Era University

CURRICULUM & EVALUATION SCHEME

OF

BACHELOR OF OPTOMETRY (B.OPTOM)

[APPLICABLE W.E.F. ACADEMIC SESSION 2023-27**]**

ERA UNIVERSITY
Hardoi Road, Lucknow, Uttar Pradesh Website:
www.erauniversity.in

About Optometry:

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

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

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

Scope and Need for Allied and Healthcare Professionals in the Indian Healthcare System

The quality of medical care has improved tremendously in the last few decades due to the advances in technology, thus creating fresh challenges in the field of healthcare. It is now widely recognized that health service delivery is a team effort involving both clinicians and non-clinicians, and is not the sole duty of physicians and nurses.1Professionals that can competently handle sophisticated machinery and advanced protocols are now in high demand. In fact, diagnosis is now so dependent on technology, that allied and healthcare professionals (AHPs) are vital to successful treatment delivery.

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

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

Thus, the breadth and scope of the allied and healthcare practice varies from one end to another, including areas of work listed below:
Across the age span of human development from neonate to old age;

With patients having complex and challenging problems resulting from systemic illnesses such as, in the case of diabetes, cardiac abnormalities/conditions and elderly care to name a few;

Towards health promotion and disease prevention, as well as assessment, management and evaluation of interventions and protocols for treatment;

In a broad range of settings from a patient's home to community, primary care centers, to tertiary care settings; and

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

Learning Goals And Objectives For Allied And Healthcare Professionals

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

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

ERA UNIVERSITY

Study of Evaluation Scheme
Of
Bachelor of Optometry (B.Optom)

Programme : **Bachelor of Optometry(**B.optom)

Duration : Four years Full time(Eight semesters)
Including one year compulsory Internship

Medium : English

Minimum Required Attendance : 75%

Total Credits **: 200**

Assessment :

Internal	External	Total
30	70	100

Internal Evaluation (Theory Papers):

Class Presentation	Care Marks	Attendance	Assignment	Mid Term Exam	Total
04	06	04	04	12	30

Evaluation of Practical/Dissertations & Project Reports:

Internal	External	Total
30	70	100

Duration of Examination:

Internal	External
01 Hrs	03 Hrs

To qualify a course/subject the student is required to secure a minimum of 40% marks in aggregate including the semester examination and teachers continuous evaluation. (i.e. both internal and external). A candidate who secures less than 40% of marks in a course shall be deemed to have failed in that course. The student should have secured at least 50% marks in aggregate to clear the semester. The subject marked with asterisk (*) in Semester-I &II are noncore papers.

Eligibility for admission:

Selection procedure:

1. He/she has passed the Higher Secondary (10+2) or equivalent examination recognized by any Indian University or a duly constituted Board with pass marks in Physics, Chemistry, Biology

OR

Diploma in Optometry after completing 12th class/ 10 +2 of CBSE or equivalent with minimum aggregate of 50% marks in physics chemistry and biology provided the candidate has passed in each subject separately.

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

A. English, Physics, Chemistry, Botany, Zoology

B. English, Physics, Chemistry, Biology and any other language

4. He/she has attained the age of 17 years as on - (current year) & maximum age limit is 30 years.
5. He/she has to furnish at the time of submission of application form, a certificate of Physical fitness from a registered medical practitioner and two references from persons other than relatives testifying to satisfactory general character.
6. Admission to B.Opto course shall be made on the basis of eligibility and an entrance test to be conducted for the purpose. No candidate will be admitted on any ground unless he/she has appeared in the admission test and interview.

A. Entrance test, to be conducted by the university as per the syllabus under 10 +2 scheme of CBSE, subject-wise distribution of questions will be as 30% in Physics, 30% in biology, 30% in Chemistry, 5% in English (Language & Comprehension) and 5% in General Awareness about health related methods.

B. . Successful candidates on the basis of written Test will be called for the interview & shall have face an interview board. The interview board will include the Head of the Department of medical imaging (Chairman of the Board) along with the Principal / chief faculty as well

as Chief of MRIT apart from other nominees, whose recommendations shall be final for the selection of the students..

C. During subsequent counseling (s) the seat will be allotted as per the merit of the candidate depending on the availability of seats on that particular day.

D. Candidate who fails to attend the Medical Examination on the notified date(s) will forfeit the claim for admission and placement in the waiting list except permitted by the competent authority under special circumstances.

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

Provision of Lateral Entry:

Lateral entry to second year for allied and healthcare science courses for candidates who have passed diploma program from the Government Boards and recognized by State/Central University, fulfilling the conditions specified and these students are eligible to take admission on lateral entry system only if the same subject have been studied at diploma level.

Duration of the course

Duration of the course: 4 years or 8 semesters including1440 hours of internship.

Medium of instruction:

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

General information:

1. **Attendance:**

A candidate has to secure minimum 80% attendance in overall with at least-

A. 75% attendance in theoretical

B. 75% in Skills training (practical) for qualifying to appear for the final examination.

No relaxation, whatsoever, will be permissible to this rule under any ground including indisposition etc.

2. **Assessment:**

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

attain at least 40% marks in each Theory, Internal assessment and Practical independently / separately for each individual subject.

>70% Distinction

60%-First Division

50-59% Second Division

40-49% Third Division

3. Aggregate passing marks 40%.
4. Practical exam must be completed within 15 days after the theory exam.
5. 15 Days summer vacation and 7 days winter vacation.
6. A candidate who is fails in all subject will be termed as year back and if candidate passes in 50% of subject then he will be promoted in next semester and if candidate passes his/her in all subject then it will be termed as all clear.
7. Abbreviation used:

   L- Lecture

   P-Practical

   T-Tutorial

   H-Hospital posting

INTERNSHIP

Internship is a phase of training where a student is expected to conduct actual practice of clinical optometry and acquire skills under supervision so that he/she may become capable of functioning independently.

INTERNSHIP DURATION: ONE YEAR

Every candidate will be required after successfully completing the final Bachelor in Optometry Examination, to undergo compulsory rotator internship to satisfaction of the University for a period of 6 months so as to be eligible for the award of the degree.

The University shall issue a provisional degree of Bachelor in Optometry on passing the final examination after the completion of internship on demand by the candidate.

The internee shall be entrusted with optometry responsibilities under direct supervision of Senior Optometrist. They shall not be working independently.

Internee will not issue certified copy of investigation reports or other related documents under their signature.

ASSESMENT OF INTERNSHIP

The Internee shall maintain the record of work, which is to be verified and certified by the senior Optometrist under whom he/she works. Apart from scrutiny of record of work, assessment and evaluation of training shall be undertaken by an objective approach using situation tests in knowledge, skills and attitude during at the end of training. Based on the record of work and date of evaluation The Director/Principal shall issue certificate for satisfactory completion of training following which the university shall award the degree of Bachelor in Optometry to the candidate.

- Satisfactory completion shall be determined on the basis of the following.
- Proficiency of knowledge required for each Optometry techniques.
- The competency and skills expected to manage each optometry technique.
- Responsibility, punctuality works up of optometry techniques, involvement in special procedures and preparation of reports.
- Capacity to work in a team (behavior with colleagues, nursing staff and relationship with medical and paramedical).
- Initiating, **participating** in discussions and developing research aptitude.

- Only 12 leaves are allowed to an internee during the period of his/her internship. If he/she extend his/her leave in the duration of internship, the period the internship shall be extended by double the days for which the student was absent.

Leave Rule

Summer Vacation: - 15 Days

Winter Vacation: - 7 Days

Preparation Leave: - 7 Days

Internship Log Book

The Log Book Submitted by the candidate will be duly verified & a viva voce shall be conducted on the same at the time of Practical Examination of final year.

S.N.	TOPIC	NO. OF CASES
1	Clinical Observation and Report writing	5
2	Visual Acuity – Distance + Near	5
3	History taking General Specific Conditions	5
4	Visual Acuity – Distance + Near (log MAR) Pinhole acuity	5
5	Extra ocular Motility	5
6	Cover test	5
7	Push up test (Amplitude of Accommodation)	5
8	Push up test (Near point of Convergence)	5
9	Stereopsis test	5
10	Tear Break up time	5
11	Amsler's Grid test	5
12	Color vision test	5
13	Schirmer's test	5
14	Confrontation visual field test	5
15	Slit lamp examination	5
16	Digital tonometry	5
17	Schiotz Tonometry	5
18	Von Herick Grading of Anterior chamber depth	5
19	Accommodative facility(+ 2.00 D)	5
20	Corneal Sensitivity test	5
21	IPD measurement	5
22	Proptosis evaluation	5
23	Ptosis evaluation	5
24	Pupillary evaluation Direct Consensual RAPD	5
25	Maddox rod (Phoria)	5

26	Retinoscopy- Static, Dynamic and Cycloplegic Retinoscopy	5
27	Keratometry	5
28	Subjective Refraction JCC Duo chrome	5
29	Visual Field chart interpretation	5
30	B scan observation	5
31	A scan chart Interpretation	5
32	Case Analysis	5
33	Contact Lens	5
34	Low Vision care Clinic	5
35	Binocular Vision clinic	5
36	Ophthalmology clinic (Common eye conditions)	10

Programme Structure 2023

Bachelor of Optometry (Total Credits -

B.Optom Semester- I (First Year)

First Semester

s.no.	Subjects (Theory)	Paper code	Hrs. per Week		Maximum Marks		
			Actual	Credit	I.A.	Exam	Total
1.	General Anatomy	BOT-101	03	03	30	70	100
2.	General Physiology	BOT-102	03	03	30	70	100
3.	General Biochemistry	BOT-103	02	02	30	70	100
4.	Geometrical Optics-I	BOT-104	03	03	30	70	100
5.	Nutrition	BOT-105	02	02	30	70	100
6.	English & Communication Skill	ENG-101	02	02	30	70	100
	Total		**15**	**15**	**180**	**420**	**600**

s.no.	Subjects (Practical)	Paper code	Hrs. per Week		Maximum Marks		
			Actual	Credit	I.A.	Exam	Total
1.	General Anatomy	BOP-101	02	01	30	70	100
2.	General Physiology	BOP-102	02	01	30	70	100
3.	General Biochemistry	BOP-103	02	01	30	70	100
4.	Geometrical Optics-I	BOP-104	02	01	30	70	100
	Total		**08**	**04**	**120**	**280**	**400**

B.Optom Semester- II (First Year)

s.no.	Subjects (Theory)	Paper code	Hrs. per Week		Maximum Marks		
			Actual	Credit	I.A.	Exam	Total
1.	Ocular Anatomy	BOT-201	03	03	30	70	100
2.	Ocular Physiology	BOT-202	03	03	30	70	100
3.	Ocular Biochemistry	BOT-203	02	02	30	70	100
4.	Geometrical Optics-II	BOT-204	03	03	30	70	100
5.	Physical Optics	BOT-205	02	02	30	70	100
6.	Basic of Computers	BOT-206	02	02	30	70	100
	Total		**15**	**15**	**180**	**420**	**600**

s.no.	Subjects (Practical)	Paper code	Hrs. per Week		Maximum Marks		
			Actual	Credit	I.A.	Exam	Total
1.	Clinical Optometry-I	BOP-201	06	03	30	70	100
2.	Basic of Computers	BOP-202	02	01	30	70	100
	Total		**08**	**04**	**60**	**140**	**200**

B.Optom Semester- III (Second Year)

Third Semester

s.no.	Subjects (Theory)	Paper code	Hrs. per Week		Maximum Marks		
			Actual	Credit	I.A.	Exam	Total
1.	Ocular Microbiology	BOT-301	02	02	30	70	100
2.	Visual Optics-I	BOT-302	02	02	30	70	100
3.	Optometric Optics-I	BOT-303	02	02	30	70	100
4.	Optometric Instruments	BOT-304	02	02	30	70	100
5.	Ocular Disease-I	BOT-305	03	03	30	70	100
6.	Clinical Examination of Visual System	BOT-306	02	02	30	70	100
7.	Indian Medicine & Tele Medicine	BOT-307	02	02	30	70	100
	Total		**15**	**15**	**210**	**490**	**700**

s.no.	Subjects (Practical)	Paper code	Hrs. per Week		Maximum Marks		
			Actual	Credit	I.A.	Exam	Total
1.	Clinical Optometry-II	BOP-301	06	03	30	70	100
	Total		**06**	**03**	**30**	**70**	**100**

B.Optom Semester- IV (Second Year)

Fourth Semester

s.no.	Subjects (Theory)	Paper code	Hrs. per Week		Maximum Marks		
			Actual	Credit	I.A.	Exam	Total
1.	Optometric Optics-II & Dispensing Optics	BOT-401	02	02	30	70	100
2.	Visual Optics-II	BOT-402	03	03	30	70	100
3.	Ocular Disease-II	BOT-403	03	03	30	70	100
4.	Pathology	BOT-404	02	02	30	70	100
5.	Basic & Ocular Pharmacology	BOT-405	03	03	30	70	100
6.	Introduction to Quality & Patient Safety	BOT-406	02	02	30	70	100
7.	Medical Psychology	BOT-407	02	02	30	70	100
	Total		**17**	**17**	**210**	**490**	**700**

s.no.	Subjects (Practical)	Paper code	Hrs. per Week		Maximum Marks		
			Actual	Credit	I.A.	Exam	Total
1.	Clinical Optometry-III	BOP-408	08	04	30	70	100
	Total		**08**	**04**	**30**	**70**	**100**

B. Optom Semester- V (Third Year)

Fifth Semester

s.no.	Subjects (Theory)	Paper code	Hrs. per Week		Maximum Marks		
			Actual	Credit	I.A.	Exam	Total
1.	Contact Lens-I	BOT-501	03	03	30	70	100
2.	Low Vision Care	BOT-502	02	02	30	70	100
3.	Geriatric & Paediatric Optometry	BOT-503	03	03	30	70	100
4.	Binocular Vision-I	BOT-504	03	03	30	70	100
5.	Systemic Disease	BOT-505	03	03	30	70	100
6.	Research Methodology & Biostatistics	BOT-506	03	03	30	70	100
	Total		**17**	**17**	**180**	**420**	**600**

s.no.	Subjects (Practical)	Paper code	Hrs. per Week		Maximum Marks		
			Actual	Credit	I.A.	Exam	Total
1.	Clinical Optometry-IV	BOP-501	08	04	30	70	100
	Total		**08**	**04**	30	70	**100**

B.Optom Semester- VI (Third Year)

Sixth Semester

s.no.	Subjects (Theory)	Paper code	Hrs. per Week		Maximum Marks		
			Actual	Credit	I.A.	Exam	Total
1.	Contact Lens-II	BOT-601	03	03	30	70	100
2.	Binocular Vision-II	BOT-602	03	03	30	70	100
3.	Public Health & Community Optometry	BOT-603	02	02	30	70	100
4.	Practice Management	BOT-604	02	02	30	70	100
5.	Occupational Optometry	BOT-605	02	02	30	70	100
6.	Optometric Law & Ethics	BOT-606	02	02	30	70	100
	Total		**14**	**14**	**180**	**420**	**600**

s.no.	Subjects (Practical)	Paper code	Hrs. per Week		Maximum Marks		
			Actual	Credit	I.A.	Exam	Total
1.	Clinical Optometry-V	BOP-601	08	04	30	70	100
2.	Research Project	BOP-603	03	03	30	70	100
	Total		**11**	**07**	**60**	**140**	**200**

SECOND SEMESTER

COURSE/PAPER- OCULAR ANATOMY

PAPER CODE: BOT-201

L	T	P	C
3	-	-	3

Course Objectives:

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

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

Course outline:

Unit I:

Ocular Embryology

Orbit

Orbital Blood supply

Ocular Adnexa and Lacrimal system

Eye Lids

Extraocular Muscles

Unit II:

Conjunctiva

Cornea

Aqueous, anterior chamber, Angle structures

Uvea – Iris, ciliary body & Choroid

Crystalline lens

Unit **III:**

Vitreous

Retina

Sclera (episclera& sclera) Optic Nerve

Visual Pathway

Unit IV

- Detailed anatomy, cellular structure, vasculature, nerve supply for all the above coats, pupils, nerve supply for Pupillary actions, Pupillary pathway.
- Cranial Nerves : Detailed study of each of the following nerves in terms of their nucluei, course, relationship within brain, effects of compression etc at different regions
  1. Optic nerve
  2. Oculomotor nerve
  3. Trochlear nerve
  4. Trigeminal nerve
  5. Abducent nerve

Unit VI

Facial nerve

Practical:

Eye dissection of bull's eye

- Demonstration / identification of various ocular structures
- Practical file of various ocular structures to be prepared by student

Department of Optometry

Era University, Lucknow

Course Outline

Effective From: 2023-24

Name of theProgram	**Bachelor of Optometry**			**Year/ Semester:**	**1st/2nd**
CourseName	Ocular Anatomy	**Course Code:**	**BOT201**	**Type:**	Regular
Credits	**03**			**Total Sessions Hours:**	**45**
EvaluationSpread	**Internal Continuous Assessment:**	**30**		**End Term Exam:**	**70**
Type ofCourse	○ Compulsory	◉ Core		○ Creative	○ Life Skill
Course Objectives	The objective of the course is to provide the students with the knowledge of the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa.				

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*

Course Outcome (CO)	At the end of the course, the students will be able to understand the applied anatomy of all structures of eye and ocular adnexa**.**
CO1	Understanding the basic concept of Ocular embryology
CO2	Understanding the concept of basic structures and connection between various part of Central nervous system and the eye
CO3	To understand the neural connection and distribution.
CO4	Understanding the basic anatomy of various tissues in the eye
CO5	Understanding of the correlation the various structures with the function.
Internal EvaluationMode	Class test+ weekly assignment Attendence Tutorial Role play Active learning

Unit NO.	**Title of the unit**	**Topic of unit**	**Hours**	**Mapped CO**
Unit 1	**OCULAR EMBRYOLOGY AND OCULAR ADNEXA**	1. Ocular Embryology 2. Orbit 3. Orbital Blood supply 4. Ocular adnexa and lacrimal system 5. Eyelids 6. Extra Ocular Muscles	9	CO1

Unit 2	**ANATOMY OF THE COATS OF EYEBALL**	1. Conjunctiva 2. Cornea 3. Aqueous, Anterior chamber, Angle structures 4. Uvea- Iris- Iris, ciliary body and choroid 5. Crystalline lens	9	CO2
Unit 3	**RETINA, VITREOUS AND VISUAL PATHWAY**	1. Vitreous 2. Retina 3. Sclera 4. Visual Pathway	9	CO3
Unit 4	**PUPILLARY PATHWAY AND CRANIAL NERVES**	1. Optic Nerve 2. Occulomotor Nerve 3. Trochlear Nerve 4. Trigeminal Nerve 5. Abducent Nerve	9	CO4
Unit 5	**FACIAL NERVE**	1. Facial Nerve	9	CO5

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	2	2	-	-	1	2	1	2	1	1	2
CO2	2	3	2	3	2	-	-	1	2	2	1	2	2	2
CO3	3	3	2	2	2	-	-	1	2	1	2	2	1	2
CO4	2	3	1	3	2	-	-	1	2	2	3	1	2	2

Strong contribution-3, Average contribution-2 , Low contribution-1,

Suggested Readings:

Text- Books	1. AK Khurana, Indu Khurana: Anatomy and Physiology, 2nd edition, CBS Publishers, New Delhi, 2006
Reference Books	1. RD Ravindran: Physiology of the Eye, Arvind eye hospitals, Pondicherry, 2012. 2. PL Kaufman, A Alm: Adler's Physiology of the eye clinical application, 10th edition, Mosby, 2002

Recapitulation & Examination Pattern

Internal Continuous Assessment:

Component	Marks	Pattern
Mid Semester	12	12 Marks theory(including MCQ, SHORT NOTE , LONG QUESTION)
Class Test	5	Short note
Online Test/ Objective Test	5	**MCQs**
Assignment/ Presentation	4	Assignment(2 MARKS) + Presentation(2MARKS)
Attendance	4	65-75 % 1 MARKS 75-85 2 MARKS 85-95 3 MARKS >95 % 4 MARKS
Total Marks	**30**	

Course created by: Ms. Ramlah Akhtar (Tutor)

Signature:

P

Approved by:

Signature:

SECOND SEMESTER

COURSE/PAPER- OCULAR PHYSIOLOGY

PAPER CODE: BOT-202

L	T	P	C
3	-	-	3

Learning objective: To enable the students to understand the normal functioning of all structures of the eye and adnexa.

Learning Outcome: At the end of the course the student will be able to explain the physiological aspects of normal development of the eye and understand physiological principles underlying pathogenesis and treatment of diseases of the eye.

UNIT 1

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

UNIT 2

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

UNIT 3

- The visual stimulus, refractive errors
- Visual acuity, Vernier acuity and principle of measurement
- Visual perception – Binocular vision, stereoscopic vision, optical illusions
- Visual pathway, central and cerebral connections
- Colour vision and colour defects. Theories and diagnostic tests

P

UNIT 4

- Introduction to electro physiology
- Scotopic and Photopic vision

- Color vision, Color mixing
- Retinal sensitivity and Visibility

UNIT 5

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

Practical

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

TEXT BOOK:

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

REFERENCE BOOKS:

1. RD Ravindran: Physiology of the eye, Arvind eye hospitals, Pondicherry, 20012. PL Kaufman, A Alm: Adler's Physiology of the eye clinical application, 10th edition, Mosby, 2002

Department of Optometry

Era University, Lucknow

Course Outline

Effective From: 2023-24

Name of theProgram	**Bachelor of Optometry**			**Year/ Semester:**	**1st/2nd**
CourseName	Ocular Physiology	**Course Code:**	**BOT202**	**Type:**	Regular
Credits	**03**			**Total Sessions Hours:**	**45**
EvaluationSpread	**Internal Continuous Assessment:**	**30**		**End Term Exam:**	**70**
Type ofCourse	○ Compulsory	◉ Core		○ Creative	○ Life Skill
Course Objectives	The objective of the course is to provide the students with the knowledge of low vision classification, social impact on the low vision patients, examination of low vision, basic concept of low vision devices and the management options for the low vision patients.				

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*

Course Outcome (CO)	At the end of the course, the students will be able to understand the normal functioning of all structures of eye and ocular adnexa**.**
CO1	Understanding the concept of protective mechanism in the eye.
CO2	Understanding the concept of general aspects of vision and photochemistry.
CO3	Applying concept of Visual acuity, Vernier acuity, Binocular Vision and color vision.
CO4	Understanding the basic concept of Electrophysiology and retinal sensitivity.
CO5	Understanding the basic concept of receptive stimulation, flicker and psychophysics
Internal EvaluationMode	Class test+ weekly assignment Attendence Tutorial Role play Active learning

Unit NO.	**Title of the unit**	**Topic of unit**	**Hours**	**Mapped CO**
Unit 1	**COATS & PROTECTIVE MECHANISM IN THE EYE**	7. Eyelids and lacrimation 8. Extrinsic eye muscles 9. Coats of eyeball 10. Cornea 11. Aqueous humour & Vitreous: Intraocular Pressure	9	CO1
Unit 2	**GENERAL ASPECTS OF SENSTAION**	1. Iris and Pupil 2. Crystalline lens and accommodation 3. Retinal structure and functions 4. Pigments of eye and photochemistry	9	CO2

Unit 3	**VISUAL STIMULUS & REFRACTIVE ERRORS**	5. Visual acuity, vernier acuity and principle of measurements 6. Visual perceptions 7. Visual pathway 8. Color vision & color defects	9	CO3
Unit 4	**ELECTROPHYSIOLOGY**	6. Introduction of electrophysiology 7. Scotopic and Photopic vision 8. Retinal sensitivity and visibility	9	CO4
Unit 5	**BASIC ASPECTS OF RECEPTIVE STIMULATION**	2. Receptive stimulation and flicker 3. Ocular movements and saccades 4. Visual perception and adaptation 5. Psychophysics	9	CO5

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	2	2	-	-	1	2	1	2	1	1	2
CO2	2	3	2	3	2	-	-	1	2	2	1	2	2	2
CO3	3	3	2	2	2	-	-	1	2	1	2	2	1	2
CO4	2	3	1	3	2	-	-	1	2	2	3	1	2	2

Strong contribution-3, Average contribution-2 , Low contribution-1,

Suggested Readings:

Text- Books	1. AK Khurana, Indu Khurana: Anatomy and Physiology, 2nd edition, CBS Publishers, New Delhi, 2006
Reference Books	3. RD Ravindran: Physiology of the Eye, Arvind eye hospitals, Pondicherry, 2012. 4. PL Kaufman, A Alm: Adler's Physiology of the eye clinical application, 10th edition, Mosby, 2002

Recapitulation & Examination Pattern

Internal Continuous Assessment:

Component	**Marks**	**Pattern**
Mid Semester	12	12 Marks theory(including MCQ, SHORT NOTE , LONG QUESTION)
Class Test	5	Short note
Online Test/ Objective Test	5	**MCQs**
Assignment/ Presentation	4	Assignment(2 MARKS) + Presentation(2MARKS)
Attendance	4	65-75 % 1 MARKS 75-85 2 MARKS 85-95 3 MARKS >95 % 4 MARKS
Total Marks	**30**	

Course created by: SALAL MOHAMMAD (AP)

Signature:

Approved by:

Signature:

SECOND SEMESTER

COURSE/PAPER- OCULAR BIOCHEMISTRY

PAPER CODE : BOT-203

L	T	P	C
2	-	2	3

Learning objective: To enable the students to understand structure, function and interrelationship of biomolecules and consequences of deviation from the normal.

Learning Outcome: At the end of the course the student will be able to explain principles of various conventional and specialized laboratory investigations and understand metabolic processes taking place in different ocular structures

UNIT 1

Hormones basic concepts in metabolic regulation with examples say insulin

UNIT 2

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

UNIT 3

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

UNIT 4

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

UNIT 5

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

Practical

1. Quantitative analysis

2. Abnormal constituents in urine, sugar proteins, ketones, blood and bile salts.

3. Techniques of detection of abnormal constituents of urine:

4. Electrophoresis

    a. Chromatography, Preparation of normal, molar and percentage solutions.

    b. Preparation of buffers, pH determination

5. Demonstration

    a. Estimation of blood cholesterol Estimation of alkaline phosphatase.

    b. Salivary amylase (effect of ph, etc) Milk analysis

TEXT BOOK:

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

REFERENCE BOOKS:

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

Department of OPTOMETRY

Era University, Lucknow

Course Outline

Effective From: 2024-25

Name of the Program	**B.Sc. (OPTOMETRY)**			**Year/ Semester:**	**1st Year/2nd Semester**
Course Name	**Ocular Biochemistry**	**Course Code:**	**BOT-203**	**Type:**	**Theory**
Credits	**02 (L-3, T-1, P-0)**			**Total Sessions Hours:**	**40 Hours**
Evaluation Spread	**Internal Continuous Assessment:**	**30 Marks**		**End Term Exam:**	**70 Marks**
Type of Course	○ Compulsory	◉ Core		○ Creative	○ Life Skill
Course Objectives	• The course objective of ocular biochemistry encompasses several key components. Firstly, it involves a deep dive into the biochemical processes fundamental to eye function, covering aspects such as metabolism, synthesis, and degradation of crucial molecules vital for vision and ocular health. • The objective includes identifying potential therapeutic targets within enzymes, receptors, and signaling pathways to develop innovative treatments for ocular diseases				
Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*					
Course Outcome (CO)	To enable the students to understand structure, function and interrelationship of biomolecules and consequences of deviation from the normal				
	Attributes				
CO1	Understanding the molecular mechanisms: Delving into the biochemical processes underlying ocular function, including the metabolism, synthesis, and degradation of key molecules essential for vision and ocular health..				
CO2	Exploring ocular diseases: Investigating how alterations in biochemical pathways contribute to various eye disorders, such as cataracts, glaucoma, retinal degeneration, and diabetic retinopathy				
CO3	Identifying therapeutic targets: Identifying potential targets for intervention, including enzymes, receptors, and signaling pathways, to develop novel treatments for ocular diseases based on a comprehensive understanding of ocular biochemistry				
CO4	Integrating research and clinical practice: Bridging the gap between basic science and clinical applications by applying knowledge of ocular biochemistry to diagnosis, prognosis, and treatment strategies in ophthalmology				
CO5	To study the molecular mechanisms underlying eye function, explore the biochemical basis of ocular diseases, identify therapeutic targets, and integrate findings into clinical practice.				
Pedagogy	Interactive, discussion-bases, student-centered, presentation.				
Internal Evaluation Mode	Mid-term Examination: 12 Marks Class test((Participation): 04 Marks Class Presentation : 04 Marks Assignments/Presentation: 04 Marks Attendance: 04 Marks Bed side Behavior: 02 Marks				

Session Details	Topic	Hours	Mapped CO
Unit 1	Hormones basic concepts in metabolic regulation with examples say insulin	06	CO1
Unit 2	• Metabolism: General whole body metabolism (carbohydrates, proteins, lipids) • Understand the Structure, function and inter-relationship of biomolecules and consequences of deviation from normal	10	CO2
Unit 3	**Ocular Biochemistry:** Various aspects of the eye, viz., cornea, lens aqueous, vitreous, retina and pigment rhodopsin. (The important chemicals in each and their roles.) Immunology of anterior segment	10	CO3
Unit 4	**Technique:** Colloidal state, sol. Gel. Emulsion, dialysis, electrophoresis. pH buffers mode of action, molar and percentage solutions, photometer, colorimeter and spectrometry. Radio isotopes: application in medicine and basic research	08	CO4
Unit 5	**Clinical Biochemistry:** Blood sugar, urea, creatinine and bilirubin significance of their estimation.	06	CO5

CO-PO and PSO Mapping

CO	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO6
CO1	1	3	1	2	-	-	-	1	2	1	2	2	-	-
CO2	2	3	2	2	-	-	-	1	2	2	1	1	-	-
CO3	1	3	1	2	-	-	-	1	2	1	2	2	-	-
CO4	2	3	1	2	-	-	-	1	2	2	3	3	-	-
CO5	1	3	1	2	-	-	-	1	2	1	2	2	-	-

Strong contribution-3, Average contribution-2 , Low contribution-1,

Suggested Readings:

Text- Books

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

Reference Books	• S. Ramakrishnan, K G Prasannan and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990 • D.R. Whikehart: Biochemistry of the Eye, 2ndedition, Butterworth Heinemann, Pennsylvania, ▪ S. Ramakrishnan, K G Prasannan and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990 2. D R Whikehart: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003

Recapitulation & Examination Pattern

Internal Continuous Assessment:

Component	**Marks**	**Pattern**
Mid Semester :	12	**Section A:** Contains **10** MCQs/Fill in the blanks/One Word Answer/ Each question carries **04 Marks.** **Section B:** Contains **02** Short questions out of which **03** questions are to be attempted. Each question carries **02 Marks**. **Section C:** Contains **01**descriptive questions are to be attempted & Question carries **04 Marks**
Class Test :	04	Contains **05 descriptive questions.** Each question carries **04** Mark.
Class Presentation :	04	Contains **10 multiple choice questions.** Each question carries **1**
		Marks.
Assignment/ Presentation :	04	Assignment to be made on topics and instruction given by subject teacher
Attendance :	04	As per policy
Bed side Behavior :	02	As per policy
TOTAL	30	

Course Created by:- Mrs. Namrata Srivastava **Assistant Professor** **Signature :**	**Course Approved by:- Mr. Sunil Kumar Gupta** **Asst. Prof. & Incharge** **Signature :**

SECOND SEMESTER

COURSE/PAPER - GEOMETRICAL OPTICS II

PAPER CODE: BOT-204

L	T	P	C
2	-	2	3

Learning objective: The objective of this course is to equip the students with a thorough knowledge of mirrors and lenses.

Learning outcome: At the end of this course, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.

UNIT 1

Vergence and vergence techniques revised, schematic and reduced eyes, visual acuity Emmetropia and ametropia.

UNIT 2

Blur retinal Imaginary, Correction of spherical ammetropia, vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptoric power, angular magnification of spectacles in aphakic, Thin lens model of the eye –angular magnification –spectacle and relative spectacle magnification.

UNIT 3

Aperture stops- entrance and exit pupils.,Astigmatism. - To calculate the position of the line image in a sphero-cylindrical lens

UNIT 4

Accommodation, Accommodation formulae and calculations, Presbyopia- Spectacle magnification, angular magnification of spectacle lens, near point, calculation of add, depth of field.

UNIT 5

Spatial distribution of optical information- modulation transfer functions- Spatial filtering-applications. Visual optics of aphakia and pseudophakia.

Practical

1. Construction of a tabletop telescope – all three types of telescopes.
2. Construction of a tabletop microscope
3. Imaging by a cylindrical lens – relationship between cylinder axis and image orientation
4. Imaging by two cylinders in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinders' powers and orientations
5. Imaging by a spherocylindrical lens – sphere and cylinder in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinder's power and orientation.

TEXT BOOK:

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

REFERENCE BOOKS:

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

Department of OPTOMETRY

Era University, Lucknow

Course Outline

Effective From: 2024-25

Name of the Program	**B.Sc. (OPTOMETRY)**			**Year/ Semester:**	**1st Year/2nd t Semester**
Course Name	**GEOMETRICAL OPTICS –II**	**Course Code:**	**BOT-204**	**Type:**	Theory
Credits	**03 (L-3, T-1, P-0)**			**Total Sessions Hours:**	**40 Hours**
Evaluation Spread	**Internal Continuous Assessment:**	**30 Marks**		**End Term Exam:**	**70 Marks**
Type of Course	○ Compulsory	◉ Core		○ Creative	○ Life Skill
Course Objectives	The objective of this course is to equip the students with a thorough knowledge ofmirrors and lenses. At the end of this course, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.				

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*

Course Outcome (CO)	The candidate should demonstrate fundamental knowledge & insight into geometrical optics in order for the candidate to be able to understand & solve problems related to the eye & optical instrument/lenses their function & correction.
	Attributes
CO1	To learn about different refractive states of eye, Objective static dynamic refractive status, including autonomic refractive devices.
CO2	Understanding the concept & terminology use to describe ophthalmic lenses.
CO3	To learn about Qualitative & Quantitative to investigate the optics of human visual system and refractive correction.
CO4	Knowledge and understanding should be demonstrate in the area of Schematic eye modals, dioptric of the eye, Entopic Phenomenon ,Quality of Retinal Image, Radiation and the eye.
CO5	Knowledge and understanding should be demonstrate in the area of Accommodation, Binocular balancing, Presbyopia – Spectacle magnification of spectacle lens.
Pedagogy	Interactive, discussion-bases, student-centered, presentation.
Internal Evaluation Mode	Mid-term Examination: 12 Marks Class test((Participation): 04 Marks Class Presentation : 04 Marks Assignments/Presentation: 04 Marks Attendance: 04 Marks Bed side Behavior: 02 Marks

Session Details	**Topic**	**Hours**	**Mapped CO**

Unit 1	**1.** Vergence and vergence techniques revised. **2.** Schematic and reduced eyes. **3.** Visual acuity Emmetropic and ametropic.	08	CO1
Unit 2	**1.** Blur retinal Imaginary, Correction of spherical ametropic, **2.** Vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptoric power. **3.** Angular magnification of spectacles in aphakic, thin lens model of the eye –angular magnification.	10	CO2
Unit 3	**1.** Aperture stops- entrance and exit pupils. **2.** Astigmatism. - To calculate the position of the line image in a sphero-cylindrical lens	08	CO3
Unit 4	**1.** Accommodation, Accommodation formulae and calculations. **2.** Presbyopia- Spectacle magnification, angular magnification of spectacle lens, near point, calculation of adds depth of field.	10	CO4
Unit 5	**1.** Spatial distribution of optical information- modulation transfer functions- Spatial filtering- applications. **2.** Visual optics of aphakia and pseudophakia.	08	CO5

CO-PO and PSO Mapping														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	**1**	**3**	**1**	**2**	**-**	**-**	**-**	**1**	**2**	**1**	**2**	**2**	**-**	**-**
CO2	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**1**	**2**	**2**	**1**	**1**	**-**	**-**
CO3	**1**	**3**	**1**	**2**	**-**	**-**	**-**	**1**	**2**	**1**	**2**	**2**	**-**	**-**
CO4	**2**	**3**	**1**	**2**	**-**	**-**	**-**	**1**	**2**	**2**	**3**	**3**	**-**	**-**
CO5	**1**	**3**	**1**	**2**	**-**	**-**	**-**	**1**	**2**	**1**	**2**	**2**	**-**	**-**

Strong contribution-3, Average contribution-2 , Low contribution-1,

Suggested Readings:

Text- Books	1. Tunnacliffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990. 2. Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.
Reference Books	**1.** Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991. 2. Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw-Hill, New York, USA, 2002.
Para Text Book	• M Swaminathan: Hand book of Food and Nutrition, fifth edition, Bangalore printing & publishing Co.Ltd, Bangalore, 2004 • C Gopalan, BV Rama Sastri, SC Balasubramanian: Nutritive Value of Indian Foods,National Institute of Nutrition, ICMR, Hyderabad,2004

Recapitulation & Examination Pattern

Internal Continuous Assessment:

Component	**Marks**	**Pattern**
Mid Semester :	12	**Section A:** Contains **10** MCQs/Fill in the blanks/One Word Answer/ Each question carries **04 Marks.** **Section B:** Contains **02** Short questions out of which **03** questions are to be attempted. Each question carries **02 Marks**. **Section C:** Contains **01**descriptive questions are to be attempted & Question carries **04 Marks**
Class Test :	04	Contains **05 descriptive questions.** Each question carries **04** Mark.
Class Presentation :	04	Contains **10 multiple choice questions.** Each question carries **1**
		Marks.
Assignment/ Presentation :	04	Assignment to be made on topics and instruction given by subject teacher
Attendance :	04	As per policy
Bed side Behavior :	02	As per policy
TOTAL	30	

Course Created by:- Mrs. Namrata Srivastava **Assistant Professor** **Signature :**	**Course Approved by:- Mr. Sunil Kumar Gupta** **Asst. Prof. & Incharge** **Signature :**

SECOND SEMESTER

COURSE/PAPER - PHYSICAL OPTICS

PAPER CODE: BOT-205

L	T	P	C
2	-	2	3

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

Learning outcome: At the end of this course, students will be able to predict the distribution of light under various conditions.

UNIT 1

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

UNIT 2

Intensity of polarized light Malus'Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle. Birefringence; ordinary and extraordinary raysRelationship between amplitude and intensity

UNIT 3

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

UNIT 4

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

UNIT 5

Basics of Lasers, Coherence; population inversion; spontaneous emission; Einstein's theory of lasers. Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy y curves; photometric units Inverse square law of photometry;

Lambert's law. Other units of light measurement; retinal illumination; Trolands

Practical

Determination of wavelengths of light from Mercury vapour lamp,Measurement of the resolving power of telescopes;; Demonstration of fluorescence and phosphorescence using crystals and paints.

TEXT BOOK:

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

REFERENCE BOOKS:

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

Department of Liberal Education Era University, Lucknow

Course Outline

Effective From:2023-24

Name of the Program	**Bachelor of optometry**			**Year/Semester:**	**2ND**
Course Name	**PHYSICAL OPTICS**	**Course Code:**	**BOT-205**	**Type: Semester**	
Credits	**45**			**Total Sessions Hours:**	**45**
Evaluation Spread	**Internal Contineuous Assessment:**			**End Term Exam:**	
Type of Course	○ Compulsory	◉ Core		○ Creative	○ Life Skill
Course Objectives	The objective of this course is to equip the students with a thorough knowledge of properties of light. At the end of this course, students will be able to predict the distribution of light under various conditions..				

Course Outcomes(CO):*After the successful course completion, learners will develop following attributes:*

Course Outcome(CO)	
CO1	Understanding the concept of Nature of light like as double nature of light, electromagnetic spectrum of light, oscillation of wave and polarization and its types.
CO2	To know how does light polarize with different methods and condition of polarization such as Malus' Law, relationship between intensity and amplitude.
CO3	To understand different types of properties of light such as diffraction, interference, coherence and its types.
CO4	To understand Resolution of an instrument like as Telescope and scattering, tyndall effects, and the phenomenon of Fluorescence and Phosphorescence.
CO5	To understand the Basics of Lasers, and population inversion; spontaneous emission; Einstein's theory of lasers.and about radiometry, photometry and its unit, Inverse square law of photometry, Lambert's law
Pedagogy	Flipped classroom Class Rotation (Whole and Group) Differentiated Learning Contextual Learning
Internal Evaluation Mode	Class test+ weekly assignment Attendance Tutorial Role play Active learning

UnitNO.	**Title of the unit**	**Topic of unit**	**Hours**	**Mapped CO**

Unit1	**Nature of light-**	- light as electromagnetic oscillation – wave equation - ideas of sinusoidal oscillations – simple harmonic oscillation; - transverse nature of oscillation; - concepts of frequency, wavelength, amplitude and phase. - Sources of light; - Electromagnetic Spectrum. - Polarized light; linearly polarized light; and circularly polarized light	9	CO1
Unit2	**Polarization of 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	9	CO2
Unit3	**Coherence** **Interference** **- Diffraction**;	- Coherence - constructive interference, - destructive interference - fringes; - fringe width - . Double slits, - multiple slits, - Gratings - diffraction by a circular aperture; - Airy's disc	9	CO3

Unit4	**-Resolution of an instrument**	- Telescope - Raleigh's criterion, - Scattering; Raleigh's - scattering; - Tyndall effect, - Fluorescence and - Phosphorescence	9	CO4
Unit 5	- **Lasers** - **Radiometry** - **Photometry**	- 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 y curves; - photometric units - Inverse square law of photometry; - Lambert's law - Other units of light measurement; - retinal illumination; Trolands	9	CO5

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	3	1	2	-	-	-	1	2	1	2	-	1	2
CO2	2	3	2	2	-	-	-	1	2	2	1	-	2	2
CO3	1	3	1	2	-	-	-	1	2	1	2	-	1	2
CO4	2	3	1	2	-	-	-	1	2	2	3	-	2	2

Strong contribution-3, Average contribution-2, Low contribution-1,

Suggested Readings:

Text-Books	1. Subrahmanyan N, BrijLal, A text book of Optics, S. Chand Co Ltd, New Delhi, India, 2003.
Reference Books	Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998. 2. Keating NM. P, Geometric, Physical and Visual Optics, Butterworth-Heinemann, Massachusetts, USA, 2002.
Para Text	**Unit1:** **Unit2:** **Unit3:** **Unit4:** **Unite5;**

Recapitulation &Examination Pattern

Internal Continuous Assessment:

Component	**Marks**	**Pattern**
Mid Semester	12	12 marks theory(including MCQ, SHORT NOTE , LONG QUESTION)
Class Test	5	Short note
Online Test/Objective Test	5	**MCQ**
Assignment/Presentation	4	Assignment(2 MARKS) +Presentation(2MARKS)
Attendance	4	65-75 % 1 MARKS 75-85 2 MARKS 85-95 3 MARKS MORE THAN 95 % 4 MARKS
Total Marks	**30**	

Course created by: Mr. Vishwdeep Mishra (AP)

Signature:

Approved by:

Signature:

SECOND SEMESTER

COURSE/PAPER- CLINICAL OPTOMETRY I

PAPER CODE: BOP-201

L	T	P	C
-	-	6	3

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel.

Course Objective: This course aims to give student the basic knowledge of the theory and practical behind the basic clinical procedures. After completion, of course the student should have standard eye examination. Learn to write formal records and understand the preliminary eye testing

Course Content: The practical will involve rotation in campus clinics, observation in eye hospitals and screening camps.

Unit of Competency:

Methods of ocular Examination 1

- The ability to communicate effectively with a diverse group of patients with arrange of optometric conditions and needs.
- The ability to use techniques in ocular examination and to understand the implication of findings in terms of subsequent examination techniques
- History taking of an Ophthalmic care
- Visual acuity testing – Distance, Near
- Basic of eye examination
- History Taking
- Visual Acuity Estimation
- Torch light Examination
- Pupil Examination
- Near point of accommodation
- Near point of convergence

- Extra ocular Motility and cover/ uncover test
- Tear function test
- Slit lamp examination – Demo
- Retinoscopy procedure on model eyes
- IPD

90 % attendance is compulsory in clinics .In case of any miss out the student will have to complete the clinical hours to be allowed for the end term exam

SECOND SEMESTER

COURSE/PAPER- BASIC OF COMPUTER

PAPER CODE: BOT-206

L	T	P	C
2	-	2	2

Course Objectives: The syllabus is designed to aim at imparting an advanced level appreciation program for the students. After completing the course the students will able to use the computer for basic purposes of preparing his personnel/business/professional letters, viewing information on Internet (the web), sending mails, using internet banking services etc.

The subject aims to provide the students with an introduction to the fundamentals of hardware, software and programming languages.

Learning outcomes:

After the completion of this course, a student will**:**

1. Explain the needs of hardware and software required for a computation task.
2. Explain the working of important application software and their use to performany computational activity.
3. Demonstrate the use of Operating system commands
4. Understanding the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer system.
5. Explain principal differences in various operating systems. Identify computersystems technical specifications

UNIT 1

Definition of Computer, Input & Output Devices, Characteristics of Computer,Advantages & Disadvantage of Computer, Classification of Computer, Basic organization Of Computer, Application of Computer.

Computer Memory: Definition of Memory, Primary Memory, Secondary Memory, Types of ROM, Memory Hierarchy, Cache memory, HDD Vs. SSD,

(Lecture 08)

UNIT 2

Operating System: Definition of operating system, objective of Operating system, components of operating system, types of operating system.

Computer Software**: Introduction, System Software, Application Software, Benefits of application software.**

Introduction of Internet: History of internet, Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails.

(Lecture 06)

UNIT 3

Computer Languages: Low Level Programming Language, Highlevel Programming Language, Compiler, Interpreter (Translator).

Multimedia: Definition of Multimedia, Components of Multimedia.

Introduction to MS Office: **Introduction, Applications of MS Office, version of MS Office, Benefits and importance of applications, key features of word, excel and power point.**

(Lecture 08)

UNIT 4

Network: Introduction, Types of Network, Advantages, Web Terminology, Topology, GSM, Wi-MAX, 5G.
Internet: History of Internet, Hardware & software requirements, IP Address, Public & Private IP, Domain Names, ISPs, Virus, Cyber Law, e-Commerce.

Email**: Definition, Advantage of email, how to create email.** Hospital Management System**: Introduction, Need of HMS, Usesof HMS, Stand Alone Computers, Centralized Systems, and Distributed database System.**

(Lecture 08)

Practical

Session details	TOPIC	Hours
MS Word	1. Procedure To Create Personal Letter 2. Procedure To Create Company Letter Head 3. Procedure To Create Simple News Letter 4. Procedures To Invitation Card 5. Procedures To Create A Resume 6. Procedure To Create Greeting Card 7. Procedures To Create A Cover Page Of A Project Report 8. Assignment Front Page 9. Time Table 10. Application 11. Text With Image (Book Writing)	**20 Hrs.**
MS Excel	12. Time Table 13. Mark sheet 14. Implementation Of Mathematical Formula And Filter 15. Making Of Graphs	**8 Hrs.**
Power Point	16. Making Of Slides And Use Of Their Functions	**2Hrs.**

Text Books / Reference Books :

1) V. Rajaraman, "Fundamentals of Computers", PHI

2) Peter Norton's, "Introduction to Computers", TMH

3) Hahn, "The Internet complete reference", TMH

4) D.S. Yadav, "Foundation of Information Technology", New Age International.

5) T. M. Ramachandran, "Principles and Techniques of Programming", GalgotiaPublications

1. Leon A. & Leon M., Introductions to Computers, Vikas Publications.

Reference Books:

1. Peter Norton_s, Introductions to Computers, Tata McGraw Hill.

2. Price Michael, Office in Easy Steps, TMH Publication.

***Latest editions of all the suggested books are recommended.**

Department of OPTOMETRY

Era University, Lucknow

Course Outline

Effective From: 2024-25

Name of the Program	**B.Sc. (OPTOMETRY)**			**Year/ Semester:**	**1st Year/2nd Semester**
Course Name	**BASIC COMPUTERS AND INFORMATION SCIENCE**	**Course Code:**	**BOT-206**	**Type:**	**Theory**
Credits	**03(L-3, T-1, P-0)**			**Total Sessions Hours:**	**40 Hours**
Evaluation Spread	**Internal Continuous Assessment:**	**30 Marks**		**End Term Exam:**	**70 Marks**
Type of Course	○ Compulsory	◉ Core		○ Creative	○ Life Skill
Course Objectives	• The syllabus is designed to aim at imparting an advanced level appreciation program for the students. After completing the course the students will able to use the computer for basic purposes of preparing his personnel/business/professional letters, viewing information on Internet (the web), sending mails, using internet banking services etc. • The students will be able to appreciate the role of computer technology and some extent able to gain hand-on experience in using computers. • The subject aims to provide the students with an introduction to the fundamentals of hardware, software and programming languages.				

Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*	
Course Outcome (CO)	Provide foundational knowledge of computer hardware, software, and operating systems. Attributes.
CO1	Introduce fundamental programming concepts using BASIC language.
CO2	Explore the principles of information science, including data organization, retrieval, and management.
CO3	Foster critical thinking and problem-solving skills through hands-on exercises and projects.
CO4	Equip students with the skills necessary to navigate and utilize digital information effectively in various contexts.

CO5	Cultivate an understanding of the ethical and societal implications of computing and information science.		
Pedagogy	Interactive, discussion-bases, student-centered, presentation.		
Internal Evaluation Mode	Mid-term Examination: 12 Marks Class test((Participation): 04 Marks Class Presentation : 04 Marks Assignments/Presentation: 04 Marks Attendance: 04 Marks Bed side Behavior: 02 Marks		
Session Details	**Topic**	**Hours**	**Mapped CO**
Unit 1	• Definition of Computer, Input & Output Devices, Characteristics of Computer, Advantages & Disadvantage of Computer, Classification of Computer, Basic organization Of Computer, Application of Computer. • Computer Memory: Definition of Memory, Primary Memory, Secondary Memory, Types of ROM, Memory Hierarchy, Cache memory, HDD vs. SSD,	06	CO1
Unit 2	• **Operating System:** Definition of operating system, objective of Operating system, components of operating system, types of operating system. • Computer Software: Introduction, System Software, Application Software, Benefits of application software • **Introduction of Internet:** History of internet, Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails	10	CO2
Unit 3	• **Computer Languages**: Low Level Programming Language, Highlevel Programming Language, Compiler, Interpreter (Translator). • **Multimedia:** Definition of Multimedia, Components of Multimedia. • **Introduction to MS Office: Introduction, Applications of MS Office, version of MS Office, Benefits and importance of applications, key features of word, excel and power point.**	10	CO3

Unit 4	• **Network**: Introduction, Types of Network, Advantages, • Web Terminology, Topology, GSM, Wi-MAX, 5G. • **Internet**: History of Internet, Hardware & software • requirements, IP Address, Public & Private IP, Domain • Names, ISPs, Virus, Cyber Law, e-Commerce. • Email: Definition, Advantage of email, how to create email. Hospital Management System: Introduction, Need of HMS, Usesof HMS, Stand Alone Computers, Centralized Systems, andDistributed database System	08	CO4

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**1**	**3**	**1**	**2**	**-**	**-**	**-**	**1**	**2**	**1**	**2**	**2**	**-**	**-**
CO2	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**1**	**2**	**2**	**1**	**1**	**-**	**-**
CO3	**1**	**3**	**1**	**2**	**-**	**-**	**-**	**1**	**2**	**1**	**2**	**2**	**-**	**-**
CO4	**2**	**3**	**1**	**2**	**-**	**-**	**-**	**1**	**2**	**2**	**3**	**3**	**-**	**-**
CO5	**1**	**3**	**1**	**2**	**-**	**-**	**-**	**1**	**2**	**1**	**2**	**2**	**-**	**-**

Strong contribution-3, Average contribution-2 , Low contribution-1,

Suggested Readings:

Text- Books	6) V. Rajaraman, "Fundamentals of Computers", PHI 7) Peter Norton's, "Introduction to Computers", TMH 8) D.S. Yadav, "Foundation of Information Technology", NewAge International. 9) Leon A. & Leon M., Introductions to Computers, Vikas Publications
Reference Books	3. Peter Norton_s, Introductions to Computers, Tata McGraw Hill. 4. Price Michael, Office in Easy Steps, TMH Publication.

Recapitulation & Examination Pattern

Internal Continuous Assessment:

Component	**Marks**	**Pattern**
Mid Semester :	12	**Section A:** Contains **10** MCQs/Fill in the blanks/One Word Answer/ Each question carries **04 Marks.** **Section B:** Contains **02** Short questions out of which **03** questions are to be attempted. Each question carries **02 Marks**. **Section C:** Contains **01**descriptive questions are to be attempted & Question carries **04 Marks**
Class Test :	04	Contains **05 descriptive questions.** Each question carries **04** Mark.
Class Presentation :	04	Contains **10 multiple choice questions.** Each question carries **1**
		Marks.
Assignment/ Presentation :	04	Assignment to be made on topics and instruction given by subject

		teacher
Attendance :	04	As per policy
Bed side Behavior :	02	As per policy
TOTAL	30	

Course Created by:- Mrs. Namrata Srivastava **Assistant Professor** **Signature :**	**Course Approved by:- Mr. Sunil Kumar Gupta** **Asst. Prof. & Incharge** **Signature :**