system. This includes knowledge of the structures of the eye, how they function, and how they can be affected by disease or injury.
	Clinical skills: Students should be proficient in performing a variety of clinical procedures, such as visual acuity testing, refraction, and eye examination. They should also be able to interpret the results of these tests and use them to diagnose and treat visual disorders.
	Record keeping: Optometrists should keep accurate and up-to-date records of patient care. This information is essential for ensuring continuity of care and for monitoring the quality of care provided.
General, technical and professional skills required to perform and accomplish tasks	Communication: Effective communication is essential for interacting with patients, understanding their concerns, and explaining diagnoses and treatment options clearly.
	Use of ophthalmic equipment: Proficiency in operating various instruments, such as ophthalmoscopes, retinoscopes, and tonometer.
	Knowledge of eye anatomy and physiology: A deep understanding of the eye's structure, function, and common conditions is fundamental.
	Contact lens fitting and evaluation: Assessing patients' suitability for contact lenses and providing proper fitting and care instructions
Application of knowledge and skills	Diagnosis and treatment of eye diseases: Optometrists are trained to diagnose and treat

	a wide range of eye diseases, including glaucoma, cataracts, macular degeneration, and diabetic retinopathy. They can prescribe medications, recommend surgery, or refer patients to other specialists as needed.
	Vision testing and correction: Optometrists use a variety of tests to assess visual acuity, depth perception, color vision, and other aspects of vision. They then prescribe eyeglasses or contact lenses to correct refractive errors such as nearsightedness, farsightedness, and astigmatism.
	Using Instruments: Operating equipment like phoropters, retinoscopes, and ophthalmoscopes for eye exams.
Generic learning outcomes	Corrective Lenses: Knowledge of different types of lenses (spectacles, contact lenses), their properties, and how to prescribe them accurately.
	Critical Thinking: Analyzing patient cases, interpreting test results, and making informed decisions about treatment.
	Digital Tools: Familiarity with modern ophthalmic equipment, including digital imaging systems and electronic health records
Constitutional, humanistic, ethical, and moral values	Equality and Non-discrimination: Optometrists must treat all patients with respect and dignity, regardless of their caste, creed, religion, gender, or socioeconomic status. This aligns with the fundamental rights enshrined in the Constitution of India.
	Respect for Human Dignity: Optometrists should recognize and respect the inherent dignity of every individual, ensuring that their interactions with patients are respectful and culturally sensitive.
	Confidentiality: Optometrists should maintain the confidentiality of patient information, protecting their privacy and ensuring that their personal details are not disclosed without their consent.
	Honesty and Integrity: Optometrists should be

	honest and transparent in their interactions with patients, providing them with accurate information and avoiding any misleading or deceptive practices.
Employability and job-ready skills, and entrepreneurship skills and capabilities/qualities and mindset	Problem-solving: Identifying and addressing patient needs and challenges.
	Opportunity Recognition: Identifying unmet needs in the community and developing innovative solutions.
	Equipment Handling: Proficient use of ophthalmic instruments like retinoscope, ophthalmoscope, and trial lens set.
Credit requirements	The successful completion of the first year (two semesters) of the undergraduate programme of 44 credit hours followed by an exit 4-credit of internship (Total 48 Credits)
Entry requirements	10+2 Medical/Non-Medical with at least 45% in the aggregate.

SEMESTER: 1st									
Course Code	**Course Title**	**Type of Courses**	**L**	**T**	**P**	**No. of Credits**	**Int.**	**Ext.**	**Total Marks**
BOP1100	General Anatomy	Core Course Theory	3	0	0	3	30	70	100
BOP1101	General Physiology	Core Course Theory	3	0	0	3	30	70	100
BOP1102	Microbiology (Ocular)	Minor Course	4	0	0	4	30	70	100
BOP1103	Introduction to quality and patient safety	Skill Enhancement Course	3	0	0	3	30	70	100
BOP1104	Human Rights and Duties	Multidisciplinary Course	3	0	0	3	30	70	100
BOP1105	General Anatomy Lab	Core Course Practical	0	0	2	1	30	70	100
BOP1106	General Physiology Lab	Core Course Practical	0	0	2	1	30	70	100
BOP1107	English for profession	Ability Enhancement Course	2	0	0	2	30	70	100
VAC0001	Environment Education	Value Added Course	2	0	0	2	30	70	100
Total			**20**	**00**	**04**	**22**	**270**	**630**	**900**

SEMESTER: 2nd									
Course Code	**Course Title**	**Type of Courses**	**L**	**T**	**P**	**No. of Credits**	**Int.**	**Ext.**	**Total Marks**
BOP2150	Anatomy (Ocular)	Core Course Theory	3	0	0	3	30	70	100
BOP2151	Geometrical Optics	Minor Course	4	0	0	4	30	70	100
BOP2152	Computer Applications	Skill Enhancement Course	3	0	0	3	30	70	100
BOP2153	Nutrition	Multidisciplinary Course	3	0	0	3	30	70	100
BOP2154	Anatomy (Ocular) Lab	Core Course Practical	0	0	2	1	30	70	100
BOP2155	Communication and Presentation Skills	Ability Enhancement Course	2	0	0	2	30	70	100
VAC0002	Human Values and Professional Ethics	Value Added Course	2	0	0	2	30	70	100
DISCIPLINE SPECIFIC ELECTIVE COURSE (Choose any one of them)									
BOP2156	Physiology (Ocular)	Discipline Specific elective course	4	0	0	4	30	70	100
BOP2157	General Microbiology								
Total			**21**	**00**	**02**	**22**	**240**	**560**	**800**

Programme learning outcomes: An Undergraduate Diploma is awarded to students who have demonstrated the achievement of the outcomes located at level 5:

Element of the Descriptor	**Programme learning outcomes relating to Undergraduate Diploma**
The graduates should be able to demonstrate the acquisition of:	
Knowledge and understanding	Optics: This involves understanding the principles of light, lenses, and how they interact with the eye. This knowledge is crucial for understanding how corrective lenses work and for using ophthalmic instruments.
	Visual and Ocular Manifestations of Systemic Diseases: Recognizing how systemic health issues like diabetes or hypertension can affect the eyes is crucial for comprehensive patient care.
	Contact Lenses: Knowledge of contact lens types, fitting techniques, and hygiene is often included in diploma programs.
	Pharmacology: Understanding the actions and uses of various ophthalmic drugs is important for managing certain eye conditions.
	Physiological Optics: This focuses on how the eye processes images and how vision works. It includes concepts like refraction, accommodation, and how the brain interprets visual information.
Skills required to perform and accomplish tasks	Contact Lens Fitting: Assessing patient suitability for contact lenses. Selecting and fitting different types of contact lenses. Educating patients on contact lens care and hygiene.
	Ocular Health Assessment: Examining the external eye and surrounding structures. Using an ophthalmoscope to view the internal structures of the eye, including the retina and optic nerve. Identifying common eye conditions and abnormalities.
	Record Keeping: Maintaining accurate and detailed patient records. Documenting examination findings, diagnoses, and treatment plans
	Communication: Communicate effectively with colleagues, healthcare professionals, and sometimes patients, both verbally and in writing.
Application of knowledge and	Selecting Lenses and Frames: Optometrists use their knowledge of lens materials, designs, and coatings to

skills	recommend the most suitable lenses for patients' needs and prescriptions. They also assist patients in choosing appropriate frames based on their facial features, lifestyle, and preferences.
	Diagnosing Eye Conditions: Based on examination findings and patient history, optometrists diagnose various eye conditions, such as myopia, hyperopia, astigmatism, cataracts, glaucoma, and macular degeneration.
	Conducting Eye Examinations: Optometrists use their knowledge of anatomy, physiology, and optics to perform comprehensive eye exams. This includes assessing visual acuity, refractive error, eye health, and binocular vision.
	Preventing Blindness: Optometrists contribute to the prevention of blindness by early detection and management of eye diseases.
Generic learning outcomes	Clinical Optics: Understand the principles of geometrical and physical optics as they relate to the eye and corrective lenses. This includes knowledge of lens types, prisms, and optical instruments.
	Visual and Ocular Manifestations of Systemic Diseases: Recognize the connections between systemic health conditions (e.g., diabetes, hypertension) and their potential impact on vision and ocular health.
	Equipment Handling: Proficiently use common optometric equipment, including the retinoscope, ophthalmoscope, trial lens set, and lensometer.
	Lens Selection: Recommend appropriate lens types and materials based on prescription and patient needs. Frame Selection: Assist patients in choosing suitable frames. Frame Fitting and Adjustment: Ensure proper fit and comfort of spectacles.
Constitutional, humanistic, ethical, and moral values	Optometrists should respect patient autonomy and their right to make informed decisions about their eye care. This includes providing patients with comprehensive information about their condition and treatment options, empowering them to choose the best course of action for their needs.
	Professionalism: Optometrists should conduct themselves with professionalism, adhering to ethical standards and maintaining a high level of competence

	in their field. This involves dressing appropriately, being punctual for appointments, and maintaining a respectful and courteous demeanor.
	Beneficence: Optometrists should always act in the best interests of their patients, providing them with the highest quality of care and recommending treatments that are evidence-based and appropriate. This involves staying up-to-date with the latest advancements in eye care and using their knowledge and skills to benefit their patients
Employability and job-ready skills, and entrepreneurship skills and capabilities/qualities and mindset	Refraction: Accurate retinoscopy, subjective refraction, and prescription of spectacles and contact lenses. Ocular Health Assessment: Basic examination of the eye to identify common conditions (e.g., dry eye, conjunctivitis). Understanding when to refer to an ophthalmologist. Dispensing: Knowledge of lens types, frame selection, and fitting spectacles. Contact Lens Fitting: Basic fitting and patient education on contact lens care. (May be a specialized area.)
	Communication: Clear verbal and written communication with patients, colleagues, and other healthcare professionals.
	Equipment Handling: Proficient use of ophthalmic instruments (retinoscope, ophthalmoscope, trial lens set, lensometer). Record Keeping: Maintaining accurate patient records and documentation.
Credit requirements	The successful completion of the 2nd year (four semesters) of the undergraduate programme of 94 credit hours followed by an exit 4-credit of internship (Total 98 Credits).
Entry requirements	Passed UG Certificate course in the BSc. OPT with 44 credits hours followed by a 4-credit of internship.

SEMESTER: 3rd									
Course Code	**Course Title**	**Type of Courses**	**L**	**T**	**P**	**No. of Credits**	**Int.**	**Ext.**	**Total Marks**
BOP3200	Visual Optics I	Core Course Theory	3	0	0	3	30	70	100
BOP3201	Ocular Disease I	Minor Course	4	0	0	4	30	70	100
BOP3202	First Aid	Skill Enhancement Course	3	0	0	3	30	70	100
BOP3203	Disaster Management	Multidisciplinary Course	3	0	0	3	30	70	100
BOP3204	Visual Optics I Lab	Core Course Practical	0	0	2	1	30	70	100
BOP3205	English for Clinical Language	Ability Enhancement Course	2	0	0	2	30	70	100
VAC0003	Hospital Infection Controls and Preventations	Value Added Course	2	0	0	2	30	70	100
DISCIPLINE SPECIFIC ELECTIVE COURSE (Choose any one of them)									
BOP3206	Optometric Optics	Discipline Specific elective course	4	0	0	4	30	70	100
BOP3207	General and Ocular Biochemistry								
Total			**21**	**00**	**02**	**22**	**240**	**560**	**800**

SEMESTER: 4th									
Course Code	**Course Title**	**Type of Courses**	**L**	**T**	**P**	**No. of Credits**	**Int.**	**Ext.**	**Total Marks**
BOP4250	Visual Optics II	Core Course Theory	3	0	0	3	30	70	100
BOP4251	Optometric Optics II and Dispensing Optics	Core Course Theory	3	0	0	3	30	70	100
BOP4252	Ophthalmic & Optical Instrumentation	Core Course Theory	3	0	0	3	30	70	100
BOP4253	Ocular Disease II	Minor Course	4	0	0	4	30	70	100
BOP4254	Visual Optics II Lab	Core Course Practical	0	0	2	1	30	70	100
BOP4255	Optometric Optics II and Dispensing Optics Lab	Core Course Practical	0	0	2	1	30	70	100
BOP4256	Ophthalmic & Optical Instrumentation Lab	Core Course Practical	0	0	2	1	30	70	100
BOP4257	English for Research Writing	Ability Enhancement Course	2	0	0	2	30	70	100
BOP4258	Industrial Training	Internship	0	0	0	4	30	70	100
IKS0002	Indian Education	Value added course	2	0	0	2	30	70	100
DISCIPLINE SPECIFIC ELECTIVE COURSE (Choose any one of them)									
BOP4259	Physical optics	Discipline Specific elective course	4	0	0	4	30	70	100
BOP4260	Pharmacology								
Total			**21**	**00**	**06**	**28**	**330**	**770**	**1100**

Programme learning outcomes: The Bachelor's degree is awarded to students who have demonstrated the achievement of the outcomes located at level 5.5:

Element of the Descriptor	**Programme learning outcomes relating to Bachelor Degree**
The graduates should be able to demonstrate the acquisition of:	
Knowledge and understanding	Optics and Visual Optics: Advanced knowledge of the principles of light, lenses, and how they interact with the eye. This includes a detailed understanding of refraction, accommodation, and how the eye processes images. You'll also learn about the optical properties of different lens materials and how they are used to correct vision.
	Ocular Health**:** In-depth knowledge of a wide range of eye diseases and conditions, including their causes, symptoms, diagnosis, and management. This includes conditions like cataracts, glaucoma, macular degeneration, diabetic retinopathy, and more.
	Diagnostic Skills**:** Interpreting results from various diagnostic tests, such as optical coherence tomography (OCT) and visual field testing, to aid in diagnosis and management.
	Ethical Practice: A thorough understanding of ethical principles and legal regulations governing optometric practice. This includes patient confidentiality, informed consent, and professional responsibility.
General, technical and professional skills required to perform and accomplish tasks	Clinical Reasoning: Analyse patient symptoms, examination findings, and test results to arrive at an accurate diagnosis.
	Critical Thinking: Evaluate information and make informed decisions about patient care, considering all available options and potential risks.
	Decision-Making: Make sound clinical decisions based on your knowledge and experience, taking into account patient preferences and needs.
	Electronic Health Records (EHR): Proficiently use EHR systems to document patient information and manage records.
	Ophthalmic Equipment: Operate and maintain various ophthalmic instruments and equipment.

Application of knowledge and skills	Comprehensive Eye Examinations: Optometrists use their in-depth knowledge of anatomy, physiology, and optics to perform thorough eye exams. This includes assessing visual acuity, refractive error (myopia, hyperopia, astigmatism), eye health (using advanced techniques like slit lamp examination and ophthalmoscopy), binocular vision (how the eyes work together), and visual field (peripheral vision).
	Comprehensive Eye Examinations: Optometrists use their in-depth knowledge of anatomy, physiology, and optics to perform thorough eye exams. This includes assessing visual acuity, refractive error (myopia, hyperopia, astigmatism), eye health (using advanced techniques like slit lamp examination and ophthalmoscopy), binocular vision (how the eyes work together), and visual field (peripheral vision).
	Providing Eye Care in Underserved Areas: Optometrists may work in community health centers, mobile clinics, or participate in outreach programs to provide eye care services to those who have limited access.
	Pediatric Optometry: Providing comprehensive eye care to children, including assessing visual development, diagnosing and managing childhood eye conditions, and prescribing appropriate corrective lenses.
	Low Vision Rehabilitation: Working with visually impaired individuals to maximize their remaining vision through the use of low vision aids and strategies.
Generic learning outcomes	Foundational Sciences: Demonstrate a comprehensive understanding of the anatomy, physiology, biochemistry, and pharmacology of the human eye and visual system. This includes a deep understanding of the neural pathways involved in vision and how the eye interacts with the brain.
	Public Health and Epidemiology: Understand the principles of public health and epidemiology as they relate to eye care. Be aware of global eye health issues and strategies for promoting eye health in communities.
	Diagnostic Skills: Interpret results from various diagnostic tests, such as optical coherence tomography (OCT), fundus photography, and visual field testing, to aid in diagnosis and management.
	Management and Treatment: Develop and implement

	comprehensive management plans for various eye conditions, including Prescribing corrective lenses (spectacles and contact lenses), Managing ocular diseases (using appropriate therapeutic agents or referring to other specialists as needed), Providing low vision rehabilitation, Managing binocular vision disorders
Constitutional, humanistic, ethical, and moral values	Optometrists should strive to provide equitable access to eye care services, particularly for marginalized and vulnerable populations who may face barriers to accessing care. This includes advocating for policies that promote eye health and prevent blindness in all communities.
	Optometrists should recognize and respect the inherent dignity of every individual, ensuring that their interactions with patients are respectful, culturally sensitive, and non-judgmental. This includes being mindful of patients' cultural beliefs, values, and practices, and adapting their approach accordingly.
	Confidentiality: Optometrists should maintain the confidentiality of patient information, protecting their privacy and ensuring that their personal details are not disclosed without their consent. This involves adhering to strict confidentiality protocols, ensuring that patient records are stored securely, and being mindful of the legal and ethical obligations related to patient privacy.
Employability and job-ready skills, and entrepreneurship skills and capabilities/qualities and mindset	Ocular Health Assessment: Proficient in comprehensive eye examinations, including advanced techniques like slit lamp bio microscopy, gonioscopy, dilated fundus examination, and interpretation of diagnostic imaging (OCT, fundus photography).
	Disease Management: Managing a wide range of ocular diseases, including dry eye, glaucoma, cataracts, macular degeneration, diabetic retinopathy, and other retinal conditions. Knowledge of treatment protocols and referral pathways.
	Specialized Testing: Performing and interpreting specialized tests like visual field testing, color vision testing, and other diagnostic procedures.
	Electronic Health Records (EHR) Proficiency: Competent in using EHR systems for patient documentation and data management.

	Adaptability and Flexibility: Responding effectively to changes in the healthcare landscape and embracing new technologies.
	Advanced Equipment Handling: Proficient use of a wide range of ophthalmic equipment, including advanced diagnostic technologies.
	Patient-centric Approach: Prioritizing patient needs and providing compassionate, individualized care.
	Entrepreneurial Spirit: Seeking opportunities for innovation and growth, even within a traditional employment setting. This can involve improving processes, developing new services, or contributing to research.
Credit requirements	The successful completion of the 3rd year (six semesters) of the undergraduate programme of 148 credit hours followed by an exit 4-credit of internship (Total 152 Credits).
Entry requirements	Passed UG Diploma in the BSc. OPT with 94 credits hours followed by a 4-credit of internship. (Total 98).

SEMESTER: 5th									
Course Code	**Course Title**	**Type of Courses**	**L**	**T**	**P**	**No. of Credits**	**Int.**	**Ext.**	**Total Marks**
BOP5300	Contact Lens I	Core Course Theory	3	0	0	3	30	70	100
BOP5301	Binocular Vision I	Core Course Theory	3	0	0	3	30	70	100
BOP5302	Basics of hospital skill learning	Core Course Theory	4	0	0	4	30	70	100
BOP5303	Research Methodology and Biostatics	Minor Course	4	0	0	4	30	70	100
BOP5304	Contact Lens I Lab	Core Course Practical	0	0	2	1	30	70	100
BOP5305	Binocular Vision I Lab	Core Course Practical	0	0	2	1	30	70	100
DISCIPLINE SPECIFIC ELECTIVE COURSE (Choose any one of them)									
BOP5306	Low Vision Care	Discipline Specific elective course	4	0	0	4	30	70	100
BOP5307	Applied Optometry & Orth optics								
DISCIPLINE SPECIFIC ELECTIVE COURSE (Choose any one of them)									
BOP5308	Geriatric Optometry and Paediatric Optometry	Discipline Specific elective course	4	0	0	4	30	70	100
BOP5309	Systemic Condition & the Eye								
Total			**22**	**00**	**04**	**24**	**240**	**560**	**800**

SEMESTER: 6th									
Course Code	**Course Title**	**Type of Courses**	**L**	**T**	**P**	**No. of Credits**	**Int.**	**Ext.**	**Total Marks**
BOP6350	Contact Lens II	Core Course Theory	3	0	0	3	30	70	100
BOP6351	Binocular Vision –II	Core Course Theory	3	0	0	3	30	70	100
BOP6352	Research Publication ethics and IPR	Minor Course	4	0	0	4	30	70	100
BOP6353	Contact Lens II Lab	Core Course Practical	0	0	2	1	30	70	100
BOP6354	Binocular Vision –II Lab	Core Course Practical	0	0	2	1	30	70	100
BOP6354	Industrial Training	Internship	0	0	0	4	30	70	100
IKS0006	Indian Health science	Value added course	2	0	0	2	30	70	100
DISCIPLINE SPECIFIC ELECTIVE COURSE (Choose any one of them)									
BOP6355	Occupational Optometry	Discipline Specific elective course	4	0	0	4	30	70	100
BOP6356	Advanced ophthalmic diagnostic procedures								
DISCIPLINE SPECIFIC ELECTIVE COURSE (Choose any one of them)									
BOP6357	Public health and Community Optometry and sports vision	Discipline Specific elective course	4	0	0	4	30	70	100
BOP6358	Applied clinical optometry								
Total			**20**	**00**	**04**	**26**	**270**	**630**	**900**

Programme learning outcomes: The Bachelor's degree (with Research) or the Post-Graduate Diploma is awarded to students who have demonstrated the achievement of the outcomes located at level 6:

Element of the Descriptor	**Programme learning outcomes relating to Bachelor Degree (with Research)**
The graduates should be able to demonstrate the acquisition of:	
Knowledge and understanding	Anatomy and Physiology: In-depth study of the intricate structures of the eye, including microscopic details of tissues and cells, and how they contribute to vision. Advanced understanding of neural pathways and visual processing in the brain.
	Optics and Visual Optics: Comprehensive understanding of light, lenses, and their interaction with the eye. Advanced knowledge of refraction, accommodation, and the optical properties of different lens materials.
	Research Methodology (Research-focused programs): Demonstrate a strong understanding of research methodologies, experimental design, data analysis, and scientific writing.
	Academic Writing: Honing academic writing skills, learning how to write clear, concise, and well-structured research papers, reports, or theses. This includes understanding academic style, citation conventions, and the process of peer review.
	Physiological Optics: Detailed understanding of how the eye functions as an optical system and how the brain interprets visual information. Includes advanced concepts like accommodation, convergence, and adaptation to varying light conditions.
General, technical and professional skills required to perform and accomplish tasks	Advanced Diagnostic Techniques: Proficient in using advanced diagnostic equipment and techniques, such as optical coherence tomography (OCT), fundus photography, and visual field testing.
	Management of Complex Cases: Manage complex cases, including patients with multiple ocular conditions, systemic diseases, and complex refractive errors.
	Research Ethics: Adhere to ethical guidelines for research involving human subjects.
	Low Vision Devices: Assess and prescribe low vision devices and provide low vision rehabilitation.

	Specialized Testing: Perform and interpret specialized tests, such as electrodiagnostic testing, and other advanced procedures.
	Research Skills (Research-focused programs): Design, conduct, and analyze research projects related to medical laboratory science. Present research findings effectively.
	Critical Thinking: Critically evaluate research findings, assess the validity of different approaches, and formulate well-reasoned arguments.
Application of knowledge and skills	Low Vision Rehabilitation Centers: Providing specialized care and rehabilitation to individuals with low vision.
	Interprofessional Collaboration: They can effectively collaborate with ophthalmologists, general practitioners, and other healthcare professionals to provide comprehensive patient care.
	Conducting Independent Research: Graduates with the "with Research" designation can design and conduct independent research projects, contributing to the advancement of knowledge in the field of optometry. This can include clinical trials, epidemiological studies, or basic science research.
	Contributing to Public Health Initiatives: Graduates can contribute to public health initiatives related to eye health, such as developing and implementing programs to prevent blindness and promote eye health in communities.
Generic learning outcomes	Clinical Optics: Possess advanced knowledge of geometrical and physical optics, including the principles of refraction, lenses, prisms, and optical instruments. Understand the optical properties of the eye in detail and their implications for vision correction.
	Clinical Examination and Assessment: Proficiently perform comprehensive and advanced eye examinations, including: Advanced techniques in visual acuity measurement, refraction, and ocular health assessment. Specialized testing procedures (e.g., electrodiagnostic testing, advanced imaging). Management of complex cases with multiple ocular conditions or systemic involvement.
	Technical Proficiency: Demonstrate advanced competency in using and maintaining a wide range of

	ophthalmic equipment and instruments, including advanced diagnostic technologies.
	Critical Thinking and Problem-Solving: Apply advanced critical thinking and problem-solving skills to complex clinical and research scenarios.
Constitutional, humanistic, ethical, and moral values	Graduates should advocate for social justice and equitable access to eye care services, particularly for marginalized and vulnerable populations. This includes working to reduce disparities in eye health outcomes and advocating for policies that promote eye health equity.
	Graduates should conduct themselves with professionalism, adhering to ethical standards, maintaining a high level of competence in their field, and demonstrating respect for patients, research participants, and colleagues. This includes dressing appropriately, being punctual for appointments and meetings, and maintaining a courteous and respectful demeanor.
	Graduates should recognize their responsibility to contribute to the well-being of society, promoting eye health awareness, advocating for policies that improve access to eye care, and participating in community outreach programs. They should also consider the broader societal implications of their research and strive to use their knowledge and skills to benefit humanity.
Employability and job-ready skills, and entrepreneurship skills and capabilities/qualities and mindset	Evidence-Based Practice: Ability to critically appraise research and apply the latest evidence to clinical decision-making.
	Data Analysis and Interpretation: Expertise in analyzing and interpreting data from various sources, including clinical tests, diagnostic imaging, and research studies.
	Complex Case Management: Expertise in managing patients with complex ocular conditions, systemic diseases affecting the eye, and challenging refractive errors. Ability to integrate data from advanced diagnostic testing to develop individualized treatment plans.
Credit requirements	The successful completion of the 4th year (eight semesters) of the undergraduate programme of 196 credit hours.

Entry requirements	Bachelor's Degree with 148 credits hours followed by a 4-credit of internship. After completing the requirement of a 3 years bachelor's degree, candidates who meet a minimum 75% marks or its equivalent grade will be allowed to continue studies in the 4th year of the Under Graduate programme leading to the Bachelor's Degree with Research.

*The 7th and 8th semester of the Bachelor of Science in optometry program focuses on preparing students for professional practice through internships and research work. This semester is crucial as it marks the transition from academic learning to practical application in real-world settings.

Internship and Research Overview:

- During the 7th & 8th semester, optometry students engage in both internship and research activities. This period provides students with the opportunity to apply their academic knowledge in clinical settings, interact with patients, and gain hands-on experience. In parallel, students are expected to undertake a research project, contributing to the body of knowledge in the field of optometry technology.
- In 7th semester the student will present 1 seminar and submit 1 case study which would be related to his/her topic of research and submission of Synopsis proceed to 8th sem. Dissertation Phase I will include Synopsis approval from Doctoral Advisory Committee (DAC) will be taken by the student and after that it will send to Institutional Research Committee (IRC), followed by Institutional Ethical Committee (IEC) for approval.
- In 8th semester as a part of dissertation phase II, dissertation will be evaluated for **300 marks** on the parameter laid down in the proforma for the evaluation in which the students will give a presentation on the dissertation and an open viva-exam examination will be conducted by the external examiner. Student will submit three hard copies of her/his dissertation along with soft copy as PDF file to the Department and 1 Review & Research paper based on his/her research work.
- The Anti-plagiarism policy of the university is to be strictly followed by the candidate and the supervisor.

SEMESTER: 7th									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**C**	**Int.**	**Ext.**	**Total Marks**
BOP7400	Internship (Six months)	Core Course	0	0	0	8	30	70	100
BOP7401	Dissertation (Phase I)	Research Based	0	0	0	12	30	70	100
BOP7402	Seminar	Skill Based	0	0	0	4	30	70	100
BOP7403	Self-Development Report	Ability Enhancement Course	0	0	0	2	30	70	100
Total			0	0	0	**26**	**120**	**280**	**400**

Dissertation (Phase) I will include Synopsis approval from Doctoral Advisory Committee (DAC) will be taken by the student and after that it will send to Institutional Research Committee (IRC), followed by Institutional Ethical Committee (IEC) for final approval.

Self-Development Report will include submission of one case study.

SEMESTER: 8th									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**C**	**Int.**	**Ext.**	**Total Marks**
BOP8450	Internship (Six months)	Core Course	0	0	0	8	30	70	100
BOP8451	Dissertation (Phase II)	Research Based	0	0	0	12	30	70	100
BOP8452	Self-Development Report	Ability Enhancement Course	0	0	0	2	30	70	100
Total			**0**	**0**	**0**	**22**	**90**	**210**	**300**
Grand Total			**126**	**0**	**30**	**192**	**1670**	**2930**	**4600**

Self-Development Report- Student will present progress report of research work in the third month of 8th semester.

Dissertation (Phase) II - Dissertation will be evaluated for **300 marks** on the parameter laid down in the proforma for the evaluation in which the students will give a presentation on the dissertation and an open viva-exam examination will be conducted by the external examiner. Student will submit three hard copies of her/his dissertation along with soft copy as PDF file to the Department and 1 Review & Research paper based on his/her research work.

1ST SEMESTER

Course Title: General Anatomy	L	T	P	Cr.
Course Code: BOP1100	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Recognition of standard anatomical terminology, including terms for movements, positions, and locations of structures.
2. Ability to identify and describe the major bones, muscles, organs, and systems of the body (skeletal, muscular, cardiovascular, nervous, etc.).
3. Understanding how the body's systems work together to maintain balance and regulate internal environments.
4. Ability to relate anatomy to clinical practice, such as understanding how anatomical variations can affect disease and injury.
5. Ability to connect anatomical knowledge with other medical disciplines like physiology, pathology, and pharmacology.

Course Contents

UNIT-I **10 Hours**

Introduction to Human Anatomy: General organization Synopsis of all systems Cell Organization: Structure & function of all cell organelles-cell division (Mitosis and meiosis) Tissues (Definition, classification with structure and function). Tissues of the Body: Epithelium, connective tissue, bone and cartilage, Muscles: Different types of muscles, their functional differentiation, their relationship with different structures, their neural supply

UNIT-II **10 Hours**

Cardiovascular and Respiratory Systems, Anatomy of the heart and circulatory system. Blood vessels: Differentiation between arteries and veins, embryology, histology of both arteries and veins, Functional differences between the two, anatomical differences at different locations. Lymphatic system: Embryology, functions, relationship with blood vessels and organs. Skin and appendages: Embryology, anatomical differences in different areas, functional and protective variations, innervations, relationship with muscles and nerves.

UNIT-III **10 Hours**

Digestive system: oral cavity, oesophagus, stomach, intestines, and

accessory organs (liver, gallbladder, and pancreas). Urinary system: kidneys, ureters, bladder, and urethra. Male reproductive system: anatomy of the testes, epididymis, vas deferens, prostate gland, and penis. Female reproductive system: anatomy and physiology of the ovaries, fallopian tubes, uterus, vagina, and breasts, Development and growth of the reproductive system.

UNIT-IV **15 Hours**

Glands: Embryology, different types of glands (exocrine and endocrine), functional, differences, neural control of glands. Nervous system: Parts of Nervous system, cell types of nervous system, Blood-brain barrier, Reflex arc, Peripheral Nerves, Spinal nerves, Nerve fibres, Autonomic Nervous system. Brain and Cranial nerves: Major parts of Brain, Protective coverings of the Brain, Cerebrospinal Fluid, Brain stem, Cerebellum, Diencephalon, Cerebrum, Cranial nerves.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Moore, K. L., Dalley, A. F., & Agur, A. M. R. (2018). Clinically Oriented Anatomy (8th ed.). Wolters Kluwer.*
- *Drake, R. L., Vogl, W., & Mitchell, A. W. M. (2014). Gray's anatomy for students. Elsevier Health Sciences.*
- *Standring, S. (Ed.). (2016). Gray's anatomy: The anatomical basis of clinical practice. Elsevier Health Sciences.*
- *Netter, F. H. (2019). Atlas of human anatomy. Elsevier Health Sciences.*
- *Snell, R. S. (2014). Clinical anatomy by systems. Lippincott Williams & Wilkins.*
- *Rohen, J. W., Yokochi, C., & Lütjen-Drecoll, E. (2019). Color atlas of anatomy: A photographic study of the human body. Lippincott Williams & Wilkins.*

Course Title: General Physiology	L	T	P	Cr.
Course Code: BOP1101	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Acquire the knowledge of the relative contribution of each organ system in maintenance of the Milieu Interior (Homeostasis)
2. Compare & contrast Functions of lipids, carbohydrates, proteins & cell organelles.
3. Classify Physiological functions of various systems, with special reference to Musculoskeletal, Neuro-motor, Cardio-respiratory, Endocrine, Uro- genital function, & alterations in function with aging
4. Conclude Properties of nerve fibers, function of neuroglia, synapse, CNS, CSF, brain, cranial nerves, demonstration of reflexes.
5. Understanding the relationships between various organs and their role in the overall function of the body.

Course Contents

UNIT-I **10 Hours**

Cell structure & organization: Tissue organization, Epithelium, Connective tissue, Collagen fibres, Elastic fibres, Areolar fibres, Cartilage, Bone Contractile tissue, striated, skeletal, cardiac, non-striated, plain – myoepithelial, General principles of cell physiology, Physiology of skeletal muscle. Blood: Composition, Volume measurement & variations, Plasma proteins –classification & functions, red blood cells –development, morphology & measurements –functions & dysfunctions. White blood cells – development –classification, morphology –functions & dysfunctions Platelets –morphology –development, functions & dysfunctions. Clotting –factors – mechanism –anti- coagulants dysfunctions. Blood grouping –classification – importance in transfusion, Rh factor & incompatibility. Suspension stability, Osmotic stability, Reticulo endothelial system, Spleen, lymphatic tissue, Thymus, bone marrow, immune system, cellular, Humoral, Autoimmune

UNIT-II **15 Hours**

Digestion: General arrangement, Salivary digestion –functions & regulations, Gastric digestion –functions & regulations, Pancreatic digestion –functions & regulations, Intestinal digestion –functions & regulations, Liver & bile- Absorption, Motility, Deglutition, Vomiting, Defecation, Functions of large intestine, Neurohumoral regulations of alimentary functions. Excretion: Body fluids –distribution, measurement & exchange, Kidney –structure of nephron –mechanism of urine formation –composition of the urine and

abnormal constituents –urinary bladder & micturition. Muscular system: types of muscles, muscle contraction, and energy metabolism, Motor units and neuromuscular junctions. Control of movement: spinal reflexes, voluntary movement, and motor pathways, Energy metabolism during exercise and physical activity. Reproduction: Male reproductive system: spermatogenesis, hormonal control, and fertility.

UNIT-III **10 Hours**

Female reproductive system: oogenesis, menstrual cycle, pregnancy, and lactation, Hormonal control of reproductive functions. Respiration: Mechanics of respiration –pulmonary function tests –transport of respiratory gases neural and chemical regulation of respiration –hypoxia, cyanosis, dyspnoea– asphyxia. Circulation: General principles Heart: myocardium – innervation –transmission of cardiac impulse- Events during cardiac cycle – cardiac output. Peripheral circulation: peripheral resistances –arterial blood pressure –measurements –factors regulation variations –capillary circulation – venous circulation. Special circulation: coronary cerebral –miscellaneous. Environmental physiology: Body temperature regulation (including skin Physiology). Exposure to low and high atmospheric pressure

UNIT-IV **10 Hours**

Structure and function of neurons and glial cells, Nervous system organization: central nervous system (CNS) and peripheral nervous system (PNS), Action potentials and nerve impulse transmission, Synaptic transmission: neurotransmitters and synaptic integration. Structure and function of the major endocrine glands, Hormones and their regulation of physiological processes, Neural control vs. endocrine control of body functions. Special senses –(Elementary) Olfaction –Taste –Hearing.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Guyton, A. C., & Hall, J. E. (2016). Textbook of Medical Physiology (13th ed.). Saunders.*
- *Boron, W. F., &Boulpaep, E. L. (2016). Medical Physiology (3rd ed.). Saunders.*
- *Widmaier, E. P., Raff, H., & Strang, K. T. (2014). Vander's Human Physiology: The Mechanisms of Body Function (13th ed.). McGraw-Hill Education.*
- *Sherwood, L. (2015). Human Physiology: From Cells to Systems (9th ed.). Cengage Learning. Silverthorn, D. U. (2018). Human*

- *Physiology: An Integrated Approach (8th ed.). Pearson.*

Course Title: Microbiology (Ocular)	L	T	P	Cr.
Course Code: BOP1102	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Understand the fundamental concepts of microbiology with a focus on ocular infections.
2. Identify common bacterial, viral, fungal, and parasitic pathogens affecting the eye.
3. Explain the pathogenesis, clinical manifestations, laboratory diagnosis, and treatment of ocular infections.
4. Perform microbiological techniques relevant to ocular disease diagnosis.
5. Interpret microbiological test results and recommend appropriate antimicrobial therapy.

Course Contents

UNIT-I **15 Hours**

- Fundamentals of Microbiology & Ocular Host Defense
  - Introduction to microbiology: classification, structure, and function of microbes
  - Normal ocular microbiota and its role in health
  - Host defense mechanisms of the eye
  - Sterilization, disinfection, and aseptic techniques in ophthalmology
  - Laboratory techniques in microbiology (microscopy, culture methods, staining techniques)

UNIT-II **15 Hours**

- Bacterial Ocular Infections
  - Common bacterial pathogens in ocular infections (Staphylococcus, Streptococcus, Pseudomonas, Neisseria, etc.)
  - Bacterial conjunctivitis, keratitis, endophthalmitis, and orbital cellulitis
  - Mechanisms of bacterial virulence and antibiotic resistance
  - Laboratory diagnosis: Gram staining, culture methods, sensitivity testing
  - Principles of antibiotic therapy and prophylaxis in ophthalmic infections

UNIT-III **15 Hours**

- Viral, Fungal, and Parasitic Ocular Infections
  - Viral infections: Herpes simplex, varicella-zoster, adenovirus, cytomegalovirus retinitis
  - Fungal infections: Aspergillus, Fusarium, Candida in keratitis and endophthalmitis
  - Parasitic infections: Acanthamoeba keratitis, Toxoplasmosis, Onchocerciasis
  - Pathogenesis and immune response in non-bacterial ocular infections
  - Diagnostic techniques: PCR, ELISA, antigen/antibody detection

UNIT-IV **15 Hours**

- Emerging Trends & Clinical Microbiology in Ophthalmology
  - Emerging and multidrug-resistant ocular pathogen
  - Molecular diagnostic techniques in ocular microbiology
  - Microbiome and its impact on ocular health
  - Biofilms and their role in ocular infections
  - Vaccination strategies for ocular infectious diseases

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Mathers RT. Ocular Microbiology. 2nd ed. New York: McGraw-Hill; 2018.*
- *Murray PR. Medical Microbiology. 9th ed. Philadelphia: Elsevier; 2020.*
- *Mukherjee PK. Infectious Diseases of the Eye. 1st ed. New Delhi: Jaypee Brothers Medical Publishers; 2017.*
- *Panda T. Textbook of Ocular Infections and Immunity. 1st ed. Singapore: Springer; 2019.*
- *Jafar TD. Clinical Ophthalmic Microbiology. 3rd ed. London: CRC Press; 2016.*

Course Title: Introduction to quality and Patient Safety	L	T	P	Cr.
Course Code: BOP1103	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. To understand the basics of emergency care and life support skills and to Manage an emergency including moving a patient
2. To help prevent harm to workers, property, the environment and the general public.
3. To provide a broad understanding of the core subject areas of infection prevention and control.
4. To provide knowledge on the principles of on-site disaster management.
5. To maintain the quality in patient care.

Course Content

UNIT I **10 Hours**

Quality assurance and management – Concepts of Quality of Care, Quality Improvement Approaches, Standards and Norms, Introduction to NABH guidelines. Basics of emergency care and life support skills - Basic life support (BLS), Vital signs and primary assessment, Basic emergency care – first aid and triage, Ventilations including use of bag-valve-masks (BVMs), Choking, rescue breathing methods, One and Two-rescuer CPR

UNIT II **10 Hours**

Bio medical waste management and environment safety -Definition of Biomedical Waste, Waste minimization, BMW – Segregation, collection, transportation, treatment and disposal (including color coding), Liquid BMW, Radioactive waste, Metals/ Chemicals / Drug waste, BMW Management & methods of disinfection, Modern technology for handling BMW, Use of Personal protective equipment (PPE), Monitoring & controlling of cross infection (Protective devices)

UNIT III **12 Hours**

Infection prevention and control - Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)], Prevention & control of common healthcare associated infections, Components of an effective infection control program, Guidelines (NABH and JCI) for Hospital Infection Control

UNIT IV **13 Hours**

Antibiotic Resistance - History of Antibiotics, How Resistance Happens and Spreads, Types of resistance- Intrinsic, Acquired, Passive, Trends in Drug Resistance, Actions to Fight Resistance, Bacterial persistence, Antibiotic sensitivity, Consequences of antibiotic resistance

Disaster preparedness and management - Fundamentals of emergency management, psychological impact management, Resource management, Preparedness and risk reduction, information management, incident command and institutional mechanisms.

Transactional Mode: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested Reading:

- *Washington Manual of Patient Safety and Quality Improvement Paperback – 2016 by Fondahn (Author)*
- *Understanding Patient Safety, Second Edition by Robert Wachter (Author)*
- *Handbook of Healthcare Quality & Patient Safety Author : Girdhar J Gyani, Alexander Thomas*
- *Researching Patient Safety and Quality in Healthcare: A Nordic Perspective Karina Aase, Lene Schibevaag*
- *Old) Handbook Of Healthcare Quality & Patient Safety by Gyani Girdhar J (Author)*
- *Handbook of Healthcare Quality & Patient Safety by .Gyani G J/Thomas A*

Course Title: Human Rights and Duties	L	T	P	Cr.
Course Code: BOP1104	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Identify and respect the ethical principles related to patient confidentiality and informed consent.
2. Demonstrate awareness of legal frameworks governing medical laboratory practice and blood banking.
3. Recognize and uphold the fundamental human rights of all individuals, regardless of background.
4. Apply principles of non-discrimination and equality in healthcare delivery.
5. Understand and fulfill the professional duties and responsibilities associated with medical laboratory technology.

Course Content

UNIT-I **15 Hours**

Introduction to Human Rights, Definition and historical evolution of human rights, Universal Declaration of Human Rights (UDHR) and its significance, Cultural relativism vs. universalism in human rights discourse, Theories of natural law, social contract, and human dignity, Debates on the universality and cultural specificity of human rights, Relationship between rights and moral duties.

UNIT-II **10 Hours**

International human rights law: treaties, conventions, and customary law, Regional human rights systems (e.g., European Convention on Human Rights, African Charter on Human and Peoples' Rights), National constitutions and domestic protection of human rights, right to life, liberty, and security, Freedom of expression, assembly, and association, right to a fair trial and due process.

UNIT-III **10 Hours**

Right to education, healthcare, and social security, right to work, just and favorable conditions of work, and adequate standard of living, Challenges in realizing economic and social rights, Rights of indigenous peoples, Rights of minorities and marginalized groups, Intersectionality and multiple forms of discrimination.

UNIT-IV **10 Hours**

Human rights violations in armed conflicts and humanitarian crises, Gender

equality and women's rights, Rights of refugees, migrants, and stateless persons, Strategies for promoting and defending human rights, Role of civil society organizations, NGOs, and grassroots movements, Ethical dilemmas and challenges in human rights advocacy

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *"The Idea of Human Rights" by Charles R. Beitz*
- *"Just and Unjust Wars" by Michael Walzer*
- *"The Ethics of Authenticity" by Charles Taylor*
- *"Global Justice: A Cosmopolitan Account" by Gillian Brock*

Course Title: General Anatomy Lab	L	T	P	Cr.
Course Code: BOP1105	0	0	2	1

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

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 analyse the integrative and regulative functions on the organs and systems.
4. Ability to correctly label bones, muscles, organs, nerves, blood vessels, and other key anatomical components.
5. Ability to interpret the three-dimensional arrangement of body structures through dissection or 3D visualization tools.

Course Contents

List of Practical's / Experiments: 30 Hours

1. Demonstrate the identification of major bones in the human body.
2. Demonstrate the range of motion and movement types at various joints in the body.
3. Demonstrate the location and function of major muscles in the body.
4. Demonstrate the anatomy and structure of vital organs such as the heart, lungs, liver, kidneys, and intestines.
5. Demonstrate the central and peripheral components of the nervous system.
6. Discuss the characteristics and functions of epithelial, connective, muscular, and nervous tissues.
7. Demonstrate the identification of surface anatomical landmarks on the body.
8. Demonstrate the stages of human embryonic development using models or visual aids.
9. Provide clinical case studies or examples to demonstrate the application of anatomical knowledge in diagnosing and understanding medical conditions**.**

Suggested readings:

- *Netter, F. H. (2019). Atlas of human anatomy. Elsevier Health Sciences.*

- *Snell, R. S. (2014). Clinical anatomy by systems. Lippincott Williams & Wilkins.*
- *Tank, P. W. (2015). Grant's dissector. Wolters Kluwer.*
- *Moore, K. L., Dalley, A. F., & Agur, A. M. (2018). Essential clinical anatomy. Wolters Kluwer.*

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Course Title: General Physiology Lab	L	T	P	Cr.
Course Code: BOP1106	0	0	2	1

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Explain the normal functioning of various organ systems of the body and their interactions.
2. Elucidate the physiological aspects of normal growth and development.
3. Describe the physiological response and adaptations to environmental stresses.
4. Know the physiological principles underlying pathogenesis of disease
5. Develop a strong understanding of key physiological concepts (e.g., homeostasis, nerve and muscle function, cardiac physiology, respiratory and renal physiology) through hands-on experiments.

Course Contents

List of Practical's / Experiments: 30 Hours

- Measure blood pressure using a sphygmomanometer and stethoscope.
- Perform an ECG recording to measure the electrical activity of the heart.
- Measure lung volumes and capacities using a spirometer
- Record and interpret brain waves using an EEG machine.
- Measure muscle strength and fatigue using a handgrip dynamometer or a grip strength measurement device.
- Measure nerve conduction velocity using surface electrodes and a stimulator
- Perform blood typing tests to determine ABO and Rh blood groups.
- Use colorimetric or electrochemical methods to measure electrolyte concentrations (such as sodium, potassium, and calcium) in blood or urine samples.
- Calculate basal metabolic rate (BMR) using indirect calorimetry, which measures oxygen consumption and carbon dioxide production.
- Perform urine analysis tests to measure parameters such as pH, specific gravity, protein, glucose, and presence of other substances.

Suggested readings:

- *Boron, W. F., &Boulpaep, E. L. (2016). Medical Physiology (3rd ed.). Saunders.*

- *Widmaier, E. P., Raff, H., & Strang, K. T. (2014). Vander's Human Physiology: The Mechanisms of Body Function (13th ed.). McGraw-Hill Education.*
- *Sherwood, L. (2015). Human Physiology: From Cells to Systems (9th ed.). Cengage Learning.*
- *Silverthorn, D. U. (2018). Human Physiology: An Integrated Approach (8th ed.). Pearson.*

Course Title: English for profession	L	T	P	Cr.
Course Code: BOP1107	2	0	0	2

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Demonstrate effective patient communication.
2. Produce clear and concise medical documentation.
3. Interpret and analyze medical texts and research.
4. Participate confidently in professional discussions and presentations.
5. Students will be able to understand and use professional vocabulary and terminology relevant to their chosen field, including industry-specific jargon.

Course Contents

UNIT I **7 Hours**

Etiquette – Telephone, Table (Different ways of enhancing oneself)

1. Parts of Speech Tens Vocabulary.
2. Synonyms.
3. Antonyms.
4. One word substitute.
5. Homophones.
6. Homonyms.

UNIT II **7 Hours**

Composition

1. Orientation to different types of letters – (Social, business letter, applying for a job, for higher studies, preparing curriculum vitae, subscribing to a journal, letters to the Editor).
2. Essay writing – Descriptive, Narrative and Reflective.
3. Précis or Summary writing
4. Report writing (with special stress on scientific/technical reports, preparing field/observation report).

UNIT III **7 Hours**

Practical/ Spoken English

- Front Desk management, fixing appointments, getting information – Managing medical representatives, able to answer FAQs, lab reports writing, telephoning in a hospital: the object is to practice influent conversation
    1. JAM session.
    2. Conversation.

3. Group discussion.
4. Role-plays.
5. Conversation. Group discussion.
6. Presentation.
7. Role plays.

UNIT IV **9 Hours**

Grammar

1. Narration.
2. Voice change (Use of passive voice particularly in scientific and official writing).
3. Use of articles and preposition.
4. Figures of speech.
5. Vocabulary
   - The language of Doctor and Patient.
   - General description and medical description.
   - Medical terminology – roots.
   - Prefixes and suffixes.
   - Medical abbreviations.
6. Punctuation.
7. Common errors in English

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Loveleen Kaur, 'Communication Skills' Satya Prakashan Publication.*
- *Narinder Kumar Bodhraj, 'Business Communication', Kalyani Publishers, 2011.*
- *S.P. Dhanavel, 'English & communication Skills for the Students of Science & Engineering' Orient blackswan publication, 2009.*
- *Indrajit Bhattacharya, 'An Approach to Communication Skills'.*
- *Chissie Wright, 'Handbook of Practical Communication Skills'*

Course Title: Environment Education	L	T	P	Cr.
Course Code: VAC0001	2	0	0	2

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Grasp the concept of Environmental Science, its components, types of natural resources, their distribution, and usage, with a focus on India.
2. Discuss the factors impacting biodiversity loss and ecosystem degradation in India and the world.
3. An overview of Contemporary Environmental Issues i.e National and Global efforts to address climate change adaptation and mitigation.
4. To understand environmental laws for monitoring pollution.
5. Principles guiding human responsibility toward the environment.

Course Content

Unit I **I6 Hours**

The man-environment interaction: Humans as hunter-gatherers; Mastery of fire; Origin of agriculture; Emergence of city-states; Great ancient civilizations and the environment, Indic Knowledge and Culture of sustainability; Middle Ages and Renaissance; Industrial revolution and its impact on the environment; Population growth and natural resource exploitation; Global environmental change. Environmental Ethics and emergence of environmentalism: Anthropocentric and eco-centric perspectives (Major thinkers); The Club of Rome- Limits to Growth; UN Conference on Human Environment 1972; World Commission on Environment and Development and Rio Summit. Natural resources: Definition and Classification. Microbes as a resource; Status and challenges. Environmental impact of over-exploitation, issues and challenges; Water scarcity and Conflicts over water. Mineral resources and their exploitation; Environmental problems due to extraction of minerals and use; Soil as a resource and its degradation. Energy resources: Sources and their classification. Implications of energy use on the environment. Introduction to sustainable development: Sustainable Development Goals (SDGs)- targets and indicators, challenges and strategies for SDGs.

Unit-II **6 Hours**

Biodiversity as a natural resource; Levels and types. Biodiversity in India and the world; Biodiversity hotspots; Species and ecosystem threat categories. Major ecosystem types in India, their services, classification, significance and characteristics of forests, wetlands, grasslands, agriculture, coastal and marine; Threats to biodiversity and ecosystems: Land use and

land cover change; Commercial exploitation of species; Invasive species; Fire, disasters and climate change. Major conservation policies: in-situ and ex-situ approaches; National and International Instruments for biodiversity conservation; the role of traditional knowledge, community-based conservation; Gender and conservation. Environmental issues and scales: micro-, meso-, synoptic and planetary scales; Temporal and spatial extents of local, regional, and global phenomena. Pollution: Types of Pollution- air, noise, water, soil, thermal, radioactive; municipal solid waste, hazardous waste; transboundary air pollution; acid rain; smog. Land use and Land cover change: land degradation, deforestation, desertification, urbanization. Biodiversity loss: past and current trends, impact. Global change: Ozone layer depletion; Natural Disasters – Natural and Man-made (Anthropogenic).

Unit-III **8 Hours**

Definition of pollution; Point and non-point sources. Air pollution: sources, Impacts, Primary and Secondary pollutants; Criteria pollutants- carbon monoxide, lead, nitrogen oxides, ground-level ozone, particulate matter and sulphur dioxide; Other important air pollutants- Volatile Organic compounds (VOCs), Peroxyacetyl Nitrate (PAN), Polycyclic aromatic hydrocarbons (PAHs) and Persistent organic pollutants (POPs); Indoor air pollution; National Ambient Air Quality Standards. Water pollution: Sources; River, lake and marine pollution, groundwater pollution, impacts; Water quality parameters and standards. Soil pollution: sources and pollutants. Solid and hazardous waste, its impacts. Noise pollution: Definition, Unit of measurement, sources, noise standards; adverse impacts. Thermal and Radioactive pollution: Sources and impacts. Climate change: natural variations in climate due to greenhouse gas emission- past, present & future. Structure of atmosphere. Projections of global climate change with special reference to temperature, rainfall, climate variability and extreme events; Importance of 1.5 °C and 2.0 °C limits to global warming; Climate change projections for the Indian sub-continent. Impacts, vulnerability and adaptation to climate change: Observed impacts of climate change on ocean and land systems; Sea level rise, changes in marine and coastal ecosystems; Impacts on forests, natural ecosystems, animal species, agriculture, health, urban infrastructure; the concept of vulnerability and its assessment; Adaptation vs. resilience; Climate-resilient development; Indigenous knowledge for adaptation to climate change. Mitigation of climate change: Synergies between adaptation and mitigation measures; Green House Gas (GHG) reduction vs. sink enhancement; Concept of carbon intensity, energy intensity and carbon neutrality; National and international policy instruments for mitigation, decarbonizing pathways and net zero targets for the future; Energy efficiency measures; Carbon capture and storage, National climate action plan and Intended Nationally Determined

Contributions (INDCs); Climate justice.

Unit-IV **10 Hours**

Introduction to environmental laws and regulation: Article 48A, Article 51A (g) and other environmental rights; Introduction to environmental legislations on the forest, wildlife and pollution control. Environmental management system: ISO 14001 Concept of Circular Economy, Life cycle analysis; Cost-benefit analysis Environmental audit and impact assessment; Environmental risk assessment Pollution control and management; Waste Management- Concept of 3R (Reduce, Recycle and Reuse) and sustainability; Ecolabeling /Ecomark scheme. Bilateral and multilateral agreements on international co-operation of instruments; conventions and protocols; binding and nonbinding measures; Conference of the Parties (COP) Major International Environmental Agreements:- Convention on Biological Diversity (CBD); Cartagena Protocol on Biosafety; Nagoya Protocol on Access and Benefit-sharing; Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES); Ramsar Convention on Wetlands of International Importance; United Nations Convention to Combat Desertification (UNCCD); Vienna Convention for the Protection of the Ozone Layer; Montreal Protocol on Substances that Deplete the Ozone Layer and the Kigali Amendment; Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal; Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade; Stockholm Convention, Minamata Convention, United Nations Framework Convention on Climate Change (UNFCCC); Kyoto Protocol; Paris Agreement; India's status as a party to major conventions Major Indian Environmental Legislations: The Wild Life (Protection) Act, 1972; The Water (Prevention and Control of Pollution) Act, 1974; The Forest (Conservation) Act, 1980; The Air (Prevention and Control of Pollution) Act, 1981; The Environment (Protection) Act, 1986; The Biological Diversity Act, 2002; The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; Noise Pollution (Regulation and Control) Rules, 2000; Industry-specific environmental standards; Waste management rules; Ramsar sites; Biosphere reserves; Protected Areas; Ecologically Sensitive Areas; Coastal Regulation Zone; Production and consumption of Ozone Depleting substances, Green Tribunal; Some landmark Supreme Court judgements Major International organisations and initiatives: United Nations Environment Programme (UNEP), International Union for Conservation of Nature (IUCN),World Commission on Environment and Development (WCED), United Nations Educational, Scientific and Cultural Organization (UNESCO), Intergovernmental Panel on Climate Change (IPCC), and Man and the Biosphere (MAB) programme.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested Readings: -

- *Chahal, M. K. (2024). Environmental Science and Hazards Management (Ecology and Risk Management), ISBN:978-93-6440-586-7.*
- *Baskar, S. and Baskar, R. (2009). Natural Disasters (Earth's Processes & Geological Hazards), ISBN: 978-81-7806-168-9.*
- *Tiefenbacher, J (ed.) (2022), Environmental Management - Pollution, Habitat, Ecology, and Sustainability, Intech Open, London. 10.5772/*
- *Kanchi Kohli and Manju Menon (2021) Development of Environment Laws in India, Cambridge University Press.*
- *Bhagwat, Shonil (Editor) (2018) Conservation and Development in India: Reimagining Wilderness, Earthscan Conservation and Development, Routledge.*
- *Manahan, S.E. (2022). Environmental Chemistry (11th ed.). CRC Press. https://doi.org/10.1201/9781003096238.*
- *William P.Cunningham and Mary A. (2015) Cunningham Environmental Science: A Global Concern, Publisher (Mc-Graw Hill, USA)*
- *Central Pollution Control Board Web page for various pollution standards. https://cpcb.nic.in/ standards/*
- *Theodore, M. K. and Theodore, Louis (2021) Introduction to Environmental Management, 2nd Edition. CRC Press.*
- *Ministry of Environment, Forest and Climate Change (2019) A Handbook on International Environment Conventions &Programmes. https://moef.gov.in/wp- content/uploads/2020/02/ convention-V-16-CURVE-web.pdf*

2nd SEMESTER

Course Title: Anatomy (Ocular)	L	T	P	Cr.
Course Code: BOP2150	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Identify the structures and landmarks of the eye.
2. Understand the functional relationships between ocular components.
3. Describe the development and embryology of the eye.
4. Discuss the anatomical basis for common ocular diseases and conditions.
5. Identify and describe the key anatomical components of the eye, including the cornea, lens, retina, iris, pupil, sclera, ciliary body, choroid, and optic nerve.

Course Contents

UNIT-I **10 Hours**

Introduction to anatomical terminology and techniques used in ocular anatomy, Brief overview of the visual system and its components, Eyeball Structure and Function; External anatomy of the eye (eyelids, conjunctiva, lacrimal apparatus, etc.), Anatomy of the globe: sclera, cornea, uvea (iris, ciliary body, choroid), lens, and vitreous humor, Ocular chambers and fluids: anterior chamber, posterior chamber, and aqueous humor.

UNIT-II **10 Hours**

Retina and its layers, including the macula and fovea, Ocular Muscles and Movements, Extraocular muscles and their functions, Innervation and actions of the extraocular muscles. Overview of the control and coordination of eye movements.

UNIT-III **12 Hours**

Optics and Refraction; Anatomy of the visual pathway: cornea, lens, and their refractive properties, Accommodation and the process of focusing light. Overview of common refractive errors and their anatomical basis, Neuroanatomy of the Visual System; Introduction to the visual pathway: retina, optic nerve, optic chiasm, optic tracts, and visual cortex, Functional subdivisions of the visual cortex and their roles in visual processing.

UNIT-IV **13 Hours**

Developmental Anatomy of the Eye; Embryology of the eye and its associated

structures, Formation of ocular tissues, chambers, and structures, Overview of congenital anomalies and developmental disorders of the eye, Clinical Applications of Ocular Anatomy; Anatomical basis for common eye diseases and conditions (e.g., cataracts, glaucoma, macular degeneration), Surgical procedures and interventions related to ocular anatomy, Diagnostic imaging techniques used to assess ocular structures.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Remington, L. A. (Ed.). (2016). Clinical Anatomy and Physiology of the Visual System (3rd ed.). Butterworth-Heinemann.*
- *Singh, P., & Nayak, S. R. (Eds.). (2020). The Eye: Basic Sciences in Practice (5th ed.). Elsevier.*
- *Kanski, J. J., & Bowling, B. (2016). Clinical Ophthalmology: A Systematic Approach (8th ed.). Elsevier.*
- *Moore, K. L., Dalley, A. F., & Agur, A. M. R. (2018). Clinically Oriented Anatomy (8th ed.). Lippincott Williams & Wilkins.*
- *Snell, R. S., & Lemp, M. A. (2013). Clinical Anatomy of the Eye (2nd ed.). Wiley-Blackwell.*
- *Probst, L. E., Loeffler, K. U., & Chang, W. J. (2014). Atlas of Ocular Anatomy. SLACK Incorporated.*
- *Hogan, M. J., Alvarado, J. A., & Weddell, J. E. (1971). Histology of the Human Eye: An Atlas and Textbook. W. B. Saunders Company.*

Course Title: Geometrical Optics	L	T	P	Cr.
Course Code: BOP2151	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. 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
2. To predict the basic properties of the images formed on the retina by the optics of the eye.
3. Explain common optical aberrations and their corrections.
4. Understand the role of geometrical optics in modern technologies (e.g., endoscopy, laser optics, fiber optics).
5. Analyze image formation by plane mirrors, concave mirrors, and convex mirrors.

Course Contents

UNIT-I **15 Hours**

- Nature of light –light as electromagnetic oscillation; ideas of sinusoidal oscillations; amplitude and phase; speed of light in vacuum and other media; refractive index, Wave fronts–spherical, elliptical and plane; Curvature and vergence; rays; convergence and divergence in terms of rays and vergence; vergence at a distance, Refractive index; its dependence on wavelength
- Fermat's and Huygen's Principle –Derivation of laws of reflection and refraction (Snell's law) from these principles, Plane mirrors –height of the mirror; rotation of the mirror
- Reflection by a spherical mirror –paraxial approximation; sign convention; derivation of vergence equation, Imaging by concave mirror, convex mirror, Reflectivity; transmissivity; Snell's Law, Refraction at a plane surface, Glass slab; displacement without deviation; displacement without dispersion, Thick prisms; angle of prism; deviation produced by a prism; refractive index of the prism, Prisms; angular dispersion; dispersive power; Abbe's number, Definition of crown and flint glasses; materials of high refractive index

UNIT-II **15 Hours**

- Thin prism –definition; definition of Prism diopter; deviation produced by a thin prism; it dependence on refractive index, Refraction by a spherical surface; sign convention; introduction to spherical

aberration using image formed by a spherical surface of a distance object; sag formula, Paraxial approximation; derivation of vergence equation, Imaging by a positive powered surface and negative powered surface, Vergence at a distance formula; effectivity of a refracting surface,

- Definition of a lens as a combination of two surfaces; different types of lens shapes, Image formation by a lens by application of vergence at a distance formula; definitions of front and back vertex powers; equivalent power; first and second principal planes/points; primary and secondary focal planes/points; primary and secondary focal lengths,
- Newton's formula; linear magnification; angular magnification, Nodal Planes, Thin lens as a special case of thick lens; review of sign convention, Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions, Imaging by a thin concave lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions, Prentice's Rule, System of two thin lenses; review of front and back vertex powers and equivalent power, review of six cardinal points, System of more than two thin lenses; calculation of equivalent power using magnification formula

UNIT-III **15 Hours**

- Vergence and vergence techniques revised, Gullstrand's schematic eyes, visual acuity, Stile Crawford, Emmetropia and ametropia, Blur retinal Imaginary, Correction of spherical ametropia, vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptric power, angular magnification of spectacles in aphakic,
- Thin lens model of the eye –angular magnification –spectacle and relative spectacle magnification,
- Aperture stops- entrance and exit pupils,

UNIT-IV **15 Hours**

- Astigmatism. - To calculate the position of the line image in a sphero-cylindrical lens,
- Accommodation –Accommodation formulae and calculations, Presbyopia- Spectacle magnification, angular magnification of spectacle lens, near point, calculation of add, depth of field,
- Spatial distribution of optical information- modulation transfer functions- Spatial filtering- applications, Visual optics of aphakia and pseudophakia.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Tunnacliffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990.*
- *Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998*
- *Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.*
- *Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw- Hill, New York, USA, 2002.*

Course Title: Computer Application	L	T	P	Cr.
Course Code: BOP2152	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Demonstrate proficiency in utilizing computer software for laboratory data management.
2. Apply computer skills to analyze and interpret laboratory results.
3. Utilize electronic resources for accessing and managing medical information.
4. Implement cyber security best practices in a laboratory setting.
5. Effectively communicate laboratory data using computer-generated reports.

Course content

Unit-I **10 Hours**

Introduction to Various Computer Parts: Input output devices: input devices (keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices); output devices (monitors, pointers, plotters, screen image projector, voice response systems). Processor and memory: The Central Processing Unit (CPU), main memory. Storage Devices: sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.

Unit-II **12 Hours**

MS- Word, Excel, Power Point: 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; worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs; creation and manipulation presentation, formatting and enhancing text, slide with graphs.

Unit-III **13 Hours**

Introduction of Windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).

Unit-IV **10 Hours**

Application of Computers in Various Fields: Medical, Education, Railway, Defense, Industry, Management, Sports, Commerce, Internet.

Transactional Mode: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested Reading:

- *Sunita Goel, 'Computer Fundamentals', Pearson Publication.*
- *Anupam Jain and Avneet Mehra, 'Computer Fundamental MS Office: Including Internet & Web Technology'.*
- *P.K. Sinha, 'Introduction to Computers' BPB Publications.*
- *Raymond Greenlaw, 'Fundamentals of the Internet & the World Wide Web'.*
- *Sunjay Saxena, 'Introduction to Computers and MS Office'*

Course Title: Nutrition	L	T	P	Cr.
Course Code: BOP2153	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Understand the basic principles of nutrition and their relevance to health.
2. Identify essential nutrients and their functions.
3. Apply dietary guidelines to promote health and prevent disease.
4. Recognize the role of nutrition in various health conditions.
5. Provide basic nutritional counseling and education.

Course Content

Unit I **10 Hours**

Fundamentals of Nutrition

- Introduction to nutrition: Definition, scope, and importance.
- Essential nutrients: Macronutrients (carbohydrates, proteins, fats) and micronutrients (vitamins, minerals).
- Digestion, absorption, and metabolism of nutrients.
- Energy balance and requirements.
- Food groups and dietary guidelines.

Unit II **10 Hours**

Nutritional Assessment and Planning

- Methods of nutritional assessment: Anthropometric measurements, biochemical assessments, clinical assessments, and dietary assessments.
- Dietary planning and meal preparation.
- Nutritional needs across the lifespan: Infants, children, adolescents, adults, and elderly.
- Special dietary considerations: Vegetarian, vegan, and cultural diets.

Unit III **12 Hours**

Nutrition in Health and Disease

- Role of nutrition in disease prevention and management.
- Nutrition-related disorders: Obesity, malnutrition, diabetes, cardiovascular diseases, and cancer.
- Enteral and parenteral nutrition.
- Food safety and hygiene.
- Food allergies and intolerances.

Unit IV **13 Hours**

Nutritional Counseling and Education

- Principles of nutritional counseling.
- Effective communication and patient education.
- Promoting healthy eating habits.
- Addressing common nutritional misconceptions.
- Community nutrition and public health.

Transactional Mode: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested Reading:

- *Whitney, E., & Rolfes, S. R. (2019). Understanding nutrition. Cengage Learning.*
- *Srilakshmi, B. (2014). Dietetics. New Age International.*
- *Wardlaw, G. M., & Smith, A. M. (2018). Contemporary nutrition. McGraw-Hill Education.*

Course Title: Anatomy (Ocular) Lab	L	T	P	Cr.
Course Code: BOP2154	0	0	2	1

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Identify the structures and landmarks of the eye.
2. Understand the functional relationships between ocular components.
3. Describe the development and embryology of the eye.
4. Discuss the anatomical basis for common ocular diseases and conditions.
5. Explain the functional significance of different ocular structures in relation to vision and eye movement.

Course Contents

List of Practical's / Experiments: **30 Hours**

- Introduction to Ocular Anatomy;
  - I. Terminology and anatomical directions related to the eye
  - II. Introduction to the anatomical planes and sections of the eye
- External Structures of the Eye;
  - I. Examination of the external features of the eye
  - II. Identification and labeling of the eyelids, conjunctiva, lacrimal apparatus, and surrounding structures, Palpation and understanding the functions of these structures
- Ocular Adnexa;
  - I. Study of the structures surrounding the eye, including the orbit and its bony boundaries
  - II. Examination of the extraocular muscles and their attachments
  - III. Understanding the innervation and movements of the eye muscles
- Anterior Segment;
  - I. Investigation of the cornea, sclera, and anterior chamber
  - II. Examination of the iris, pupil, and lens
  - III. Identification of the structures involved in aqueous humor production and drainage
- Posterior Segment;
  - I. Study of the vitreous body, retina, and choroid
  - II. Identification of the optic nerve and its relationship to the retina
  - III. Understanding the blood supply to the retina and its clinical significance

Suggested readings:

- *Dartt, D. A., Besharse, J. C., & Dana, R. (Eds.). (2011). Encyclopedia of the Eye. Academic Press.*
- *Liversidge, J., & Sewell, H. F. (Eds.). (2013). The Eye: Basic Sciences in Practice (4th ed.). Saunders Ltd*
- *Pardue, M. T., &Hackam, A. S. (Eds.). (2016). Ocular Disease: Mechanisms and Management. Elsevier.*
- *Kaufman, P. L., Alm, A., & Levin, L. A. (Eds.). (2011). Adler's Physiology of the Eye: Expert Consult (11th ed.). Saunders.*
- *Levin, L. A., Nilsson, S. F. E., & Ver Hoeve, J. N. (Eds.). (2019). Adler's Physiology of the Eye: Expert Consult (12th ed.). Saunders.*

Course Title: Communication and Presentation Skills	L	T	P	Cr.
Course Code: BOP2155	2	0	0	2

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Demonstrate clear and effective verbal and non-verbal communication.
2. Construct and deliver organized and engaging presentations.
3. Apply active listening and interpersonal skills in professional settings.
4. Produce accurate and professional written communication.
5. Adapt speech based on audience, context, and purpose.

Course Content

UNIT I **7 Hours**

1) Communication: Definition, meaning.
2) Importance of Communication in Health
3) Functions of Communication.

UNIT II **7 Hours**

1) Communication channels - Definition dimension and classification, selection of communication channels.
2) Feedback in communication – Feedback process, effect of feedback in health communication.
3) Problems in communication - various types of problems.

UNIT III **7 Hours**

1) Mass communication e.g. Radio, television, traditional systems like nukkadnatak, drama, puppet show
2) Inter personal communication: Lecture method (IPC).

UNIT IV **9 Hours**

1) Intrapersonal communication like demonstration, group discussions, seminars symposium, workshop, conference, CME, communication network
2) Various ways of creating awareness about health-related issues
3) Counseling, pretest counseling, posttest counseling.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Loveleen Kaur, 'Communication Skills' Satya Prakashan Publication.*
- *Narinder Kumar Bodhraj, 'Business Communication', Kalyani Publishers, 2011.*
- *S.P. Dhanavel, 'English & communication Skills for the Students of Science & Engineering' Orient blackswan publication, 2009.*
- *Indrajit Bhattacharya, 'An Approach to Communication Skills'.*

Course Title: Human Values and Professional Ethics	L	T	P	Cr.
Course Code: VAC0002	2	0	0	2

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Understand the essence of Indian ethos, cultural values and ethical principles derived from scriptures, integrating self-exploration with scientific inquiry.
2. Analyze human values, self-awareness and ethical decision-making by distinguishing between perspectives, ideologies and universal moral principles.
3. Evaluate constitutional values, global responsibilities and the role of ethics in citizenship while promoting inclusivity and social welfare.
4. Develop essential life skills, stress management techniques and holistic well-being through mindfulness, self-discipline and personality development.
5. Describe the importance of ethics in professional fields such as medicine, engineering, law, and management.

Course Content

Unit-I **7 Hours**

Meaning of ethos and cultural essence of India, Scriptures as the base of the Indian Knowledge System (IKS), Integrating the two methodologies: interiorization process for self-exploration and exterior scientifc pursuit for the prosperity of world, The Law of Karma and Nishkama Karma (The Law of action and selfless action), Practical: Five hours of Yoga practice per week, Ethics through Music and Indian Poetry, Community Engagement

Unit-II **8 Hours**

Knowing the Self and the universal values that we stand for. This is self-enquiry & self-discovery, Background conversations and deep listening, recognizing the assumptions that we make, the biases we have and the implications for ethical action. Self-identity: distinguishing and embracing oneself (and others) four profiles (inner potential, social, professional, personality), Distinguish ideology, perspectives beliefs from embodying values. Practical: Self-discovery, self-enquiry and Mindfulness, Yama & Niyama of Ashthang Yoga

Unit-III **7 Hours**

Values embedded in the Preamble of the Indian Constitution, Integration of Human Rights and duties. Principles and responsibilities: as citizens of India, towards global environment, Loksangraha and Vasudhaiva Kutumbakam, Conscious Full Spectrum Response model. Distinguishing judgement from discernment, Practical: Development of concentration among students through music, fine arts, mathematics, sports, yoga and mindfulness

Unit-IV **8 Hours**

The three gunas (qualities of sattva—purity and harmony, rajas —activity and passion, tamas —darkness and chaos), the four antah-karanas (inner instruments) and panch kosha (five sheaths), Stress management, Oneness, non-duality and equanimity, Physical, mental, social and spiritual well-being. Practical: Talks on importance of the Ayurvedic concept of well-being and nutrition, sports activities.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Mahadevan, B., Bhat, V.R. and Nagendra, P.R.N. 2022. Introduction to Indian Knowledge System. Delhi: PHI.*
- *Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.*
- *Kashyap, Subhash C. 2019. Constitution of India. A handbook for students. New Delhi: National Book Trust.*
- *Dr. Awadesh Pradhan, Mahamanake Vichara". (B.H.U., Vanarasi 2007)*
- *Harold Koontz & Heinz Weihrich, Essentials of Management, Tata McGraw Hill.*
- *Lama, D. 2012. Beyond Religion: Ethics for a Whole World. India: Harper Collins.*

Course Title: Physiology (Ocular)	L	T	P	Cr.
Course Code: BOP2156	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Illustrate the anatomy of the eye, including its various structures such as the cornea, lens, retina, and optic nerve.
2. Describe the process of vision, including the formation and focusing of light on the retina, and the conversion of light into electrical signals by photoreceptor cells.
3. Explain the role of the different types of photoreceptors cells, namely rods and cones, in visual perception, including their distribution across the retina and their sensitivity to light.
4. Demonstrate the process of accommodation, which allows the eye to focus on objects at different distances through changes in the shape of the lens.
5. Identify and explain the structure and function of key components of the eye, including the cornea, lens, retina, optic nerve, and the muscles controlling eye movement. Understand their role in visual acuity, focusing, and accommodation.

Course Contents

UNIT-I **15 Hours**

Introduction to Ocular Physiology, Overview of the visual system, Anatomy and structure of the eye, Principles of ocular physiology, Optics and Refraction, Light and its interaction with the eye, Cornea and lens: refraction and accommodation, Optical aberrations and their effects on vision, Retinal Physiology, Retinal layers and cell types.

UNIT-II **15 Hours**

Phototransduction: from light to electrical signals, Rods and cones: structure and function, Visual Pathways and Processing, Neural pathways from the retina to the brain, Visual processing in the primary visual cortex, Color vision and processing of different visual attributes, Visual Perception.

UNIT-III **15 Hours**

Depth perception and binocular vision, Visual acuity and contrast sensitivity, Visual field and visual attention, Ocular Movements and Control, Extraocular muscles and their innervations, Oculomotor control and eye movements, Vestibular-ocular reflex and gaze stabilization, Ocular Health and Diseases, Ocular surface physiology and tear film, Intraocular pressure

and glaucoma, Age-related macular degeneration and retinal diseases.

UNIT-IV **15 Hours**

Clinical Applications, Ocular examination techniques, Diagnostic tests in ocular physiology, Application of ocular physiology in clinical practice, Emerging Topics in Ocular Physiology, Advances in retinal imaging techniques, Optogenetics and vision restoration, Ocular pharmacology and drug delivery.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Kolb, H., Fernandez, E., & Nelson, R. (2016). Webvision: The Organization of the Retina and Visual System. University of Utah Health Sciences Center. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK11537/*
- *Kandel, E. R., Schwartz, J. H., Jessell, T. M., Siegelbaum, S. A., & Hudspeth, A. J. (2012). Principles of Neural Science (5th ed.). McGraw-Hill Education.*
- *Dartt, D. A., Besharse, J. C., & Dana, R. (Eds.). (2011). Encyclopedia of the Eye. Academic Press.*
- *Liversidge, J., & Sewell, H. F. (Eds.). (2013). The Eye: Basic Sciences in Practice (4th ed.). Saunders Ltd*
- *Pardue, M. T., &Hackam, A. S. (Eds.). (2016). Ocular Disease: Mechanisms and Management. Elsevier.*
- *Kaufman, P. L., Alm, A., & Levin, L. A. (Eds.). (2011). Adler's Physiology of the Eye: Expert Consult (11th ed.). Saunders.*
- *Levin, L. A., Nilsson, S. F. E., & Ver Hoeve, J. N. (Eds.). (2019). Adler's Physiology of the Eye: Expert Consult (12th ed.). Saunders.*

Course Title: General Microbiology	L	T	P	Cr.
Course Code: BOP2157	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Describe the major groups of microorganisms (bacteria, archaea, fungi, protozoa, algae, and viruses).
2. Compare the structural and functional differences between prokaryotic and eukaryotic cells.
3. Explain microbial growth, metabolism, and reproduction.
4. Understand the basic principles of microbial genetics, including DNA replication, transcription, translation, and gene regulation.
5. Demonstrate proper use of aseptic technique and laboratory safety.

Course Contents

UNIT-I **15 Hours**

Introduction to Microbiology; Types of Microorganism bacteria: cell structure, element idea about classification and morphological basis. Staining reaction: Gram staining, acid fast staining, Bacterial growth: nutritional requirements, Physical factors Effecting culture media and growth curve. Sterilization and disinfection in the laboratory. Antibiotic: Bacteriostatic and bactericidal effects.

UNIT-II **15 Hours**

Micro Vs Humans, The development of infection, the disease process, Pathogenicity and virulence- Ocular Bacteriology- Gram Positive (Staphylococcus aureus, Staphylococcus epidermidis, Streptococcus Propionibacterium, actinomyceses, nocardia) Pneumococcus. Bactetria including acid fast bacilli (mycobacterium tuberculosis, mycobacterium leparae)

UNIT-III **15 Hours**

Ocular Bacteriology: Gram negative Bacteria (Pseudomonas, Heamophilous, Brucella, neisseria, morazella) Spirochetes (Treponema, Leptospiraccae)

UNIT-IV **15 Hours**

Virology: Classification of viruses in ocular disease, Rubella, Adenovirus, Oncogenic viruses (HPV, HBV, Retrovirus), HIV Fungi-yeast, intracellular parasites protozoa (taxoplasmosis, acanthamoeba),heliminthus (toxocariasis, onchocerciasis, trematodes)

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Tortora GJ, Funke BR, Case CL. Microbiology: An Introduction. 13th ed. Boston: Pearson; 2018.*
- *Madigan MT, Bender KS, Buckley DH, Sattley WM, Stahl DA. Brock Biology of Microorganisms. 16th ed. New York: Pearson; 2020.*
- *Prescott LM, Harley JP, Klein DA. Microbiology. 9th ed. New York: McGraw-Hill; 2014.*
- *Willey JM, Sandman K, Wood D. Prescott's Microbiology. 11th ed. New York: McGraw-Hill Education; 2021.*
- *Levinson W. Review of Medical Microbiology and Immunology. 16th ed. New York: McGraw-Hill; 2020.*

3rd SEMESTER

Course Title: Visual Optics I	L	T	P	Cr.
Course Code: BOP3200	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will 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.
3. Explain refractive errors (myopia, hyperopia, astigmatism, and presbyopia) and their optical correction.
4. Use basic optical instruments (e.g., lensometers, retinoscopes, autorefractors) to assess refractive errors.
5. Solve practical problems related to refraction, accommodation, and corrective lenses.

Course Contents

UNIT-I **10 Hours**

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

UNIT-II **10 Hours**

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

UNIT-III **13 Hours**

- 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

UNIT-IV **12 Hours**

- 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

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *A H Tunnacliffe: Visual optics, The Association of British Optician, 1987*
- *AG Bennett & RB Rabbets: Clinical Visual optics, 3rd edition, Butterworth Heinemann, 1998*
- *M P Keating: Geometric, Physical and Visual optics, 2nd edition, Butterworth-Heinemann, USA, 2002*
- *HL Rubin: Optics for clinicians, 2nd edition, Triad publishing company. Florida, 1974.*
- *H Obstfeld: Optic in Vision- Foundations of visual optics & associated computations, 2nd edition, Butterworth, UK, 1982.*
- *WJ Benjamin: Borish's clinical refraction,2nd edition, Butterworth Heinemann, Missouri, USA,2006*
- *T Grosvenor: Primary Care Optometry,4th edition, Butterworth – heinneman, USA,2002*

Course Title: Ocular Disease I	L	T	P	Cr.
Course Code: BOP3201	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Understand the Basic Anatomy and Physiology of the Eye – Describe the structure and function of ocular tissues relevant to disease processes.
2. Recognize Common Anterior Segment Diseases – Identify and differentiate conditions affecting the cornea, conjunctiva, sclera, and anterior chamber.
3. Understand Posterior Segment Pathologies – Explain diseases of the retina, choroid, optic nerve, and vitreous.
4. Differentiate Between Infectious and Non-Infectious Ocular Conditions – Identify bacterial, viral, fungal, and inflammatory ocular diseases.
5. Interpret Clinical Signs and Symptoms of Ocular Diseases – Develop a systematic approach to diagnosing common eye conditions.

Course Contents

UNIT-I **15 Hours**

- Anterior segment ocular diseases involving orbit, eyelids, adnexa, conjunctiva, cornea, urea, sclera, anterior chamber, iris and lens.
- Symptomatology, clinical signs, diagnosis, pathogenesis, patho physiology, systemic disease relationships and treatment of degenerative, infections and inflammatory conditions affecting these structures.
- Disease of the Lids – Congenital Deformities of the Lids. Oedema of the Lids. Inflammatory Conditions of the Lids. Deformities of the Lid Margins. Deranged Movement of the Eyelids. Neoplasms of the Lids. Injuries of the Lids.

UNIT-II **15 Hours**

- Diseases of the Lachrymal Apparatus-. Dry Eye. Disease of the Lachrymal Gland. Disease of the Lachrymal Passages. Operations for Chronic Dacryocystitis.
- Disease of the Conjunctiva- Subconjunctival Haemorrhage Infective Conjunctivitis. Follicular Conjunctivitis. Granulomatous Conjunctivitis.
- Allergic Conjunctivitis. Conjunctivitis Associated with Skin conditions. Degenerative conditions of the Conjunctiva. Vitamin- A Deficiency.

Cysts and Tumours of the Conjunctiva. Conjunctival Pigmentation. Injuries of the Conjunctiva.

UNIT-III **15 Hours**

- Disease of the Cornea –Congenital Anomalies. Inflammation of the Cornea (Keratitis). Superficial Keratitis.
- Deep Keratitis. Vascularisation of Cornea. Opacities of the Cornea. Keratoplasty. Corneal Degenerations. Corneal Dystrophy's.
- Corneal Pigmentation. Corneal Injuries. Refractive Corneal Surgery. Corneal Ulcer (Bacterial, Viral, Fungal)
- Disease of the Sclera- Episcleritis. Scleritis. Staphyloma of the Sclera. Blue Sclerotic Scleromalacia Performs. Nonophthalmic. Injuries of the Sclera.

UNIT-IV **15 Hours**

- Disease of the Iris.-. Congenital Anomalies. Inflammations (Anterior Uveitis). Specific Types of Iridocyclites. Degenerations of the Iris. Cysts and Tumours of the Iris. Injuries of the Iris.
- Disease of the Celery Body- Inflammations of the Celery Body. Purulent iridocyclitis (Pan ophthalmitis) Evisceration.
  Sympathetic Ophthalmia. Vogt- Koyanagi – Harada Syndrome.
  Tumours of the Celery body. Injuries of the Celery body.
- Glaucoma Formation of Aqueous Humour. Drainage of Aqueous. Intraocular Pressure (IOP).
- Ocular Rigidity.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *"Kanski's Clinical Ophthalmology: A Systematic Approach" – Brad Bowling*
- *"Parson's Diseases of the Eye" – Sihota & Tandon*
- *"Ocular Pathology" – Myron Yanoff & Joseph W. Sassani*
- *"Ophthalmology" – Yanoff & Duker*
- *"Clinical Optometry: Principles and Practice" – Andrew Keirl& Caroline Christie*

Course Title: First Aid	L	T	P	Cr.
Course Code: BOP3202	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Provide appropriate first Aid form in or injuries including small cuts, grazes, bruises etc.
2. Assess situations and circumstances in order to provide First Aid safely, promptly and effectively in arrange of emergencies.
3. Manage organizations, records related to patients and departmental statistics.
4. Identify signs and symptoms of common medical emergencies, injuries, and accidents.
5. Learners will understand the importance of clear communication, including how to give concise instructions, alert emergency services, and provide relevant information during a crisis.

Course Contents

UNIT-I **15 Hours**

First aid: Aims and objectives of first aid; wounds and bleeding, dressing and bandages; pressure and splints, supports etc. Shock; insensibility; asphyxia; convulsions; resuscitation, use of suction apparatus; drug reactions; prophy lactic measures; administration of oxygen; electric shock; burns; scalds; hemorrhage; pressure points; compression band. Fractures; splints, bandaging; dressing, foreign bodies; poisons.

UNIT-II **10 Hours**

Infection: Bacteria, their nature and appearance; spread of infections; auto- infection or cross-infection; the inflammatory process; local tissue reaction, general body reaction; ulceration; Asepsis and antisepsis. Universal precautions, hospital acquired infections-HIV, HepatitisB, C, and MRSA etc.

UNIT-III **10 Hours**

Principles of Asepsis: Sterilization- methods of sterilization; use of central sterile supply department; care of identification of instruments, surgical dressings in common use, including filament swabs, elementary operating theatre procedure; setting of trays and trolleys

UNIT-IV **10 Hours**

Departmental procedures: Department staffing and organizations; records relating to patients and departmental statistics; professional attitudes of the technologist to patients and other members of the staff, medico-legal aspects accidents in the department

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested Readings:

- *Curry,T.S.,Dowdey,J.E.,&Murray,R.C.(1990).Christe nsen'sphysicsof diagnostic radiology. Lippincott Williams & Wilkins.*
- *Podgoršak, E. B. (2006). Radiation physics for medical physicists (Vol. 1). Berlin: Springer.*
- *Weishaupt, D., Köchli, V. D., &Marincek, B. (2008). How does MRI work?:an introduction to the physics and function of magnetic resonance imaging. Springer Science & Business Media.*

Course Title: Disaster Management	L	T	P	Cr.
Course Code: BOP3203	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Understand the principles of disaster management.
2. Identify and classify different types of disasters.
3. Apply emergency medical response protocols in disaster situations.
4. Participate in disaster preparedness and mitigation activities.
5. Communicate effectively during disaster response.

Course Contents

Unit 1 **10 Hours**

Introduction to Disaster Management

- Definitions and concepts of disaster, hazard, risk, and vulnerability.
- Types of disasters: Natural (earthquakes, floods, cyclones) and man-made (chemical spills, industrial accidents).
- The disaster management cycle: Mitigation, preparedness, response, and recovery.
- National and international disaster management frameworks.
- Role of paramedical professionals in disaster management.

Unit 2 **10 Hours**

Disaster Preparedness and Mitigation

- Risk assessment and vulnerability analysis.
- Developing disaster management plans.
- Early warning systems and communication strategies.
- Community-based disaster preparedness.
- First aid and basic life support training.
- Resource management and logistics.

Unit 3 **15 Hours**

Emergency Medical Response in Disasters

- Triage and casualty management.
- Management of trauma and injuries.
- Infection control and sanitation.

- Psychological first aid.
- Mass casualty incidents and field hospitals.
- Transportation of injured people.

Unit 4 **10 Hours**

Post-Disaster Recovery and Rehabilitation

- Needs assessment and damage evaluation.
- Rehabilitation and reconstruction.
- Mental health and psychosocial support.
- Disease surveillance and prevention.
- Ethical considerations in disaster management.
- Legal aspects of disaster management.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question Answer

Recommended Textbooks:

- *Alexander, D. (2016). Natural disasters. Routledge.*
- *Haddow, G. D., Bullock, J. A., & Coppola, D. P. (2017). Introduction to emergency management. Butterworth-Heinemann.*
- *Carter, W.N. (1991). Disaster Management: A Disaster Manager's Handbook. Asian Development Bank.*
- *WHO, (Various publications) World Health Organization emergency and disaster related publications.*

Course Title: Visual Optics I Lab	L	T	P	Cr.
Course Code: BOP3204	0	0	2	1

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Understand the fundamental principles of visual optics and its applications in clinical practice.
2. Demonstrate proficiency in basic optical instruments used in optometry and ophthalmology.
3. Measure and analyze refractive errors using various optical techniques.
4. Perform objective and subjective refraction to determine the best corrective lenses.
5. Evaluate accommodation and binocular vision through practical assessments.

Course Contents

List of Practical's / Experiments **30 HOURS**

1. Introduction to Optical Instruments – Handling and understanding trial lens sets, retinoscopes, and keratometers.
2. Measurement of Pupillary Distance (PD) – Using pupillometers and manual methods.
3. Measurement of Visual Acuity – Snellen's chart, LogMAR chart, and near vision testing.
4. Retinoscopy (Static & Dynamic) – Identifying myopia, hyperopia, and astigmatism.
5. Subjective Refraction Techniques – Fogging method, duochrome test, and Jackson's cross-cylinder.
6. Cross Cylinder Test – Determining astigmatism power and axis.
7. Accommodation Tests – Near point of accommodation (NPA) and near point of convergence (NPC).
8. Cover Test & Maddox Rod Test – Assessing phoria and tropia.
9. Prism Bar Measurement – Measuring heterophoria and heterotropia.
10. Worth 4-Dot Test – Evaluating binocular vision and suppression.
11. Lens Neutralization using a Lensometer – Identifying power and type of ophthalmic lenses.
12. Effects of Spherical & Cylindrical Lenses on Vision – Understanding optical corrections.

13. Practical Application of Progressive and Bifocal Lenses – Demonstration and fitting.

Suggested readings:

- *"Clinical Optics" by A.R. Elkington, Helena J. Frank, and Michael J. Greaney*
- *"Optics for Optometry Students" by M. Kasthurirangan*
- *"Optics and Refraction" by David B. Elliott*

Course Title: English for Clinical Language	L	T	P	Cr.
Course Code: BOP3205	2	0	0	2

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Understand and utilize medical terminology accurately.
2. Communicate effectively with patients and healthcare professionals.
3. Write clear and concise medical reports and documentation.
4. Demonstrate professional communication skills in healthcare settings.
5. Students will acquire the necessary vocabulary related to medical procedures, diagnoses, treatments, and anatomy, enabling them to confidently understand and use clinical terms in both verbal and written communication.

Course Content

UNIT I **7 Hours**

Foundations of Medical Terminology

1) Introduction to medical terminology: Roots, prefixes, suffixes.
2) Anatomical and physiological terms.
3) Terms related to common diseases and conditions.
4) Understanding and using medical abbreviations.
5) Pronunciation and spelling of medical terms.

UNIT II **7 Hours**

Patient Communication and Interaction

1) Effective communication techniques with patients.
2) Taking patient history and conducting interviews.
3) Explaining medical procedures and treatments.
4) Handling difficult or sensitive conversations.
5) Cultural sensitivity in patient communication.

UNIT III **7 Hours**

Medical Documentation and Report Writing

1) Principles of medical documentation.
2) Writing patient reports and case studies.
3) Documenting medical procedures and observations.
4) Using medical charts and electronic health records (EHR).

5) Grammar and style for medical writing.

UNIT IV **9 Hours**

Professional Communication in Healthcare

1) Communication with other healthcare professionals.
2) Presenting medical information in meetings and conferences.
3) Using professional email and correspondence.
4) Ethical considerations in medical communication.
5) Developing presentation skills.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Young, B. A. (2018). Medical terminology: An illustrated guide. F.A. Davis.*
- *Rice, R. (2017). Medical terminology with human anatomy. Pearson.*
- *Boothman, R. C. (2013). How to Connect in Business in 90 Seconds or Less. Pearson.*
- *Geffner, D. (2018). The Skilled Helper: A Problem-Management and Opportunity-Development Approach to Helping. Cengage Learning.*

Course Title: Hospital Infection Control and Preventions	L	T	P	Cr.
Course Code: VAC0003	2	0	0	2

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Define infection control and explain its importance in the hospital setting.
2. Explain the nature and characteristics of pathogens (bacteria, viruses, fungi, and parasites).
3. Understand the role of surveillance in preventing infections.
4. Understand the unique infection risks posed to vulnerable patient populations (e.g., immunocompromised patients).
5. Participants will learn to identify common healthcare-associated infections, their symptoms, and risk factors, and understand how they are transmitted within hospital environments.

Course Content

UNIT-I **7 Hours**

1.1. Introduction to Infection Control

- Definition and importance of infection control in hospitals
- Types of infections in healthcare settings (e.g., nosocomial infections, cross-contamination)
- Impact of hospital-acquired infections (HAIs) on patient outcomes, healthcare workers, and hospital operations
- Legal and ethical considerations in infection control

1.2. Key Concepts and Terminologies

- Infections vs. Colonization
- Modes of Transmission (contact, droplet, airborne, etc.)
- Reservoirs, portals of entry and exit, and susceptible hosts
- Infection Control principles (Isolation, Standard Precautions, etc.)

1.3. Microbial Pathogens in Healthcare Settings

- Bacteria, viruses, fungi, and parasites commonly found in healthcare settings
- Antibiotic-resistant pathogens (e.g., MRSA, C. difficile, CRE, etc.)
- Understanding pathogenicity and virulence

UNIT-II **7 Hours**

2.1. Standard Precautions

- Hand hygiene (indications, techniques, alcohol-based hand rubs, and soap-and-water washing)
- Personal Protective Equipment (PPE) – types, proper use, and disposal
- Respiratory hygiene and cough etiquette
- Safe injection practices and needle-stick injury prevention
- Cleaning, disinfecting, and sterilizing medical equipment

2.2. Transmission-Based Precautions

- Contact Precautions: Types of infections and examples (e.g., MRSA, C. difficile)
- Droplet Precautions: Infections transmitted by respiratory droplets (e.g., influenza, COVID-19)
- Airborne Precautions: Diseases that require negative pressure rooms (e.g., tuberculosis, measles)
- Special considerations for managing different infection types

2.3. Safe Handling of Waste

- Procedures for handling and disposing of contaminated waste and sharps
- Infectious waste segregation and labeling protocols

UNIT-III **7 Hours**

3.1. Infection Control in Patient Care Areas

- Isolation rooms: Purpose and proper usage
- Operating rooms and intensive care units (ICUs): Infection control in high-risk areas
- Infectious disease outbreaks in hospitals (managing outbreaks, tracing sources)
- Infection control in maternal and child health settings
- Infection control in dialysis centers

3.2. Infection Control in Healthcare Personnel

- Health and safety protocols for healthcare workers
- Employee vaccinations and screenings (e.g., flu, TB, hepatitis B)

- Preventing occupational exposures (e.g., sharps injuries, blood-borne pathogens)
- Post-exposure management and protocols

3.3. Infection Control in Visitors and Family Members

- Visitor screening and restrictions during outbreaks
- Ensuring visitor compliance with infection control measures
- Education and training for family members

UNIT-IV **7 Hours**

4.1. Surveillance Systems and Reporting

- Infection surveillance: Purpose, methods, and types (e.g., active vs. passive surveillance)
- Tracking infections and outbreaks: Key performance indicators and metrics
- Using data to drive infection control efforts (e.g., infection rate reduction)

4.2. Audits and Inspections

- Conducting infection control audits
- Monitoring adherence to infection control protocols
- Corrective actions and improvement plans following audit results

4.3. Training and Education

- Role of ongoing education for healthcare staff
- Infection control training programs and their effectiveness
- Building a culture of safety: Encouraging staff engagement and compliance

4.4. Research and Advancements in Infection Control

- New technologies in infection prevention (e.g., UV light, antimicrobial surfaces)
- Current research trends and innovations in hospital infection control
- The role of antimicrobial stewardship in preventing infections

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *World Health Organization.* WHO Guidelines on Hand Hygiene in Health Care**.***Geneva: WHO; 2009.*
- *Grol R, Wensing M, Eccles M. Improving Patient Care: The Implementation of Change in Clinical Practice. 2nd ed. Edinburgh: Elsevier; 2013.*
- *Mayo Clinic. Infection Control: Preventing Healthcare-associated Infections. Mayo Clinic Press; 2016.*
- *Goh KT, Salim A, Buehler JW. Microbiology of Hospital Infections. 3rd ed. New York: Springer; 2017.*
- *Spence RP, Stevens DL. Infection Control: A Practical Approach. 1st ed. Oxford: Oxford University Press; 2012.*
- *Centers for Disease Control and Prevention (CDC). Infection Control Guidelines. Atlanta: CDC; 2019.*

Course Title: Optometric Optics	L	T	P	Cr.
Course Code: BOP3206	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Measurement of lens power, lens centration using conventional techniques
2. Transposition of various types of lenses
3. Knowledge to identify different forms of lenses (equi- convex, planoconvex, periscopic, etc.)
4. Knowledge to select the tool power for grinding process.
5. Measurement of surface powers using lens measure.

Course Contents

UNIT-I **15 Hours**

- Introduction –Light, Mirror, Reflection, Refraction and Absorption
- Prisms –Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel's prisms, rotary prisms
- Lenses –Definition, units, terminology used to describe, form of lenses, Vertex distance and vertex power.
- Lens shape, size and types i.e., spherical, cylindrical and Sphero-cylindrical

UNIT-II **15 Hours**

- Prismatic effect, centration, decentration and Prentice rule, Prismatic effect of Plano- cylinder and Sphero cylinder lenses.
- Magnification in high plus lenses, Minification in high minus lenses.
- Magnification in high plus lenses, Minification in high minus lenses.
- Aberration in Ophthalmic Lenses
- Spectacle Lenses - II: Manufacture of glass, Lens materials, Lens surfacing

UNIT-III **15 Hours**

- 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)

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

UNIT-IV **15 Hours**

- Tinted & Protective Lenses: Characteristics of tinted lenses Absorptive Glasses, Polarizing Filters, Photochromic & Reflecting filters, Safety Lenses-Toughened lenses, Laminated Lenses, CR 39, Polycarbonate lense.
- Multifocal Lenses: Introduction, history and development, types, Bifocal lenses, Trifocal & Progressive addition lenses
- 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
- Miscellaneous Spectacle: Iseikonic lenses, Spectacle magnifiers, Recumbent prisms Fresnel prism and lenses, Lenticular & Aspherical lenses, High Refractive index glasses

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Jalie M: The principles of Ophthalmic Lenses, The Association of Dispensing Opticians, London, 1994.*
- *David Wilson: Practical Optical Dispensing, OTEN- DE, NSW TAFE Commission,1999*
- *C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth Heinemann, USA, 1996*
- *Troy E. Fannin, Theodore Grosvenor: Clinical Optics, 2nd edition, Butterworth– Heinemann, 1996*
- *Michael P Keating: Geometric, Phisical& Visual Optics, 2nd edition, Butterworth – Heinemann, 2002*

Course Title: General and Ocular Biochemistry	L	T	P	Cr.
Course Code: BOP3207	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Develop a comprehensive understanding of the fundamental biochemical principles that govern biological processes.
2. Investigate the biochemical processes that occur in the eye and contribute to its structure, function, and diseases.
3. Explore the biochemical abnormalities associated with ocular disorders such as cataracts, glaucoma, diabetic retinopathy, and macular degeneration.
4. Demonstrate the molecular mechanisms that enable vision and explore how dysregulation can lead to vision impairment or blindness.

Course Contents

UNIT-I **15 Hours**

Introduction to biochemistry and its importance in understanding biological systems, Overview of biomolecules: carbohydrates, lipids, proteins, and nucleic acids, Structure, properties, and functions of biomolecules.

Overview of carbohydrate metabolism: glycolysis, gluconeogenesis, and the pentose phosphate pathway, Regulation of carbohydrate metabolism, Disorders of carbohydrate metabolism, such as diabetes mellitus.

Structure and classification of lipids, Lipid digestion and absorption, Disorders of lipid metabolism, such as hyperlipidemia

UNIT-II **15 Hours**

Protein and Amino Acid Metabolism, Structure and properties of amino acids, Protein synthesis: transcription, translation, and post-translational modifications, Amino acid metabolism: transamination, deamination, and urea cycle, Disorders of amino acid metabolism, such as phenylketonuria and maple syrup urine disease.

Structure and functions of DNA and RNA, DNA replication, transcription, and translation, Nucleotide metabolism: synthesis and degradation of purines and pyrimidines, Disorders of nucleotide metabolism, such as gout and Lesch Nyhan syndrome.

Laboratory techniques in biochemistry: spectrophotometry, chromatography, electrophoresis, and enzyme assays, Biochemical analysis of clinical samples: blood, urine, and cerebrospinal fluid

UNIT-III **15 Hours**

Overview of ocular anatomy and physiology, Unique aspects of ocular biochemistry and metabolism, Ocular tissues and their specific biochemical properties, Role of biochemistry in maintaining ocular health and function Structure and functions of the tear film, Biochemical composition of tears: proteins, lipids, and mucins, Biochemical processes at the ocular surface: epithelial cell turnover, wound healing, and inflammation, Biochemical abnormalities associated with dry eye syndrome and other ocular surface disorders Lens structure and transparency, Lens proteins and their modifications: posttranslational changes, aggregation, and cataract formation, Lens metabolism and nutrient transport, Biochemical aspects of age-related cataract formation

UNIT-IV **15 Hours**

Structure and function of the retina, Photo transductionand visual pigment biochemistry, Retinal metabolism and energy requirements, Biochemical mechanisms underlying retinal diseases, such as age-related macular degeneration and retinitis pigmentosa.

Structure and function of the optic nerve, Myelin and axonal integrity in the optic nerve, Biochemical processes involved in optic nerve degeneration and regeneration, Biochemical markers for optic nerve diseases, including glaucoma.

Pharmacokinetics and pharmacodynamics of ocular drugs, Drug metabolism and elimination in the eye, Biochemical interactions between drugs and ocular tissues, Biochemical mechanisms of action for commonly used ocular medications

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Nelson, D. L., Cox, M. M., Lehninger, A. L., & Cox, M. M. (2017). Lehninger principles of biochemistry. W.H. Freeman.*
- *Berg, J. M., Tymoczko, J. L., & Gatto, G. J. (2018). Stryer's biochemistry. W.H. Freeman.*
- *Champe, P. C., Harvey, R. A., & Ferrier, D. R. (2017). Lippincott illustrated reviews: Biochemistry. Lippincott Williams & Wilkins.*
- *Devlin, T. M. (2019). Textbook of biochemistry: With clinical correlations. Wiley.*
- *Lobo, V., Patil, A., Phatak, A., & Chandra, N. (2010). Free radicals, antioxidants and functional foods: Impact on human health. Pharmacognosy Reviews, 4(8), 118-126.*

- *Umapathy, E., & Nandhakumar, J. (Eds.). (2021). Advances in ocular drug delivery: Therapeutic applications. CRC Press.*
- *Peyman, G. A., Conway, M. D., & Nagpal, K. C. (2020). Principles and practice of ophthalmic plastic and reconstructive surgery. Springer.*
- *Levin, L. A., & Nilsson, S. F. E. (Eds.). (2019). Ocular physiology and biochemistry. CRC Press.*

4th SEMESTER

Course Title: Visual Optics II	L	T	P	Cr.
Course Code: BOP4250	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Explain the optical components of the human eye and their role in image formation.
2. Classify different types of ametropia (myopia, hyperopia, astigmatism, presbyopia) and their optical corrections.
3. Conduct subjective refraction using various techniques (fogging, duochrome test, Jackson's cross-cylinder, binocular balancing).
4. Describe the accommodative-convergence relationship and its significance in binocular vision.
5. Compare spectacle and contact lens corrections in different refractive errors.

Course Contents

UNIT-I **15 Hours**

Accommodation & Presbyopia

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

Convergence:

- Type, Measurement and Anomalies
- Relationship between accommodation and convergence (AC/A ratio)

UNIT-II **10 Hours**

Objective Refraction (Static & Dynamic)

- Streak retinoscopy
- Principle, Procedure, Difficulties and interpretation of findings
- Transposition and spherical equivalent
- Dynamic retinoscopy various methods
- Radical retinoscopy and near retinoscopy

- Cycloplegic refraction

UNIT-III **10 Hours**

Subjective Refraction:

- Principle and fogging
- Fixed astigmatic dial (Clock dial), Combination of fixed and rotator dial (Fan and block test),
- Duochrome test
    - Binocular balancing- alternate occlusion, prism dissociation, dissociate Duochrome balance, Borish dissociated fogging
    - Binocular refraction-Various techniques

UNIT-IV **10 Hours**

Effective Power & Magnification:

- Ocular refraction vs. Spectacle refraction
- Spectacle magnification vs. Relative spectacle magnification
- Axial vs. Refractive ammetropia, Knapp's law
- Ocular accommodation vs. Spectacle accommodation
- Retinal image blur-Depth of focus and depth of field

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

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

Course Title: Optometric optics II and Dispensing optics	L	T	P	Cr.
Course Code: BOP4251	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

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

Course Contents

UNIT-I **10 Hours**

Spectacle Lenses - II:

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

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

Tinted & Protective Lenses:

- Characteristics of tinted lenses Absorptive Glasses
- Polarizing Filters, Photochromic & Reflecting filters
- Safety lenses-Toughened lenses, Laminated Lenses, Polycarbonate lenses

UNIT-II **10 Hours**

Multifocal Lenses:

- Introduction, history and development, types
- Bifocal lenses, Trifocal & Progressive addition lenses

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

Miscellaneous Spectacle:

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

UNIT-III **15 Hours**

- Components of spectacle prescription & interpretation, transposition, Add and near power relation
- Frame selection
    - based on spectacle prescription, professional requirements, age group, face shape
- Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height
- Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments
    - facial wrap, pantoscopic tilt
- Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements)

UNIT-IV **10 Hours**

- Neutralization
    - Hand &lensometer, axis marking, prism marking
- Faults in spectacles (lens fitting, frame fitting, patient's complaints, description, detection and correction)
- Final checking & dispensing of spectacles to customers, counseling on wearing & maintaining of spectacles, Accessories
    - Bands, chains, boxes, slevets, cleaners, screwdriver kit
- Spectacle repairs
    - tools, methods, soldering, riveting, frame adjustments

- Special types of spectacle frames
    - Monocles
    - Ptosis crutches
    - Industrial safety glasses
    - Welding glasses

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

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

Course Title: Ophthalmic and optical instrumentation	L	T	P	Cr
Course Code: BOP4252	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Explain the principles of optics and their application in ophthalmic instrumentation.
2. Develop skills in using and interpreting measurements from different ophthalmic instruments.
3. Demonstrate a foundational understanding of basic optics principles relevant to the operation of optical instruments.
4. Operate lens edging equipment to cut and mount lenses into eyeglass frames accurately.
5. Provide knowledge about different types of refractive surgery, such as LASIK and PRK.

Course Contents

UNIT-I **10 Hours**

Introduction to Ophthalmic Instrumentation, Overview of ophthalmic instruments and their applications, Historical perspective and development of ophthalmic instruments, Optics for Ophthalmic Instrumentation, Principles of geometrical and physical optics, Refraction, reflection, and absorption of light, Lens systems and their properties. Advanced Diagnostic Instruments: Fundus cameras and imaging techniques, Optical coherence tomography (OCT), Corneal topography, Visual field testing and perimetry

UNIT-II **10 Hours**

Structure and function of the eye, Optical properties of the cornea, lens, and retina, Visual pathway and visual perception, Visual Acuity Testing Instruments, Snellen chart and visual acuity measurements, Projectors, charts, and vision testing systems, Refraction and Prescribing Instruments, Retinoscopy and autorefraction. Advanced Refractive Instruments: Autorefractors and keratometers, Aberrometry and wavefront analysis, Phoropters and subjective refraction, contact lens fitting instruments, Ocular Imaging Techniques: Ultrasound bio microscopy (UBM), Anterior segment imaging, Posterior segment imaging, Specular microscopy,

UNIT-III **15 Hours**

Direct and indirect ophthalmoscopy, Fundus photography and imaging techniques, Tonometry and Intraocular Pressure Measurement, Principles

and techniques of tonometry; Applanation, indentation, and non-contact tonometry, Diagnostic Imaging in Ophthalmology, Optical coherence tomography (OCT), Ultrasound bio microscopy (UBM). Ophthalmic Surgical Instruments: Introduction to ophthalmic surgery instruments, Microsurgical instruments, Phacoemulsification systems, Vitrectomy machines, Laser Systems in Ophthalmology: Introduction to lasers in ophthalmology, Excimer lasers for refractive surgery, Argon and diode lasers, Photocoagulation lasers.

Unit-IV **10 Hours**

Microsurgical instruments for cataract, cornea, and glaucoma surgeries, Laser systems for refractive surgery, Instrument Maintenance and Quality Assurance, Cleaning, calibration, and maintenance of ophthalmic instruments, Quality control and assurance in instrument operation. Ophthalmic Procedures: Intraocular lens (IOL) implantation, Corneal surgeries (e.g., LASIK, PRK), Glaucoma surgeries, Retinal surgeries, Quality Assurance and Maintenance: Calibration and quality control of instruments, routine maintenance and troubleshooting, Compliance with safety regulations, Infection control procedures

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *American Academy of Ophthalmology. (2018). Basic Ophthalmology for Medical Students and Primary Care Residents. American Academy of Ophthalmology.*
- *Bartlett, J. D., Jaanus, S. D., & Kaye, G. I. (Eds.). (2010). Clinical Ocular Pharmacology (5th ed.). Butterworth-Heinemann.*
- *Khurana, A. K. (2019). Comprehensive Ophthalmology (7th ed.). Jaypee Brothers Medical Publishers.*
- *Yanoff, M., & Duker, J. S. (Eds.). (2018). Ophthalmology (5th ed.). Elsevier.*
- *Bennett, A. G., & Rabbetts, R. B. (2012). Clinical Visual Optics (4th ed.). Butterworth-Heinemann.*

Course Title: Ocular Disease II	L	T	P	Cr.
Course Code: BOP4253	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Describe the pathophysiology, epidemiology, and clinical presentation of advanced ocular diseases, including retinal, corneal, uveitic, neuro-ophthalmic, and systemic-related ocular conditions.
2. Differentiate between various ocular diseases based on clinical signs, symptoms, imaging, and diagnostic testing.
3. Explain the pharmacological and surgical treatment options for advanced ocular diseases.
4. Identify the ocular manifestations of systemic diseases such as diabetes, hypertension, autoimmune conditions, and infectious diseases.
5. Perform a comprehensive ocular examination to assess and diagnose complex ocular diseases.

Course Contents

UNIT-I **15 Hours**

Retina and Vitreous:

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

Ocular Injuries:

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

UNIT-II **15 Hours**

Lens

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

UNIT-III **15 Hours**

Clinical Neuro-ophthalmology

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

UNIT-IV **15 Hours**

Glaucoma

- 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, Intermittent glaucoma, acute congestive, chronic angle closure)
- Secondary Glaucoma's
- Management: common medications, laser intervention and surgical techniques

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *"Kanski's Clinical Ophthalmology: A Systematic Approach" – Brad Bowling*
- *"Vaughan & Asbury's General Ophthalmology" – Paul Riordan-Eva, John P. Whitcher*
- *"Yanoff & Duker: Ophthalmology" – Myron Yanoff, Jay S. Duker*
- *"Diagnostic Imaging: Ophthalmology" – Afshin Gangi, Robert F. Mattrey*
- *"Clinical Atlas of OCT and OCT Angiography" – Amar Agarwal*
- *"Neuro-Ophthalmology Illustrated" – Valérie Biousse, Nancy J. Newman*

Course Title: Visual Optics II Lab	L	T	P	Cr.
Course Code: BOP4254	0	0	2	1

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Calculate the range and amplitude of accommodation and understand its variation with age.
2. Identify accommodative anomalies (insufficiency, spasm, fatigue) and their clinical significance.
3. Assess presbyopic changes and determine appropriate near additions for different age groups.
4. Explain the relationship between hypermetropia and accommodation in spectacle and contact lens correction.
5. Conduct cycloplegic refraction and interpret findings in children and young adults.

Course Contents

List of Practical's / Experiments **30 HOURS**

1. Measurement of Accommodation
    - Determining near and far points of accommodation using RAF rule.
    - Calculating range and amplitude of accommodation.
    - Observing age-related changes in accommodation.
    - Identifying and assessing anomalies of accommodation (e.g., accommodative insufficiency, spasm, paralysis).
2. Presbyopia & Hypermetropia
    - Measuring near add requirement for presbyopic patients.
    - Evaluating accommodative effort in hypermetropic patients.
    - Demonstrating the effects of different spectacle corrections on accommodation.
3. Convergence Testing
    - Measuring near point of convergence (NPC) using RAF ruler.
    - Assessing fusional convergence and divergence reserves with prisms.
    - Calculating AC/A ratio (gradient and calculated methods).
    - Identifying anomalies of convergence (e.g., convergence insufficiency, excess).
4. Static Retinoscopy

- Practicing streak retinoscopy on various refractive errors (myopia, hyperopia, astigmatism).
- Interpreting reflex movements and neutralization techniques.
- Identifying and overcoming common challenges in retinoscopy.

5. Transposition & Spherical Equivalent
   - Performing cylinder transposition between plus and minus forms.
   - Calculating spherical equivalent for cylindrical lenses.
6. Dynamic Retinoscopy & Cycloplegic Refraction
   - Demonstrating Mohindra retinoscopy (near retinoscopy technique).
   - Performing Bell's retinoscopy and Nott's retinoscopy for accommodation assessment.
   - Conducting cycloplegic refraction and evaluating its impact on accommodation.
7. Astigmatic Tests
   - Using clock dial and fan & block test for astigmatism detection.
   - Performing Jackson's Cross Cylinder (JCC) test for refinement.
8. Binocular Balancing &Duochrome Test
   - Performing Duochrome test to assess chromatic aberrations and refine sphere power.
   - Conducting binocular balancing using alternate occlusion, prism dissociation, and fogging techniques.
9. Binocular Refraction
   - Practicing various binocular refraction techniques to optimize visual comfort.
   - Comparing monocular vs. binocular refraction results.

Suggested readings:

- *Grosvenor TP. Primary Care Optometry. 5th ed. St. Louis: Butterworth-Heinemann; 2007.*
- *Borish IM. Clinical Refraction. 3rd ed. St. Louis: Butterworth-Heinemann; 2006.*
- *Bennett AG, Rabbetts RB. Clinical Visual Optics. 4th ed. Oxford: Butterworth-Heinemann; 2007.*
- *Eskridge JB, Amos JF, Bartlett JD. Clinical Procedures in Optometry. Philadelphia: Lippincott Williams & Wilkins; 1991.*
- *Hunter DG, West DC. Last-Minute Optics: A Concise Review of Optics, Refraction, and Contact Lenses. 2nd ed. Thorofare, NJ: SLACK Incorporated; 2015.*

Course Title: Optometric optics II and Dispensing optics Lab	L	T	P	Cr.
Course Code: BOP4255	0	0	2	1

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Understand the manufacturing process of optical glass and different lens materials (glass, CR39, polycarbonate, high-index plastics).
2. Explain the principles of lens surfacing, generation, and polishing used in optical labs.
3. Identify lens defects (material and surface faults) and apply quality inspection techniques according to industry standards (FDA, ANSI, ISI).
4. Differentiate between various spectacle frame materials and their properties (weight, durability, flexibility, coloration).
5. Classify spectacle frames based on construction, design, and mounting type.

Course Contents

List of Practical's / Experiments **30 HOURS**

1. Manufacturing & Material Study of Lenses
    - Demonstration of glass manufacturing process
    - Study of different lens materials (glass, CR39, polycarbonate)
    - Lens surfacing and polishing methods
    - Identifying faults in lens material and surface
2. Lens Inspection & Quality Standards
    - Visual & instrumental inspection of lenses for defects
    - Understanding and applying FDA, ANSI, and ISI safety standards
3. Spectacle Frames: Study & Selection
    - Identification of different frame materials and their properties
    - Frame construction and parts study
    - Frame selection based on size, shape, and mounting
4. Tinted & Protective Lenses
    - Examination of different tinted lenses and their absorption properties
    - Practical demonstration of polarizing filters, photochromic lenses, and safety lenses
    - Comparative analysis of different lens coatings

5. Multifocal Lens Study
    - Identification and differentiation of bifocal, trifocal, and progressive lenses
    - Practical demonstration of dividing line reflection in bifocals
    - Lens marking and power measurement of multifocal lenses
6. Reflection & Coatings
    - Demonstration of ghost images and reflections in lenses
    - Practical application and observation of anti-reflection and mirror coatings
    - Understanding Hard Multi-Coating (HMC) and hydrophobic coatings

Suggested readings:

- *Jalie M. Principles of Ophthalmic Lenses. 5th ed. London: Association of British Dispensing Opticians; 1984.*
- *Brooks CW, Borish IM. System for Ophthalmic Dispensing. 3rd ed. St. Louis: Elsevier; 2007.*
- *Jalie M. The Principles of Ophthalmic Dispensing. 3rd ed. London: Association of British Dispensing Opticians; 2016.*
- *Bennett AG, Rabbetts RB. Clinical Visual Optics. 4th ed. Edinburgh: Butterworth-Heinemann; 2007.*
- *Borish IM. Clinical Refraction. 3rd ed. St. Louis: Mosby; 1998.*
- *Wilson MA, Daras T. Ophthalmic Dispensing and Applications. New York: McGraw-Hill; 2005.*
- *Evans BJW. Pickwell's Binocular Vision Anomalies. 5th ed. Edinburgh: Butterworth-Heinemann; 2007.*

Course Title: Ophthalmic and optical instrumentation Lab	L	T	P	Cr.
Course Code: BOP4256	0	0	2	1

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Explain the principles of optics and their application in ophthalmic instrumentation.
2. Develop skills in using and interpreting measurements from different ophthalmic instruments.
3. Demonstrate a foundational understanding of basic optics principles relevant to the operation of optical instruments.
4. Operate lens edging equipment to cut and mount lenses into eyeglass frames accurately.
5. Discuss the principles of laser physics, laser safety, and the appropriate use of different laser modalities.

Course Content

List of Practical's / Experiments: 30 Hours

1. Lensometry: Measurement of lens power, verification of prescription lenses, and interpretation of lens markings.
2. Ophthalmic Measurements: Practical techniques for measuring visual acuity, intraocular pressure, corneal curvature, and pupil size.
3. Retinoscopy: Hands-on practice of retinoscopy techniques for objective refraction assessment.
4. Ophthalmoscopy: Examination of the ocular fundus using direct and indirect ophthalmoscopes, including the identification of various ocular structures and abnormalities.
5. Slit Lamp Biomicroscopy: Application of the slit lamp for detailed examination of the anterior segment of the eye, including the cornea, iris, and lens.
6. Tonometry: Measurement of intraocular pressure using different tonometry methods, such as Goldmann applanation tonometry or non-contact tonometry.
7. Instrument Maintenance and Safety: Proper handling, cleaning, and maintenance of ophthalmic instruments, as well as safety precautions to ensure the well-being of both patients and practitioners.
8. Ophthalmic Instruments:
    I. Fundamentals of ophthalmic instruments and their applications

II. Ophthalmoscopes
III. Slit lamps
IV. Tonometers
V. Autorefractors
VI. Keratometers
VII. Perimeters
VIII. Optical coherence tomography (OCT)
IX. Wavefront analyzers
X. Aberrometers

Suggested readings:

- *Manns, F., Söderberg, P. G., & Ho, A. (Eds.). (2017). Ophthalmic Lenses and Dispensing (3rd ed.). Butterworth-Heinemann.*
- *Bennett, A. G., & Rabbetts, R. B. (2012). Clinical Visual Optics (4th ed.). Butterworth-Heinemann.*
- *American Academy of Ophthalmology. (2018). Basic Ophthalmology for Medical Students and Primary Care Residents. American Academy of Ophthalmology.*
- *Bartlett, J. D., Jaanus, S. D., & Kaye, G. I. (Eds.). (2010). Clinical Ocular Pharmacology (5th ed.). Butterworth-Heinemann.*
- *Eskridge, J. B., Amos, J. F., & Bartlett, J. D. (2019). Clinical Procedures for Ocular Examination (4th ed.). McGraw-Hill Education.*

Course Title: English for Research Writing	L	T	P	Cr.
Course Code: BOP4257	2	0	0	2

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Understand the structure and conventions of academic research writing and use appropriate academic vocabulary.
2. Critically analyze and synthesize information from research articles.
3. Write different sections of a research paper, including abstracts, introductions, methods, results, and discussions.
4. Format and cite sources accurately using recognized citation styles (e.g., APA, Vancouver).
5. Students will be able to apply academic writing conventions, including appropriate use of citations, referencing, and academic tone, to produce high-quality research papers.

Course Content

Unit I **7 Hours**

Foundations of Academic Writing and Reading

- Introduction to academic writing: purpose, audience, and style.
- Understanding the structure of a research article.
- Developing critical reading skills: skimming, scanning, and in-depth analysis.
- Identifying and evaluating sources of information.
- Introduction to academic integrity and plagiarism.

Unit II **7 Hours**

Grammar and Vocabulary for Scientific Communication

- Review of essential grammar: verb tenses, subject-verb agreement, and sentence structure.
- Use of passive voice and nominalization in scientific writing.
- Building academic vocabulary: roots, prefixes, and suffixes.
- Medical terminology: definitions and usage.
- Hedging and boosting: expressing certainty and uncertainty.

Unit III **7 Hours**

Writing the Research Paper

- Writing abstracts: summarizing key findings.
- Writing introductions: establishing the research context and purpose.
- Writing methods: describing the research design and procedures.
- Writing results: presenting data and findings
- Writing discussions: interpreting and analyzing results.
- Writing case reports.

Unit IV **9 Hours**

Referencing and Presentation

- Introduction to citation styles: APA and Vancouver.
- Creating and formatting references and bibliographies.
- Designing effective tables and figures.
- Revision and editing techniques.
- Introduction to the publication process.
- Basics of research presentation.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Swales, J. M., & Feak, C. B. (2012). Academic writing for graduate students: Essential tasks and skills. University of Michigan Press.*
- *Day, R. A., & Gastel, B. (2011). How to write and publish a scientific paper. Cambridge University Press.*
- *Pechenik, J. A. (2016). A short guide to writing about biology. Pearson.*
- *American Psychological Association. (2020). Publication manual of the American Psychological Association (7th ed.).*
- *International Committee of Medical Journal Editors. (ICMJE). (Various years). Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals. Available at: www.icmje.org*
- *O'Connor, M. (1991). Writing successfully in science. HarperCollins Academic.*
- *Jordan, R.R. (1997). English for Academic Purposes: A guide and resource book for teachers. Cambridge University Press.*

Course Title: Indian Education	L	T	P	Cr.
Course Code: IKS0002	2	0	0	2

Total Hours: 30 hrs

Learning Outcomes: On the completion of the course, the students will able:

1. Understand the Indian Education Pre-Vedic and Post Vedic Period
2. Critically analyse the Paravidhya and Apravidhya in Indian education
3. Examine the methods of Vedas, Jainisism and Bhodhsim Education
4. Development the curriculum according to Vedas, Jainisism and Bhodhsim

Course Content

Unit-I **7 Hours**

Religion and Philosophy in India: Ancient Period: Pre-Vedic and Vedic Religion, Buddhism and Jainism, Indian philosophy – Vedanta and Mimansa school of Philosophy

Unit-II **7 Hours**

Paravidya: Relation between God and Self and Aparavidya: Vedas, Vedangas, Rituals, Astronomy, Ithihasas, Puranas, Ethics and Military sciences etc.

Unit-III **8 Hours**

Methods of teaching: Vedic Education: - Saravana, Manana, Nididhyasana and Intuition/revelation Jainisism – Matigyan, saruti Gyan, Avvidhiyagyan, Man: Paryav, Kaveleye

Bhodhsim- Direct and application Method, Lecture Method, Practice Method, Knowledge through conversation, Questioner answer Method

Unit-IV **8 Hours**

Vedas- Mantel Development, Physical Development and Seprulity development, Jainisim- Dravye, Astikay and Anistakay

Bhodhisim- four Arya Truth (Shabad Vidhya, Chikitasya Vidhya and Shilpasan Vidhya, Hetu Vidhya and Adhyatam Vidhya

Transactional Mode: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested Readings:

- *Chaudhuri, Kirti N.: Trade and Civilisation in the Indian Ocean, CUP, Cambridge, 1985.*
- *Malekandathil, Pius: Maritime India: Trade, Religion and Polity in the Indian Ocean, Primus*
- *McPherson, Kenneth: The early Maritime Trade of the Indian Ocean, in: ib.: The Indian*
- *Ocean: A History of People and The Sea, OUP, 1993, pp. 16-75.*
- *Christie, J.W., 1995, State formation In early Maritime Southeast Asia, BTLV*
- *Christie, J.W., 1999, The Banigrama in the Indian Ocean and the Java sea during the early*

Course Title: Physical Optics	L	T	P	Cr.
Course Code: BOP4259	4	0	0	4

Total Hours: 60 hr

Learning Outcomes: After completion of this course, the learner will be able:

1. Describe the fundamental principles of wave optics, including the wave-particle duality of light.
2. Analyze interference patterns from thin films and their practical applications (e.g., anti-reflective coatings, Newton's rings).
3. Analyze diffraction patterns produced by single slits, double slits, and diffraction gratings.
4. Explain how light can be polarized by reflection, scattering, and transmission through polarizing filters.
5. Discuss real-world applications of interference, diffraction, and polarization in optical instruments.

Course Contents

UNIT-I **15 Hours**

Nature of light –light as electromagnetic oscillation –wave equation; ideas of sinusoidal oscillations –simple harmonic oscillation; transverse nature of oscillation; concepts of frequency, wavelength, amplitude and phase.

UNIT-II **15 Hours**

Sources of light; Electromagnetic Spectrum, Polarized light; linearly polarized light; and circularly polarized light, Intensity of polarized light; Malus Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle, Birefringence; ordinary and extraordinary rays, Relationship between amplitude and intensity.

UNIT-III **15 Hours**

Coherence; interference; constructive interference, destructive interference; fringes; fringe width, Double slits, multiple slits, gratings, Diffraction; diffraction by a circular aperture; Airy's disc, Resolution of an instrument (telescope, for example); Raleigh's criterion, Scattering; Raleigh's scattering; Tyndall effect, Fluorescence and Phosphorescence

UNIT-IV **15 Hours**

Basics of Lasers –coherence; population inversion; spontaneous emission; Einstein's theory of lasers, Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric

units, Inverse square law of photometry; Lambert's law, other units of light measurement; retinal illumination; Trolands

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Hecht E. Optics. 5th ed. Boston: Pearson; 2016.*
- *Born M, Wolf E. Principles of Optics: Electromagnetic Theory of Propagation, Interference and Diffraction of Light. 7th ed. Cambridge: Cambridge University Press; 1999.*
- *Pedrotti FL, Pedrotti LS, Pedrotti LW. Introduction to Optics. 3rd ed. San Francisco: Addison-Wesley; 2006.*
- *Ghatak A. Optics. 6th ed. New Delhi: McGraw Hill Education; 2017.*
- *Goodman JW. Introduction to Fourier Optics. 4th ed. Greenwood Village: Roberts and Company Publishers; 2017.*

Course Title: Pharmacology	L	T	P	Cr.
Course Code: BOP4260	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Describe the processes of drug absorption, distribution, metabolism, and elimination (ADME) in the body.
2. Explain the interactions between drugs and their molecular targets, including receptors, enzymes, and ion channels.
3. Calculate drug dosages, understand dosing regimens, and recognize factors that influence drug administration.
4. Analyze the actions of drugs on specific physiological and biochemical processes, including dose-response relationships and drug efficacy.

Course Contents

UNIT-I **15 Hours**

Introduction to Pharmacology; Definition and scope of pharmacology, Pharmacokinetics and pharmacodynamics, Drug development and approval process, Routes of administration, Principles of Drug Action; Receptors and drug-target interactions, Agonists and antagonists, Enzyme inhibition and induction, Drug-drug interactions

UNIT-II **15 Hours**

Pharmacokinetics; Absorption, distribution, metabolism, and excretion (ADME) of drugs, Bioavailability and bioequivalence, Drug clearance and halflife, Factors affecting pharmacokinetics (age, gender, disease, genetics), Drug Classes and Mechanisms of Action

UNIT-III **15 Hours**

Autonomic pharmacology (sympathomimetics, sympatholytic, parasympathomimetic, parasympatholytic), Central nervous system (CNS) drugs (sedatives, hypnotics, analgesics, antipsychotics, antidepressants), Cardiovascular drugs (antiarrhythmics, antihypertensives, diuretics)

UNIT-IV **15 Hours**

Antimicrobial agents (antibiotics, antivirals, antifungals), Endocrine drugs (hypoglycemic agents, hormones, contraceptives), Drug Toxicity and Adverse Effects, Drug allergies and hypersensitivity reactions, Adverse drug reactions (ADRs), Drug-drug interactions and drug-food interactions, Drug toxicity and overdose management, Clinical Applications of Pharmacology;

Therapeutics and rational drug use, Individualized drug therapy, Drug development and clinical trials

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Rang, H. P., Dale, M. M., Ritter, J. M., Flower, R. J., & Henderson, G. (2020). Rang and Dale's Pharmacology (9th ed.). Elsevier.*
- *Katzung, B. G., Masters, S. B., & Trevor, A. J. (2021). Basic and Clinical Pharmacology (15th ed.). McGraw-Hill Education.*
- *Brunton, L. L., Hilal-Dandan, R., &Knollmann, B. C. (2020). Goodman & Gilman's The Pharmacological Basis of Therapeutics (13th ed.). McGrawHill Education.*
- *Hardman, J. G., Limbird, L. E., & Goodman Gilman, A. (Eds.). (2018). Goodman & Gilman's: The Pharmacological Basis of Therapeutics (13th ed.). McGraw-Hill Education.*
- *Stahl, S. M. (2020). Stahl's Essential Psychopharmacology: Neuroscientific Basis and Practical Applications (4th ed.). Cambridge University Press.*

5th SEMESTER

Course Title: Contact Lens I	L	T	P	Cr.
Course Code: BOP5300	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. A detailed knowledge of lens design and manufacture for RGP including verification.
2. An ability to fit and assess a range of RGP lens designs
3. An ability to fit a range contact lenses to correct regular and irregular astigmatism, such as early keratoconus
4. An ability to fit a range of contact lenses to correct presbyopia
5. An ability to provide ongoing management and advice for maintaining healthy contact lens wear

Course Contents

UNIT-I **10 Hours**

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

UNIT-II **10 Hours**

- Properties of CL materials- Physiological (Dk, Ionicity, Water content), Physical (Elasticity, Tensile strength, Rigidity), Optical (Transmission, Refractive index)
- Indications and contraindications
- Parameters / Designs of Contact Lenses & Terminology
- RGP Contact Lens materials
- Manufacturing Rigid and Soft Contact Lenses –various methods
- Pre-Fitting examination –steps, significance, recording of results

UNIT-III **10 Hours**

- Correction of Astigmatism with RGP lens

- Types of fit –Steep, Flat, Optimum –on spherical cornea with spherical lenses
- Types of fit –Steep, Flat, Optimum –on Toric cornea with spherical lenses
- Calculation and finalizing Contact lens parameters
- Ordering Rigid Contact Lenses –writing a prescription to the Laboratory

UNIT-IV **15 Hours**

- Checking and verifying Contact lenses from Laboratory
- Modifications possible with Rigid lenses
- Common Handling Instructions- Insertion & Removal Techniques, Do's and Dont's
- Care and Maintenance of Rigid lenses - cleaning agents & Importance, rinsing agents & Importance, disinfecting agents & importance, Lubricating & Enzymatic cleaners
- Complications of RGP lenses

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Efron N. Contact Lens Practice. 3rd ed. Edinburgh: Elsevier; 2017.*
- *Bennett ES, Henry VA. Clinical Manual of Contact Lenses. 5th ed. Philadelphia: Wolters Kluwer; 2019.*
- *Hom MM. Manual of Contact Lens Prescribing and Fitting. 3rd ed. St. Louis: Butterworth-Heinemann; 2006.*
- *Phillips AJ, Speedwell L. Contact Lenses. 6th ed. Edinburgh: Elsevier; 2019.*
- *Mandell RB. Contact Lens Practice: Hard and Soft Lenses. 4th ed. Springfield: Charles C Thomas; 1988.*
- *Solomon OD. Soft contact lens materials: recent advances and future innovations. Eye Contact Lens. 2007;33(6 Pt 2):387-92.*
- *Stapleton F, Stretton S, Papas E, Skotnitsky C, Sweeney DF. Silicone hydrogel contact lenses and the ocular surface. Ocul Surf. 2006;4(1):24-43.*

Course Title: Binocular Vision I	L	T	P	Cr.
Course Code: BOP5301	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Demonstrate an in-depth knowledge of the gross anatomy and physiology relating to the extra ocular muscles.
2. Provide a detailed explanation of, and differentiate between the aetiology, investigation and management of binocular vision anomalies.
3. Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely.
4. Ability to independently investigate and diagnose case of strabismus with comments in respect to retinal correspondence and binocular single vision.
5. Ability to perform all the investigations to check retinal correspondence, state of Binocular Single Vision, angle of deviation and special investigations for paralytic strabismus.

Course Contents

UNIT-I **15 Hours**

- Binocular Vision and Space perception- Relative Courseive visual direction., Retino motor value, Grades of BSV, SMP and Cyclopean Eye, Correspondence, Fusion, Diplopia, Retinal rivalry, Horopter, Physiological Diplopia and Suppression, Stereopsis, Panum's area, BSV, Stereopsis and monocular clues – significance, Egocentric location, clinical applications, Theories of Binocular vision.
- Anatomy of Extra Ocular Muscles- Rectii and Obliques, LPS, Innervation & Blood Supply, Physiology of Ocular movements, Center of rotation, Axes of Fick, Action of individual muscle, Laws of ocular motility, Donder's and Listing's law, Sherrington's law, Hering's law, Uniocular& Binocular movements - fixation, saccadic & pursuits, Version &Vergence., Fixation & field of fixation
- Near Vision Complex Accommodation- Definition and mechanism, (process), Methods of measurement, Stimulus and innervation, Types of accommodation, Anomalies of accommodation –aetiology and management.
- Convergence- Definition and mechanism, Methods of measurement, Types and components of, convergence - Tonic, accommodative, fusional, proximal, Anomalies of Convergence –aetiology and

management.

UNIT-II **10 Hours**

- Sensory adaptations Confusion
- Suppression Investigations, Management Blind spot syndrome
- Abnormal Retinal Correspondence, Investigation and management, Blind spot syndrome
- Eccentric Fixation, Investigation and management

UNIT-III **10 Hours**

- Amblyopia Classification: Aeitiology, Investigation, Management
- Neuro-muscular anomalies: Classification and etiological factors
- History –recording and significance.
- Convergent strabismus- Accommodative convergent squint: Classification, Investigation and Management, Non accommodative Convergent squint: Classification, Investigation and management
- Divergent Strabismus: Classification, A& V phenomenon, Investigation and, Management
- Vertical strabismus: Classification, Investigation and, Management

UNIT-IV **10 Hours**

- Paralytic Strabismus: Acquired and Congenital-Clinical Characteristics, Distinction from comitant and restrictive Squint
- Investigations- History and symptoms, Head Posture, Diplopia Charting, Hess chart, PBCT, Nine directions, Binocular field of vision
- Nystagmus
- Surgical and Non-surgical Management of Squint
- Restrictive Strabismus – Features- Musculo facial anomalies, Duane's Rétraction syndrome, Clinical features and management, Brown's Superior oblique sheath syndrome, Strabismus fixus, Congenital muscle fibrosis

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.*
- *Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd*
- *Gunter K. Von Noorden: BURIAN- VON NOORDEN'S Binocular vision and ocular motility theory and management of strabismus, Missouri,*

Second edition, 1980, C. V. MosbyCompany

- *Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular VisionHeterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers*

Course Title: Basics of hospital skill learning	L	T	P	Cr.
Course Code: BOP5302	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Understand the basic ideas on how to check for Vital Signs of the Patient
2. Learn how to handle the patients and their positioning
3. Learn on the Basics of Nasal-Gastric Tube
4. Learn on Administration of IV, IV and Medication
5. Know about Cleanliness in the Asepsis

Course Contents

UNIT-I **15 Hours**

MEASURING VITAL SIGNS: Temperature: Axillaries Temperature, Pulse: Sites of pulse, Measurement, Respiratory, Blood Pressure, Pain: Pain Scale
PHYSICAL EXAMINATION: Observation, Auscultation (Chest), Palpation, Percussion, History Taking

UNIT-II **15 Hours**

FEEDING: ENTRAL FEEDING, NG TUBE: Measurement, Procedure, Care, Removal of Nasal-Gastric Tube, Nasal-Gastric Tube Feeding, and Parentral Nutrition.
MOBILITY AND SUPPORT: Moving and Positioning, range of Motion exercises (Active & Passive) Assisting for Transfer, Application of Restraints

UNIT-III **15 Hours**

ADMINISTRATIONS: Oral, Intravenous, Intramuscular, Subcutaneous, Recapping of Syringe, Loading of Drugs, Calculation of Drugs, Venipuncture, IV Infusion, Cannula, Attachment of IV infusion Set, Fluid Collection, Heparin Lock, Maintenance of IV set, Performing Nebulizer Therapy, Inhaler, Oxygen Therapy (Nasal, prongs, nasal Catheter, Venturi Mask, face mask)

UNIT-IV **15 Hours**

ASEPSIS: Hand wash Techniques, (Medical, Surgical) Universal Precaution, Protecting Equipments: Using Sterile Gloves, Opening a Sterile package and Establishing a Sterile Field, Sterile Dressing Changes, Surgical Attire , Wound Dressing, Suture Removal, Cleaning and Application of Sterile Dressing, Wearing and Removal of personal protective Equipment

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Scott IA. Health care system performance and physician training: A review of current problems and future directions. Med J Aust. 2019;211(1):39-42.*
- *Wachter RM. Understanding patient safety. 3rd ed. McGraw-Hill Education; 2017.*
- *Leonard M, Graham S, Bonacum D. The human factor: The critical importance of effective teamwork and communication in providing safe care. Qual Saf Health Care. 2004;13(Suppl 1):i85-i90.*
- *World Health Organization. Patient safety curriculum guide: multi-professional edition. WHO Press; 2011.*
- *Centers for Disease Control and Prevention. Guide to Infection Prevention for Outpatient Settings. CDC; 2016.*

Course Title: Research methodology and Biostatics	L	T	P	Cr.
Course Code: BOP5303	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Understand the Basics of Research
2. Formulate a Research Problem
3. Study Design & Data Collection
4. Data Management & Analysis
5. Scientific Writing & Publication

Course Contents

UNIT 1 **15 hours**

Introduction to Research: Definition of Research, Types & Methods of research Applied versus Fundamental research, exploratory research, Observational research, Inductive and Deductive approaches; Designing Research protocol: Research Protocol Development, Literature search, Identification of Research problem, Research gap, Research question, Research Hypothesis, Null and Alternative Hypothesis, Study Objectives; Data and types: Types of Data, Primary and Secondary data, Scales of measurement of data- Nominal data, Ordinal, Interval and Ratio scale, Variables and Confounders, Dependent and Independent Variables, Extraneous variable, Control variable.

UNIT 2 **15 hours**

Literature Review: Importance of literature review, Sources of literature: Journals, books, and online databases, Organizing and synthesizing research findings; Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Different Research Designs, Basic Principles of Experimental Designs; Study population: Selecting Cases and Control, Comparison Group, Target population, Matching, Case Definition, Inclusion and Exclusion Criteria; Qualitative vs. Quantitative research methods; Data Collection and analysis : Types and sources of data – Primary and secondary, Methods of collecting data, Concept of sampling and sampling methods – sampling frame, sample, characteristics of good sample, simple random sampling, purposive sampling, convenience sampling, snowball sampling.

Unit 3 **15 hours**

Statistics: Measures of central tendency: Mean, median, and mode,

Measures of dispersion: Range, variance, and standard deviation, Frequency distributions and histograms, Data visualization: Bar charts, pie charts, and box plots; Probability and Probability Distributions: Basic probability concepts, Probability distributions: Normal distribution, binomial distribution, and Poisson distribution, Law of large numbers and central limit theorem.

Unit 4 **15 hours**

Chi-square test for independence and goodness of fit, One-way and two-way analysis of variance (ANOVA), Post-hoc tests following ANOVA; Regression Analysis: Simple linear regression, Multiple linear regression, Model assumptions and diagnostics, Logistic regression (binary outcomes), Poisson regression (count data); Biostatistics for Clinical Trials: Design and analysis of clinical trials, Randomization techniques, Statistical monitoring of trials, Regulatory considerations (e.g., FDA guidelines**.**

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Creswell, J.W. & Creswell, J.D. – Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*
- *Hulley, S.B., Cummings, S.R., Browner, W.S., et al. – Designing Clinical Research*
- *Kothari, C.R. & Garg, G. – Research Methodology: Methods and Techniques*
- *Bland, M. – An Introduction to Medical Statistics*
- *Rosner, B. – Fundamentals of Biostatistics*
- *Dawson, B. & Trapp, R.G. – Basic & Clinical Biostatistics*
- *Daniel, W.W. & Cross, C.L. – Biostatistics: A Foundation for Analysis in the Health Sciences*
- *Zhou, X-H., Obuchowski, N.A., McClish, D.K. – Statistical Methods in Diagnostic Medicine*

Course Title: Contact Lens I Lab	L	T	P	Cr.
Course Code: BOP5304	0	0	2	1

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Explain the history and development of contact lenses.
2. Describe different types of contact lenses, including soft, rigid gas permeable (RGP), and specialty lenses.
3. Understand the materials used in contact lens manufacturing and their impact on ocular health.
4. Demonstrate proper techniques for fitting soft and RGP lenses.
5. Interpret fluorescein patterns for RGP lens fitting.

Course Contents

List of Practical's / Experiments: 30 Hours

1. Introduction to Contact Lenses
    - Handling and identification of different types of contact lenses (RGP, Soft, Hybrid)
    - Understanding Contact Lens Terminology
2. Anatomy & Physiology Related to Contact Lenses
    - Examination of Tear Film – Schirmer's Test, TBUT
    - Corneal Topography – Keratometry Readings
3. Contact Lens Materials & Properties
    - Identification of different Contact Lens materials (RGP, Soft)
    - Understanding Dk Value, Water Content, Ionicit
4. Pre-Fitting Examination
    - Slit-lamp examination of anterior eye structures
    - Recording Keratometry values
    - Measuring Pupil size & Palpebral Aperture
5. RGP Lens Fitting and Evaluation
    - Trial lens fitting on spherical cornea
    - Assessing lens movement, centration, and coverage
6. RGP Lens Fit on Toric Cornea
    - Evaluating steep, flat, and optimum fit with fluorescein pattern
7. Contact Lens Prescription Writing & Ordering
    - Calculation of final RGP parameters
    - Writing a prescription for an RGP lens
8. Contact Lens Verification & Modification
    - Checking lens power, base curve, and diameter using a lensometer and radiuscope

- Making modifications (polishing, edge finishing)

Suggested readings:

- *Efron N. Contact Lens Practice. 3rd ed. Edinburgh: Elsevier; 2017.*
- *Bennett ES, Henry VA. Clinical Manual of Contact Lenses. 5th ed. Philadelphia: Wolters Kluwer; eedwell L. Contact Lenses. 6th ed. Edinburgh: Elsevier; 2019.*
- *Hom MM. Manual of Contact Lens Prescribing and Fitting. 3rd ed. St. Louis: Butterworth-Heinemann; 2006.*
- *Mandell RB. Contact Lens Practice: Hard and Soft Lenses. 4th ed. Springfield: Charles C Thomas; 1988.*
- *Sweeney DF, editor. Silicone Hydrogels: Continuous Wear Contact Lenses. Oxford: Butterworth-Heinemann; 2004.*
- *Solomon OD. Soft contact lens materials: recent advances and future innovations. Eye Contact Lens. 2007;33(6 Pt 2):387-92.*

Course Title: Binocular Vision I Lab	L	T	P	Cr.
Course Code: BOP5305	0	0	2	1

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Explain the concept of relative visual direction and egocentric localization.
2. Describe the importance of stereopsis and monocular depth cues in space perception.
3. Use different stereotests (Titmus, Lang, TNO, Randot) to measure depth perception.
4. Differentiate between normal and abnormal stereopsis in clinical settings.
5. Discuss management strategies, including orthoptic exercises and prism therapy.

Course Contents

List of Practical's / Experiments: 30 Hours

1. Measurement of Relative Visual Direction
2. Assessment of Grades of Binocular Single Vision (BSV)
3. Testing for Suppression and Physiological Diplopia
4. Measurement of Stereopsis – Different Tests (Titmus, Lang, TNO, etc.)
5. Demonstration of Panum's Area and Retinal Rivalry
6. Evaluation of Horopter and Correspondence Tests
7. Clinical Applications of Egocentric Localization
8. Testing for Monocular and Binocular Cues in Depth Perception
9. Measurement of Amplitude of Accommodation
10. Stimulus and Response Testing for Accommodation
11. Assessment of Accommodative Facility (Flipper Test)
12. Testing for Different Types of Accommodation (Tonic, Reflex, etc.)
13. Diagnosis of Anomalies of Accommodation (Presbyopia, Insufficiency, Spasm)
14. Testing for Suppression – Worth 4 Dot, Bagolini Striated Glasses
15. Investigation of Abnormal Retinal Correspondence (ARC)

Suggested readings:

- *Noorden GK, Campos EC. Binocular Vision and Ocular Motility: Theory*

and Management of Strabismus. 6th ed. St. Louis: Mosby; 2002.

- *Evans BJW. Pickwell's Binocular Vision Anomalies: Investigation and Treatment. 5th ed. Edinburgh: Elsevier; 2007.*
- *Benjamin WJ. Borish's Clinical Refraction. 2nd ed. Philadelphia: Saunders; 2006.*
- *Steinman SB, Steinman BA, Garzia RP. Foundations of Binocular Vision: A Clinical Perspective. New York: McGraw-Hill; 2000.*
- *Scheiman M, Wick B. Clinical Management of Binocular Vision: Heterophoric, Accommodative, and Eye Movement Disorders. 4th ed. Philadelphia: Wolters Kluwer; 2013.*
- *Ciuffreda KJ, Ludlam WM, Kapoor N. Clinical assessment of binocular vision. Optom Vis Sci. 1999;76(5):333-49.*
- *Schroeder TL, Rainey BB, Goss DA, Grosvenor TP. Reliability of and comparisons among three tests of stereopsis. Optom Vis Sci. 1996;73(6):379-85.*
- *Karania R, Evans BJ. The role of accommodative facility in vergence dysfunction. Graefes Arch Clin Exp Ophthalmol. 2006;244(4):514-21.*

Course Title: Low Vision Care	L	T	P	Cr.
Course Code: BOP5306	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. After completion, students will be able to know about the detailed definition of low vision and different types of low vision
2. After completion, students will be able to know about epidemiology of low vision
3. After completion, students will be able to know about different models for the service of low vision
4. After completion, students will be able to know about the clinical evaluation of low vision patients along with prognostic and psychological factors associated with low vision. They will also know about the psycho-social impact of low vision on patients
5. After completion, students will be able to know about the detailed aids available for low vision patients including optical aids, non-optical aids and electronic devices

Course Contents

UNIT-I **15 Hours**

- Definitions & classification of Low vision
- Epidemiology of low vision
- Model of low vision service
- Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers

UNIT-II **15 Hours**

- Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psycho-social impact of low vision
- Types of low vision aids – optical aids, non-optical aids & electronic devices
- Optics of low vision aids

UNIT-III **15 Hours**

- Clinical evaluation – assessment of visual acuity, visual field, selection of low vision aids, instruction & training
- Pediatric Low Vision care
- Low vision aids – dispensing & prescribing aspects

UNIT-IV **15 Hours**

- Visual rehabilitation & counseling
- Legal aspects of Low vision in India
- Determining reading speed with a low vision aid of different magnifications.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth- Heinemann, 1998*
- *Sarika G, Sailaja MVSE Vaithilingam: practice of Low vision –A guide book, Medical Research Foundation, 2015.*
- *Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999*
- *Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991 A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinnemann, 2007*

Course Title: Applied Optometry & Orth optics	L	T	P	Cr.
Course Code: BOP5307	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Conduct comprehensive clinical evaluations of patients to assess their visual acuity, refractive errors, and binocular vision status.
2. Accurately determine refractive errors and prescribe appropriate corrective lenses, including glasses and contact lenses.
3. Evaluate binocular vision and eye alignment through orthoptic assessments, including cover-uncover and alternate cover tests.
4. Design and implement vision therapy programs to improve binocular vision, eye coordination, and visual perception in patients with specific visual disorders.

Course Contents

UNIT-I **15 Hours**

Introduction to Optometry, History and development of optometry, Scope of practice and ethical considerations, Professional organizations and regulations, Ocular Anatomy and Physiology

UNIT-II **15 Hours**

Structure and function of the eye, Visual pathways and processing, Ocular health and diseases, Visual Optics, Geometric optics and principles of light, Refraction and lenses, Lens designs and prescription interpretation, Visual Perception, Visual acuity and contrast sensitivity, Color vision and color deficiencies, Depth perception and spatial vision

UNIT-III **15 Hours**

Ophthalmic Instruments, Examination techniques and equipment, Visual field testing, Ophthalmoscopy and slit-lamp biomicroscopy, Ocular Disease and Pharmacology, Common eye conditions and diseases, Pharmacological interventions and treatments, Ocular emergencies and triage

UNIT-IV **15 Hours**

Contact Lens Practice, Types of contact lenses and fitting techniques, Care and maintenance of contact lenses, Complications and management of contact lens wear, Binocular Vision and Orthoptics, Principles of binocular vision, Binocular vision anomalies and disorders, Orthoptic assessment and treatment options, Pediatric Optometry; Visual development in infants and children, Pediatric eye conditions and management, Amblyopia and

strabismus,Low Vision Rehabilitation, Evaluation and management of low vision patients

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Scheiman, M., & Wick, B. (2020). Clinical Management of Binocular Vision: Heterophoric, Accommodative, and Eye Movement Disorders (5th ed.). Wolters Kluwer.*
- *Gottlieb, D. D., & Soden, R. (2018). Manual of Ocular Diagnosis and Therapy (8th ed.). Lippincott Williams & Wilkins.*
- *Rouse, M. W., Borsting, E., Mitchell, G. L., & Cotter, S. A. (Eds.). (2015). Visual Optics and Refraction: A Clinical Approach (3rd ed.). Elsevier.*
- *Cooper, J. (2012). Ocular Trauma: Principles and Practice. Slack.*
- *Ciuffreda, K. J., & Ludlam, W. M. (Eds.). (2011). Concepts and Models of Vision Rehabilitation: Optometric Aspects of Low Vision (2nd ed.). Elsevier.*

Course Title: Geriatric optometry and Pediatric optometry	L	T	P	Cr.
Course Code: BOP5308	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. To have a knowledge of the principal theories of childhood development, and visual development
2. To have the ability to take a thorough geriatric history, and pediatric history which encompasses the relevant developmental, visual, medical and educational issues
3. To be able to identify visual and ocular problems in children and the elderly by collecting relevant clinical information
4. To be able to perform appropriate assessment and management of accommodative-vergence system, types of ametropia, accommodation and vergence disorders.
5. To be familiar with the aetiology, clinical presentation and treatment of amblyopia, comitant strabismus and commonly presenting incomitant strabismus

Course Contents

UNIT-I **15 Hours**

- Structural, and morphological changes of eye in elderly
- Physiological changes in eye in the course of aging.
- Introduction to geriatric medicine –epidemiology, need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebrovascular disease, Diabetes, COPD)
- Optometric Examination of the Older Adult
- Ocular diseases common in old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye
- Contact lenses in elderly

UNIT-II **15 Hours**

- Pharmacological aspects of aging
- Low vision causes, management and rehabilitation in geriatrics.
- Spectacle dispensing in elderly –Considerations of spectacle lenses and frames
- The Development of Eye and Vision
- History taking Pediatric Courses
- Assessment of visual acuity

UNIT-III **15 Hours**

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

UNIT-IV **15 Hours**

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

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Pediatric Optometry - JEROME ROSNER, Butterworth, London 1982*
- *William Harvey/ Bernard Gilmartin, Butterworth –Heinemann, 2004*
- *Binocular Vision and Ocular Motility - VON NOORDEN G K Burian Von Noorden's, 2nd Ed., C.V.Mosby Co. St. Louis, 1980.*
- *Assessing Children's Vision. By Susan J Leat, Rosalyn H Shute, Carol A Westall.45 Oxford: Butterworth-Heinemann, 1999.*
- *Clinical pediatric optometry. LJ Press, BD Moore, Butterworth-Heinemann, 1993*
- *Natarajan: An update on Geriatrics, SakthiPathipagam, Chennai, 1998 • DE Rosenblatt, VS Natarajan: Primer on geriatric Care A clinical approach to the older patient, Printers Castle, Cochin, 2002*

Course Title: Systemic Condition & the Eye	L	T	P	Cr.
Course Code: BOP5309	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Develop an understanding of various systemic conditions that have ocular manifestations or can impact eye health.
2. Demonstrate the mechanisms through which systemic conditions affect the eye.
3. Recognize ocular manifestations of systemic conditions.
4. Discuss about the management of ocular complications associated with systemic conditions.

Course Contents

UNIT-I **15 Hours**

Introduction to Systemic Conditions and the Eye, Overview of the relationship between systemic health and eye health, Importance of understanding systemic conditions for eye care professionals, Cardiovascular Conditions and the Eye, Hypertension and its effects on the eye

UNIT-II **15 Hours**

Atherosclerosis and its impact on the ocular system, Diabetic retinopathy as a manifestation of cardiovascular disease, Autoimmune Disorders and the Eye, Rheumatoid arthritis and its ocular complications, Systemic lupus erythematosus (SLE) and its effects on the eye, Sjögren's syndrome and ocular manifestations

UNIT-III **15 Hours**

Infectious Diseases and the Eye, HIV/AIDS and associated ocular conditions, Herpes simplex virus and its impact on the eye, Lyme disease and ocular manifestations, Endocrine Disorders and the Eye, Diabetes mellitus and diabetic eye disease, Thyroid disorders (hypothyroidism and hyperthyroidism) and their ocular effects, Pituitary gland disorders and visual disturbances, Neurological Disorders and the Eye

UNIT-IV **15 Hours**

Multiple sclerosis and its ocular manifestations, Parkinson's disease and visual impairments, Stroke and its impact on vision, Gastrointestinal Conditions and the Eye, Inflammatory bowel disease (Crohn's disease and ulcerative colitis) and ocular complications, Liver disease (cirrhosis, hepatitis) and their effects on the eye.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Riordan-Eva, P., & Cunningham, E. T. (Eds.). (2019). Vaughan &Asbury's General Ophthalmology (19th ed.). McGraw-Hill Education.*
- *Riordan-Eva, P., & Whitcher, J. P. (Eds.). (2019). Eye Pathology: An Atlas and Text (3rd ed.). Lippincott Williams & Wilkins.*
- *Albert, D. M., & Miller, J. W. (Eds.). (2010). Albert &Jakobiec's Principles and Practice of Ophthalmology (3rd ed.). Saunders.*
- *Kanski, J. J., Bowling, B., & Nischal, K. K. (2016). Kanski's Clinical Ophthalmology: A Systematic Approach (8th ed.). Elsevier.*
- *Kaiser, P. K., Friedman, N. J., Pineda, R., & Ritterband, D. C. (Eds.). (2020). The Massachusetts Eye and Ear Infirmary Illustrated Manual of Ophthalmology (5th ed.). Elsevier.*

6th SEMESTER

Course Title: Contact Lens II	L	T	P	Cr.
Course Code: BOP6350	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

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

Course Contents

UNIT-I **10 Hours**

- SCL Materials & Review of manufacturing techniques
- Comparison of RGP vs. SCL
- Pre-fitting considerations for SCL
- Fitting philosophies for SCL

UNIT-II **10 Hours**

- Fit assessment in Soft Contact Lenses: Types of fit – Steep, Flat, Optimum
- Calculation and finalising SCL parameters
  - Disposable lenses
  - Advantages and availability
- Soft Toric CL
  - Stabilization techniques
  - Parameter selection
  - Fitting assessment

UNIT-III **15 Hours**

- Common Handling Instructions
  - Insertion & Removal Techniques
  - Do's and Dont's
- Care and Maintenance of Soft lenses
  - Cleaning agents & Importance
  - Rinsing agents & Importance
  - Disinfecting agents & importance

  - Lubricating & Enzymatic cleaners
- Follow up visit examination

UNIT-IV **10 Hours**

- Complications of Soft lenses
- Therapeutic contact lenses
  - Indications
  - Fitting consideration
- Specialty fitting
  - Aphakia
  - Pediatric
  - Post refractive surgery
- Management of Presbyopia with Contact lenses

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

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

Course Title: Binocular vision II	L	T	P	Cr.
Course Code: BOP6351	3	0	0	3

Total Hours: 45 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Understand the mechanisms of binocular vision – including sensory and motor fusion, stereopsis, and suppression.
2. Diagnose and manage binocular vision disorders – such as strabismus, amblyopia, convergence insufficiency, and accommodative dysfunctions.
3. Apply clinical techniques for assessing binocular vision – including cover tests, Maddox rod, Worth 4-dot test, and stereopsis tests.
4. Interpret and analyze clinical binocular vision data – to design management plans.
5. Demonstrate proficiency in binocular vision assessment techniques – during practical sessions.

Course Contents

UNIT-I **10 Hours**

- Neuro-muscular anomalies
  - Classification and etiological factors
- History – recording and significance.
- Convergent strabismus
  - Accommodative convergent squint
    - Classification
    - Investigation and Management
  - Non accommodative Convergent squint
    - Classification
    - Investigation and Management

UNIT-II **10 Hours**

- Divergent Strabismus
  - Classification
  - A& V phenomenon
  - Investigation and Management
- Vertical strabismus
  - Classification
  - Investigation and Management
- Paralytic Strabismus
  - Acquired and Congenital

  - Clinical Characteristics
- Distinction from comitant and restrictive Squint

UNIT-III **10 Hours**

- Investigations
  - History and symptoms
  - Head Posture
  - Diplopia Charting
  - Hess chart
  - PBCT
  - Nine directions
  - Binocular field of vision
- Amblyopia and Treatment of Amblyopia
- Nystagmus

UNIT-IV **15 Hours**

- Non-surgical Management of Squint
- Restrictive Strabismus
  - Features
  - Musculo-fascical anomalies
  - Duane's Retraction syndrome
  - Clinical features and management
  - Brown's Superior oblique sheath syndrome
  - Strabismus fixus
  - Congenital muscle fibrosis
- Surgical management

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Scheiman M, Wick B. Clinical management of binocular vision: heterophoric, accommodative, and eye movement disorders. 5th ed. Philadelphia: Wolters Kluwer; 2020.*
- *Evans BJW. Pickwell's binocular vision anomalies: investigation and treatment. 6th ed. Edinburgh: Elsevier; 2022.*
- *Benjamin WJ. Borish's clinical refraction. 2nd ed. St. Louis: Butterworth-Heinemann; 2006.*
- *Griffin JR, Grisham JD. Binocular anomalies: diagnosis and vision therapy. 4th ed. Boston: Butterworth-Heinemann; 2002.*
- *Rouse MW, Cooper JS, Cotter SA. Binocular vision and accommodative disorders: theory, testing, and therapy. Santa Ana: Optometric*

Extension Program Foundation; 1999.

Course Title: Research Publication ethics and IPR	L	T	P	Cr.
Course Code: BOP6352	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Define research misconduct (plagiarism, data fabrication, falsification).
2. Recognize ethical guidelines in publishing (ICMJE, COPE).
3. Identify the role of peer review and conflicts of interest
4. Differentiate between copyright, patents, and trademarks.
5. Understand open-access policies and licensing (Creative Commons, PubMed Central).

Course Contents

Unit 1 **15 Hours**

Scientific Writing: Structure of a scientific paper (Title, abstract, introduction, methodology, results, discussion, conclusion); Writing a research proposal: Objectives, methodology, expected outcomes, Academic writing style and language (Clarity, conciseness, and logical flow), Citation and referencing: Understanding various citation styles (APA, MLA, Chicago, etc.), Reference management tools.

Unit 2 **15 Hours**

Plagiarism: Types, plagiarism detection software, Publication misconduct and Publication Ethics, Plagiarism avoiding techniques, regulation of plagiarism in India; Publication Ethics: Integrity and Ethics, Best Practices, Intellectual Honesty & Research Integrity: Scientific Misconducts & Redundant Publications, Conflict of Interest, Publication Misconduct, Violation of Publication Ethics, Authorship and Contributorship; Identification of Publication Misconduct: Fabrication, Falsification and Plagiarism (FFP), Predatory Publishers & Journals.

Unit 3 **15 Hours**

Open Access Publishing: Concept of OER, Concept of open license, Open access publishing, Open access content management; Database and Research Metrics: Indexing Databases, Citation Databases: Web of Science, Scopus, Google Scholar, Metrics: h-index, g-ind, i10 index, Understanding Citation Metrics for Quality Research: Impact & Visualization Analysis; Peer Review and Journal Selection: Understanding the peer-review process, Types of journals: Open access vs. subscription-based journals, How to select a

journal for publication, Writing a cover letter and responding to reviewer comments.

Unit 4 **15 Hours**

Intellectual Property Rights (IPR): Definition and types of intellectual property (IP): Copyright, patents, trademarks, and trade secrets; The importance of IP in research and innovation, Historical development and international IP laws (e.g., the role of WIPO, TRIPS Agreement); Key IP terms: Patentable inventions, originality, novelty, and industrial applicability; Patents: Overview of the patent system: Types of patents, Steps involved in obtaining a patent: Application, examination, and grant, Patentability requirements: Novelty, non-obviousness, and usefulness, Patent infringement and enforcement; Licensing and Commercialization of IP: Types of IP licenses: Exclusive vs. non-exclusive licenses, Licensing agreements and revenue sharing, Commercialization of research findings: Startups, spin-offs, and patent exploitation, Technology transfer offices: Role in university-based IP commercialization; Patent issues in academic research: Balancing public knowledge with commercial interests, Ethical concerns in patenting research outcomes, Impact of IP laws on collaborative research, IP in publicly funded research.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *International Committee of Medical Journal Editors (ICMJE). Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals. Available at: www.icmje.org*
- *Committee on Publication Ethics (COPE). Ethical Guidelines for Peer Reviewers and Editors. Available at: https://publicationethics.org/*
- *Wager E, Kleinert S. Responsible research publication: International standards for authors. Toxicology Letters. 2010; 197(3): 161-168.*
- *Hames I. Peer Review and Manuscript Ethics. The COPE Report 2013; 25–32.*
- *World Intellectual Property Organization (WIPO). Understanding Copyright and Patents. Available at: https://www.wipo.int/*
- *Das S. Intellectual Property Rights in Research & Academia. Journal of Academic Ethics. 2020;18(4): 345-358.*

Course Title: Contact Lens II Lab	L	T	P	Cr.
Course Code: BOP6353	0	0	2	1

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Identify common lens-related complications (e.g., hypoxia, infection, GPC).
2. Recommend appropriate lens modifications and treatment strategies.
3. Fit and evaluate lenses for keratoconus, post-surgical eyes, and orthokeratology.
4. Understand the role of scleral lenses and hybrid contact lenses in vision correction.
5. Analyze lens-to-cornea relationships for optimal performance.

Course Contents

List of Practical's / Experiments: **30 Hours**

1. Examination of old soft Lens
2. RGP Lens fitting
3. RGP Lens Fit Assessment and flurosce in 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)

Suggested readings:

- *"Contact Lens Practice" by Nathan Efron – Covers advanced contact lens fitting, troubleshooting, and specialty lenses.*
- *"Fitting Guide for Rigid and Soft Contact Lenses" by Edward S. Bennett & Vinita Allee Henry – Provides practical guidance for fitting complex contact lenses.*
- *"Clinical Manual of Contact Lenses" by Edward S. Bennett & Milton M. Hom – Great for clinical procedures and lab techniques.*
- *"Contact Lenses" by Anthony J. Phillips & Lynne Speedwell – A comprehensive resource on contact lens materials, fitting, and car*

Course Title: Binocular vision II Lab	L	T	P	Cr.
Course Code: BOP6354	0	0	2	1

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Perform clinical tests for binocular vision assessment, including cover test, Maddox rod test, and stereopsis evaluation.
2. Analyze binocular vision anomalies, such as strabismus, suppression, and accommodation disorders.
3. Interpret binocular vision test results to diagnose conditions like convergence insufficiency, divergence excess, and accommodative dysfunctions.
4. Apply vision therapy techniques for managing binocular vision disorders.
5. Use corrective methods, including prisms and lenses, for treating binocular vision issues.

Course Contents

List of Practical's / Experiments: **30 Hours**

1. Cover Test (Unilateral & Alternating)
2. Near Point of Convergence (NPC) Test
3. Maddox Rod & Modified Thorington Test
4. Worth 4-Dot Test
5. Bagolini Striated Glasses Test
6. Stereopsis Assessment (Randot, Titmus, TNO tests)
7. AC/A Ratio Measurement (Gradient & Calculated)
8. Fixation Disparity Measurement
9. Heterophoria & Fusional Vergence Testing
10. NRA & PRA (Negative and Positive Relative Accommodation)
11. Amplitude & Facility of Accommodation

Suggested readings:

- *Scheiman M, Wick B. Clinical management of binocular vision: heterophoric, accommodative, and eye movement disorders. 5th ed. Philadelphia: Wolters Kluwer; 2020.*
- *Evans BJW. Pickwell's binocular vision anomalies: investigation and treatment. 6th ed. Edinburgh: Elsevier; 2022.*
- *Benjamin WJ. Borish's clinical refraction. 2nd ed. St. Louis: Butterworth-Heinemann; 2006.*
- *Griffin JR, Grisham JD. Binocular anomalies: diagnosis and vision*

therapy. 4th ed. Boston: Butterworth-Heinemann; 2002.

- *Rouse MW, Cooper JS, Cotter SA. Binocular vision and accommodative disorders: theory, testing, and therapy. Santa Ana: Optometric Extension Program Foundation; 1999.*

Course Title: Indian Health Science	L	T	P	Cr.
Course Code: IKS0006	2	0	0	2

Total Hours: 30 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Understand knowledge of India's traditional health systems
2. Critically analyse India's healthcare policies
3. Understand the patterns, causes, and effects of diseases in India and strategies for prevention and control.
4. Learn about nutrition, sanitation, mental health, and lifestyle diseases like diabetes and cardiovascular disorders, along with preventive healthcare measures.

Course Content

Unit – I: **7 Hours**

Introduction, Vedic foundations of Ayurveda. Ayurveda is concerned both with maintenance of good health and treatment of diseases.

Unit – II: **8 Hours**

Basic concepts of Ayurveda. The three Gunas and Three Doshas, Pancha-mahabhuta and Sapta-dhatu.

The importance of Agni (digestion). Six Rasas and their relation to Doshas. Ayurvedic view of the cause of diseases.

Unit – III: **8 Hours**

Dinacharya or daily regimen for the maintenance of good health. Ritucharya or seasonal regimen. Important Texts of Ayurveda. Selected extracts from *Astāngahrdaya*(selections from *Sūtrasthāna*)

and *Suśruta-Samhitā*(sections on plastic surgery, cataract surgery and anal fistula). The large pharmacopeia of Ayurveda.

Unit – IV: **7 Hours**

Charaka and Sushruta on the qualities of a Vaidya. The whole world is a teacher of the good Vaidya.

Charaka's description of a hospital. Hospitals in ancient and medieval India.

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Park's Textbook of Preventive and Social Medicine – K. Park*
- *Ayurveda: The Science of Self-Healing – Dr. Vasant Lad*
- *Health Sector in India: A Policy Perspective – P. K. Pandey*
- *Essential Readings in Health Policy and Law – Joel B. Teitelbaum & Sara E. Wilensky*

Course Title: Occupational Optometry	L	T	P	Cr.
Course Code: BOP6356	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Understand the role of optometry in workplace safety and vision care.
2. Explain workplace vision screening standards and regulations.
3. Recommend ergonomic adjustments for reducing digital eye strain.
4. Understand emergency management of occupational eye injuries
5. Interpret occupational vision standards for different industries.

Course Contents

UNIT-I **15 Hours**

Introduction to Occupational Optometry

- Definition and scope
- Role of optometrists in workplace vision care
- Visual requirements for different occupations
- Occupational visual standards and legal considerations
- hygiene and safety, international bodies like ILO, WHO, National bodies etc Acts and Rules - Factories Act, WCA, ESI Act

UNIT-II **15 Hours**

Visual Ergonomics & Workplace Vision

- Ergonomics and workplace design
- Digital eye strain and blue light exposure
- Visual display terminals (VDT) and their impact on vision
- Strategies for minimizing occupational eye strain
- Electromagnetic Radiation and its effects on Eye
- Light –Definitions and units, Sources, advantages and disadvantages,
- Color –Definition, Color theory, Color coding, Color defects, Color Vision tests standard

UNIT-III **15 Hours**

Occupational Hazards & Eye Safety

- Common workplace hazards (chemical, mechanical, radiation, etc.)
- Industrial eye protection: types and standards (ANSI, ISO, CSA)
- Contact lenses in industrial environments
- First aid for ocular injuries
- Occupational hazards and preventive/protective methods
- Industrial Vision Screening –Modified clinical method and Industrial

Vision test

UNIT-IV **15 Hours**

Workplace Vision Assessments & Regulations

- Occupational vision screening techniques
- Prescription safety eyewear: regulations and fitting
- Vision testing for commercial drivers and pilots
- Vision Standards –Railways, Roadways, Airlines
- Regulatory bodies (OSHA, CSA, ANSI, ISO)
- Visual Display Units
- Contact lens and work

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Efron N. Contact Lens Practice. 3rd ed. Elsevier; 2017.*
- *Bennett ES, Henry VA. Clinical Manual of Contact Lenses. 5th ed. Lippincott Williams & Wilkins; 2019.*
- *Sheedy JE, Shaw-McMinn PG. Diagnosing and Treating Computer-Related Vision Problems. Butterworth-Heinemann; 2002.*
- *OSHA. Occupational Safety and Health Standards – Eye and Face Protection. U.S. Department of Labor; 2020.*
- *Rosenfield M. Computer vision syndrome: a review of ocular causes and potential treatments. Ophthalmic Physiol Opt. 2011;31(5):502-515.*

Course Title: Advanced ophthalmic diagnostic procedures	L	T	P	Cr.
Course Code: BOP6357	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Perform medical and surgical procedural and technical skills.
2. Perform appropriate history and physical examinations.
3. Develop and Implement patient management plans.
4. Demonstrate the role of preventive medicine in healthcare including screening recommendations.

Course Contents

UNIT-I **15 Hours**

Introduction to Ophthalmic Diagnostics: Overview of ophthalmic diagnostic procedures, Importance of accurate diagnosis in ophthalmology, Ophthalmic Imaging Techniques: Fundus photography, Optical coherence tomography (OCT), Ultrasound biomicroscopy (UBM), Fluorescein angiography, Indocyanine green angiography

UNIT-II **15 Hours**

Visual Field Testing: Perimetry techniques, Automated visual field testing, Interpretation of visual field results, Corneal Topography and Biometry: Principles of corneal topography, Anterior and posterior corneal topography, Biometry for intraocular lens (IOL) calculations

UNIT-III **15 Hours**

Electrophysiological Testing: Electroretinography (ERG), Visual evoked potentials (VEP), Electrooculography (EOG), Multifocal ERG (mfERG), Intraocular Pressure Measurement: Applanation tonometry, Non-contact tonometry, Tono-pen tonometry, Dynamic contour tonometry, Ocular Ultrasonography: A-scan and B-scan ultrasonography, Immersion and contact techniques

UNIT-IV **15 Hours**

Diagnostic applications of ocular ultrasonography, Ocular Surface Evaluation: Tear film evaluation, Corneal staining and vital dye tests, Meibomian gland imaging, Schirmer's test and tear breakup time (TBUT), Interpretation of Diagnostic Test Results: Normal ranges and variations, Recognizing artifacts and errors, Correlating findings with clinical conditions

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Yanoff, M., & Duker, J. S. (Eds.). (2018). Ophthalmology (5th ed.). Elsevier.*
- *Riordan-Eva, P., & Cunningham, E. T. (Eds.). (2019). Vaughan & Asbury's General Ophthalmology (19th ed.). McGraw-Hill Education.*
- *Yanoff, M., & Cameron, D. (Eds.). (2014). Ocular Pathology (7th ed.). Elsevier.*
- *Kanski, J. J., Bowling, B., & Nischal, K. K. (2016). Kanski's Clinical Ophthalmology: A Systematic Approach (8th ed.). Elsevier.*
- *Duker, J. S., Kaiser, P. K., Singh, R. P., &Sickenberg, M. (Eds.). (2013). Ophthalmology (4th ed.). Saunders.*

Course Title: Public health and community optometry and Sports vision	L	T	P	Cr.
Course Code: BOP6358	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

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. To understand visual demands for various kinds of sports for athletes
5. To perform a comprehensive sports vision assessment for athletes
6. To be able prescribe vision correction appropriate to address the visual demands for sport activity

Course Contents

UNIT-I **15 Hours**

- Public Health Optometry: Concepts and implementation, Stages of diseases
- Dimensions, determinants and indicators of health
- Levels of disease prevention and levels of health care patterns
- Epidemiology of blindness – Defining blindness and visual impairment
- Eye in primary health care
- Contrasting between Clinical and community health programs
- Community Eye Care Programs
- Community based rehabilitation programs
- Nutritional Blindness with reference to Vitamin A deficiency
- Vision 2020: The Right to Sigh

UNIT-II **15 Hours**

- Screening for eye diseases
- National and International health agencies, NPCB
- Role of an optometrist in Public Health
- Organization and Management of Eye Care Programs – Service Delivery models
- Health manpower and planning & Health Economics
- Evaluation and assessment of health programmes
- Optometrists' role in school eye health programmes
- Basics of Tele Optometry and its application in Public Health
- Information, Education and Communication for Eye Care programs

UNIT-III **15 Hours**

- Introduction to Sports Vision- History of Sports Vision, Definitions of Terms
- Vision and Sports- Vision Performance and Athletics
- Principles of Vision Training
- Sports Vision Examinations- Visual Acuity, High Contrast, Refraction, Color Vision, Stereopsis, Dominant Eye / Hand, Eye Health, Cover Test, Ocular Motility, Visual Field, Night Vision, Glare Sensitivity, Glare Recovery

UNIT-IV **15 Hours**

- Visual Skills Description and Training Procedures Accommodation – Vergence Facility, Distance Fixation Disparity, Dynamic Visual Acuity , Eye–Hand Co-ordination, Response Speed, Eye-Foot Co-ordination, Response Speed, Eye-Foot-Body Balance, Peripheral Awareness, Anticipation Timing, Visual Concentration, Speed of Recognition, Visual Concentration, Speed of Recognition, Visual Adjustability, Peripheral Reaction Time, Visualization, Speed of Focusing, Increased Fusional Reserve, Fixation Ability, Visual Memory, Spatial Localization
- Designing Sports Vision Program
- Orthoptic Evaluation- Identification of sports eye wear for various sports Identification of sports protective devices, Dispensing of various kinds of sports eyewear.
- Sports-related Injuries and First Aid

Transactional modes: Video based teaching, Collaborative teaching, Case based teaching, Question-Answer.

Suggested readings:

- *Sports Vision by DFC Loran and C J MacEwen Publishers: Butterworth and Heinmann*
- *GVS Murthy, S K Gupta, D Bachani: The principles and practice of community Ophthalmology, National programme for control of blindness, New Delhi, 200*
- *Newcomb RD, Jolley JL : Public Health and Community Optometry, Charles C Thomas Publisher, Illinois, 1980*
- *K Park: Park's Text Book of Preventive and Social Medicine, 19th edition,*
- *MC Gupta, Mahajan BK, Murthy GVS, 3rd edition. Text Book of Community Medicine, Jaypee Brothers, New Delhi, 2002*

Course Title: Applied clinical optometry	L	T	P	Cr.
Course Code: BOP6359	4	0	0	4

Total Hours: 60 hrs

Learning Outcomes: After completion of this course, the learner will be able:

1. Develop a comprehensive understanding of the clinical examination and assessment of visual disorders.
2. Gain knowledge of common eye diseases, their diagnosis, and appropriate treatment options.
3. Develop effective communication and patient management skills in a clinical setting.
4. Promote an ethical and professional approach to optometric practice.

Course Contents

UNIT-I **15 Hours**

Introduction to Clinical Optometry; Overview of clinical optometry and its significance, Professional ethics and responsibilities in optometric practice, Visual Examination Techniques, Visual acuity testing, Refraction techniques, Binocular vision assessment, Ocular motility evaluation, Near point of convergence measurement, Pupillary assessment

UNIT-II **15 Hours**

Diagnostic Procedures, Slit-lamp bio microscopy, Fundus examination, Tonometry (e.g., applanation, non-contact), Corneal topography, Visual field testing, Optical coherence tomography (OCT)

UNIT-III **15 Hours**

Common Eye Conditions, Myopia, hyperopia, astigmatism, and presbyopia, Amblyopia, Strabismus, Cataracts, Glaucoma, Diabetic retinopathy, Agerelated macular degeneration (AMD), Dry eye syndrome, Contact Lenses, Selection and fitting of contact lenses, Contact lens materials and designs, Complications and management of contact lens-related issues

UNIT-IV **15 Hours**

Referral and Co-management, Recognizing conditions requiring referral to ophthalmologists, Co-management of patients with systemic diseases impacting vision, Communication and Patient Management, Patient interviewing and history-taking, Effective communication strategies with patients and healthcare professionals, Patient education and counseling

Transactional modes: Video based teaching, Collaborative teaching, Case

based teaching, Question-Answer.

Suggested readings:

- *Gottlieb, D. D. (2020). Clinical Optometry (3rd ed.). Butterworth Heinemann.*
- *Bennett, E. S., & Weissman, B. A. (2018). Clinical Contact Lens Practice (3rd ed.). Lippincott Williams & Wilkins.*
- *Elliott, D. B., & Peli, E. (Eds.). (2015). Clinical Vision Science: A Multidisciplinary Approach (2nd ed.). Springer.*
- *Rosenfield, M., & Logan, N. (Eds.). (2013). Optometry: Science, Techniques, and Clinical Management (2nd ed.). Butterworth Heinemann.*
- *Grosvenor, T., & Scott, R. (2017). Clinical Optics (4th ed.). Butterworth Heinemann*