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:
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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**

B.Optom Semester- VII (Fourth Year)

Seventh Semester

s.no.	Subjects (Practical)	Paper code	Hrs. per Week		Maximum Marks		
			Actual	Credit	I.A.	Exam	Total
1.	Internship-I	BOP-701	-	25	30	70	100
2.	Research Mid Term Review	BOP-702	-	05	30	70	100
	Total		**-**	**30**	**60**	**140**	**200**

B.Optom Semester- VIII (Fourth Year)

Eighth Semester

s.no.	Subjects (Practical)	Paper code	Hrs. per Week		Maximum Marks		
			Actual	Credit	I.A.	Exam	Total
1.	Internship-II	BOP-801	-	15	30	70	100
2.	Dissertation	BOP-802	-	15	30	70	100
	Total		**-**	**30**	**60**	**140**	**200**

FIRST SEMESTER

COURSE/PAPER -GENERAL ANATOMY

PAPER CODE: BOT-101

L	T	P	C
3	-	2	4

Learning Objective- To enable the students to develop the basic concept of gross, functional and applied anatomy of various structures as well as identification of microscopic structures of various tissues and organs of the human body.

UNIT -1

Organization and general plan of the body: Levels of Organization, Metabolism and Homeostasis, Terminology and General Plan of the Body, Body Parts and Areas, Terms of Location and Position, Body Cavities and Their Membranes, Dorsal cavity, Ventral cavity, Planes and Sections

UNIT -2

Cells: Structure, function and location, Prokaryotic and eukaryotic cells, Cell organelles, Cell division, Tissue, Types, Structure, Location and Function of Epithelial Tissue, Connective Tissue, Muscle Tissue, Nerve Tissue, Membranes, Glandular tissue, The Integumentary System: structure and function of The Skin, Subcutaneous Tissue

UNIT –3

The Skeletal System: Functions of the Skeleton, Types of Bone Tissue, Classification of Bones, Embryonic Growth of Bone, Factors That Affect Bone Growth and Maintenance, The Skeleton, types of joints and movement

The Muscular System: Muscle Structure, Energy Sources for Muscle Contraction, Muscle Fiber

Muscle Contraction—the Sliding Filament Mechanism, Major Muscles of the Body.

UNIT –4

The Nervous System -Nervous System Divisions, Nerve Tissue, Types of Neurons, Nerves and Nerve Tracts, The Nerve Impulse, The Spinal Cord, The Brain, Meninges and Cerebrospinal Fluid, Cranial Nerves, The Autonomic Nervous System and its function

The Senses Sensory Pathway, Characteristics of Sensations, Cutaneous Senses, Muscle Sense, Sense of Taste, Sense of Smell, Hunger and Thirst, the Eye, the Ear

UNIT-5

The Endocrine System -Chemistry of Hormones, Regulation of Hormone Secretion, The Pituitary Gland, Thyroid Gland, Parathyroid Glands, Pancreas, Adrenal Glands, Ovaries, Testes, Other endocrine glands
Embryology: Spermatogenesis, Oogenesis, Gametogenesis, Ovulation and fertilization.

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

Learning Outcome- At the end of the course the student will develop the sense of co-relation between different anatomical structures on the basis of its location and functional aspects.

Course Contents:

Demonstration of -

1. Major organs through models and permanent slides.
2. Parts of circulatory system from models.
3. Parts of respiratory system from models.
4. Digestive system from models.
5. Excretory system from models.
6. Nervous system from models.
7. Structure of eye and ear
8. Structural differences between skeletal, smooth and cardiac muscles.
9. Various bones
10. Various joints
11. Various parts of male & female reproductive system from models

TEXT BOOKS:-

1. Mariano S.H. Difiore: Atlas of Human Histology, 5th Ed. 1981, Lea and Feliger.
2. G.J. Tortora & N.P Anagnostakos: Principles of Anatomy and Physiology. (recent edition)
3. B.D. Chaurasia: Handbook of General Anatomy, 2nd Ed., CBS

Publishers and Distributors, New Delhi - 110 032.

REFERENCE BOOKS:-

1. Peter L. Williams And Roger Warwick: - Gray's Anatomy - Descriptive and Applied, 36th Ed., 1980, Churchill Livingstone.

2. T.S. Ranganathan: Text book of Human Anatomy, 1982, S. Chand & Co., New Delhi 110 055.

3. Inderbir Singh: Human Embryology, 3rd Ed., Macmillan India, 1981.

4. R. Kanagasuntharam, P. Sivananda-Singham & A. Krishnamurti:

5. Anatomy- Regional, Functional, & Clinical, P.G. Publisher, Singapore 1987.

Department of OPTOMETRY
Era University, Lucknow
Course Outline
Effective From: 2024-25

Name of the Program	**B.Sc. (OPTOMETRY)**			**Year/ Semester:**	**1st Year/1st Semester**
Course Name	**GENERAL ANATOMY**	**Course Code:**	**BOT101**	**Type:**	**Theory**
Credits	**04 (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	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 andcorrelate the structure with the functions. 3. Comprehend the basic structure and connections between the various parts of the central nervous system so as to analyze the integrative and regulative functions on the organs and systems.				
Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*					
Course Outcome (CO)	General anatomy deals with the entire human anatomy with emphasis on different tissues, blood vessels, glands, nerves and the entire central nervous system in particular. **Attributes**				
CO1	To learn about anatomical nomenclature, position, location & their function.				
CO2	To study about classification of bone, Ossification of bone, type of cartilage, classifications of joints..				
CO3	To learn about classification & function about Muscular system.				
CO4	To learn about nervous & cardiovascular system.				
CO5	To learn about Integumentary and Reproductive System.				
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	**Topic**	**Hours**	**Mapped CO**

Details			
Unit 1	1. Introduction to Anatomy and its Division. 2. Cell: Definition, Parts, and Types. 3. Tissues: Definition, types and location. 4. Introduction to organ systems and their types. Anatomical nomenclature, Body Planes, Positions, Body Membranes, Body cavities and movements..	06	CO1
Unit 2	1. **Skeletal System:** Introduction to the skeletal system and its parts. 2. Bone, ossification of bone, classification of bone based on structure, size, shape, and location. 3. Cartilage: Types of cartilage, their characteristics, features, and location in the body. 4. Introduction to Arthrology: Definition and classifications of joints with examples in detail. 5. Brief about Joints of superior extremity & inferior extremity.	10	CO2
Unit 3	1. **Muscular System:** Classification of muscles and their characteristics, features and action of muscles. 2. Introduction to surface landmarks of superior extremity. Brief about Muscles and fascia of Pectoral region: Pectoral muscles, Scapular region and Back, Muscles of Arm, Forearm, and Hand, their action and nerve supply.	10	CO3
Unit 4	1. **Nervous System:** Introduction and subdivision of nervous system. a. CNS: Structure and Characteristic features of Neurons, Brain, and Spinal cord. b. PNS: Introduction to PNS, Classification of PNS and spinal nerves & cranial nerves. **2. Cardiovascular System:** Introduction to CVS, structure of Blood vessels, Arteries & Veins with their major and minor branches in detail, Structure of heart along with blood and nerve supply, types of circulation	08	CO4
Unit 5	1. **Integumentary system-** Skin (Introduction, Structure, Function), hair, nails, exocrine glands. 2. **Reproductive System:** Introduction and classification. 3. **Male reproductive System-** Testes, Scrotum, penis, and glands. 4. **Female reproductive System-** External genitalia, & Internal organs – Vagina, Cervix, Uterus, Fallopian tubes and Ovaries.	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	1. MARIANO S.H.DIFIORE:Atlas of Human Histology,5th Ed.1981,Lea and Filiger 2. G.J.TORTORA & N.P ANAGNOSTAKOS:Principles of Anatomy andPhysiology. 3. B.D.CHAURASIA:Handbook of GeneralAnatomy, 2nd Ed., CBS Publishers and Distributors,New Delhi.
Reference Books	1. Principles of Anatomy & Physiology – Tortora Gerard J. 2. Chourasia's, A Text Book of Anatomy. 3. Ranganathan, T.S., A Text Book of Human Anatomy. 4. Fattana, Human Anatomy, (Description and Applied), Saunder's & C P Prism Publishers, Bangalore 5. Ester. M. Grishcimer, Physiology & Anatomy with Practical Considerations, J.P.Lippin Cott. Philadelphia. 6. Ross and Wilson- Anatomy and Physiology in health and illness. 7. Ranganathan, T.S., A Text Book of Human Anatomy
Para Text	**Unit 1:** • https://www.youtube.com/watch?v=jQx_jZxdCbs **Unit2:** • https://www.sciencedirect.com/topics/psychology/linguistictheory#:~:text=Linguistic%20Theory%20was%20formed%20by,to%20all%20typically%20developing%20humans **Unit 3:** • . https://linguistics.ucla.edu/undergraduate/what-is-linguistics/ **Unit4:** • https://www.thoughtco.com/noam-chomsky-4769113

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. & Icharge** **Signature :**

FIRST SEMESTER

COURSE/PAPER- GENERAL PHYSIOLOGY-I

COURSE CODE: BOT-102

L	T	P	C
3	-	2	4

Learning Objective- To enable the students to understand the normal functioning of various organ systems of the body and their interactions.

UNIT-1

Cell physiology: Organization of the Body, Body Composition, Measurement of Body Fluid Volumes, Plasma Volume, Total Blood Volume, & Red Cell Volume, Diffusion, Osmosis, Tonicity

UNIT-2

Gastrointestinal physiology: Organs of GIT and their structure & function, secretion, digestion, absorption and assimilation, gastrointestinal hormones, physiology of digestion of carbohydrates, proteins & lipids, Structure & function of liver, spleen, gall bladder & pancreas, Jaundice, Cirrhosis & Pancreatitis

Respiratory system: parts of respiratory system, mechanism of respiration, pulmonary function, pulmonary circulation, lungs volume, and gas transport between lungs and tissues, respiratory adjustments in health and diseases.

UNIT-3

Cardiovascular and lymphatic system: heart structure and function, blood vessels and valves, mechanism of circulation, cardiac cycle, heart sounds, heart rate, pulse rate, blood pressure. Blood, its composition and function, function of RBC, WBC & platelets, Lymphatic system: lymph, its composition and function, lymphatic tissue

Organs of Excretory System: kidneys, nephron, Mechanism of Excretion Urine formation (glomerular filtration and tubular reabsorption) Electrolytes: their balances and imbalances. Acid-base balance. Acidosis and Alkalosis

UNIT- 4

Musculo-skeletal system: Muscles structure, types of muscles, mechanism of contraction, major muscles of the body,, classification of bones , structure of bones, hormones involved in bone growth, types of joints, Arthritis, Gout, Osteoporosis

Nervous system and special senses: organization of the nervous system, Structure & Properties of Neuron ,Cell bodies, Axons, Dendrites, Nerve Impulse, Type of Nerves, Central Nervous System including Brain & Spinal Cord. Peripheral Nervous System & autonomic nervous system.

Structure and function of eye, ear, tongue and nose.

Endocrine System: Structure, function, regulation & secretion of the following glands, hypothalamus, pituitary, pineal, thyroid, parathyroid, adrenal, thymus, pancreas, testes and ovary. Basic concepts about hypo and hyper secretion of hormones and their diseases

UNIT-5

Structure and function of male and female reproductive organ, function of testicular and ovarian hormones. Gametogenesis (oogenesis and spermatogenesis), menstrual cycle, implantation, pregnancy, menopause and various contraceptive measures

Body fluids and their significance: Important terms, types of body fluid, total body water, general principles for fluid balance, cardinal principle, Homeostasis through fluid maintenance, Electrolytes & ions, Function of electrolytes.

Practical

Learning Outcome- At the end of the course the student will be able to explain the physiological aspects of normal growth and development describe the physiological response and adaptations to environmental stresses and know the physiological principles underlying pathogenesis of disease.

1. To measure pulse rate
2. To measure blood pressure
3. Demonstration of ECG
4. To perform Hemoglobin by CMG method.
5. To perform Total RBC count.
6. To perform total leucocyte count.
7. To perform differential leucocyte count.
8. To perform PCV
9. To calculate Red cell indices

TEXT BOOKS:-

1. L Prakasam reddy, Fundamentals of Medical Physiology, 4th Edition, Paras medical Publisher, Hyderabad, 2008

2. Sujit K. Chaudhuri, Concise Medical Physiology, 6th edition, New Central Book Agency, Kolkata, 2008

REFERENCE BOOKS:-

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

2. A C Guyton: Text book of Medical Physiology, 8th edition, saunders company, Japan,

3. G J Tortora, B Derrickson: Principles of anatomy & physiology,11th edition, Harper & Row Publishers, New York

4. John Wiley & Sons Inc, New Jersey, 2007

Department of OPTOMETRY

Era University, Lucknow

Course Outline

Effective From: 2024-25

Name of the Program	**B.Sc. (OPTOMETRY)**			**Year/ Semester:**	**/1st Year/1st Semester**
Course Name	**GENERAL PHYSIOLOGY**	**Course Code:**	**BOT102**	**Type:**	**Theory**
Credits	**04 (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	1. The student will be able to demonstrate knowledge in human physiology as Explain the normal functioning of various organ systems of body& their interactions. 2. Describe the physiological responses and adaptations to environmental stresses. 3. Know the physiological principles underlying pathogenesis of disease. 4. Elucidate the physiological aspects of normal growth & development.				
Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*					
Course Outcome (CO)	General anatomy deals with the entire human anatomy with emphasis on different organ system, their physiological functions with special emphasis on blood & Neurophysiology.				
	Attributes				
CO1	To learn about Cell and cell division, Cellular movement, Osmosis, Dialysis..				
CO2	To study about composition of blood morphology of cells, Hemoglobin, ESR, MCV, MCH, MCHC, PT, APTT, BT, CT, ABO, Cross matching, Etc...				
CO3	Introduction of Respiratory System, Respiration measures, Regulation of respiration.				
CO4	To learn about basic physiology of heart, blood circulation, Cardiac Cycle, etc.				
CO5	To learn about introduction and physiology of digestive system.				
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.** Cell Functions, Cellular Movements: Endocytosis and Exocytosis, Molecules of cell. **2.** Transport across the cell membrane, Homeostasis. **3.** Diffusion, Osmosis, Bonding, Filtration, Dialysis, Surface Tension, Absorption, Colloid.	8	CO1
Unit 2	**1.** Introduction of blood, Composition, and function of blood, Blood cell morphology and development. **2.** Blood cell types and function, Composition, and function of blood plasma and Blood clotting factor, Haemoglobin-structure, normal content, function, types. Erythropoiesis. **3. c.** Erythrocyte sedimentation rate (ESR) and its significance, Hematocrit, PCV, MCV, MCH, MCHC, Blood volume, Prothrombin time, Clotting time, Bleeding time, Blood Group, ABO and Rh factor, Cross matching, Coagulation, and Anticoagulants.	10	CO2
Unit 3	**1.** Nervous System: Function of important structure and spinal cord, neuron, nerve impulse, type of nerves according to function, Autonomic nervous system-organization & function. **2.** 2. Special senses- general organization & functions.	8	CO3
Unit 4	**1.** Basic Physiology of Heart, Blood circulation. **2.** Cardiac Cycle and heart sound. **3. c.** Conductive system of heart, Blood Pressure definition, Regulation factor affecting blood Pressure.	6	CO4
Unit 5	**1.** Introduction of Reproductive Systems in human. **2.** Spermatogenesis and Oogenesis. **3.** Physiological functions of Reproductive Hormones. **4.** Menstrual Cycle. **5.** Placental Hormone (Physiological Function).	8	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	-	1	-	-
CO2	1	3	1	3	-	-	-	1	3	2	-	2	-	-
CO3	1	3	1	2	-	-	-	1	3	1	-	1	-	-
CO4	1	3	1	2	-	-	-	1	2	1	-	1	-	-
CO5	1	3	1	2	-	-	-	1	2	1	-	1	-	-

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

Suggested Readings:

Text- Books

1. L.Prakasam reddy, Fundamentals of Medical Physiology.
2. Sujit K. Chaudhuri, Concise Medical Physiology.

Reference Books

1. Principles of Anatomy & Physiology – Tortora Gerard J.
2. Human Physiology: A.K. Jain.
3. Essentials of Medical Physiology: K. Sembulingam, Jaypee Publishers.
4. Textbook of Physiology: Guyton Cott. Philadelphia.

Para Text	• **Unit 1:** https://youtu.be/JuhDx9hQAx8 • **Unit2:** https://youtu.be/Ta_vWUsrjho • **Unit 3:** . https://youtu.be/h1qSFZ9aw94 • **Unit4:** https://youtu.be/uYm4l_alVV0

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. & Icharge

Signature :

FIRST SEMESTER

COURSE/PAPER - GENERAL BIOCHEMISTRY

PAPER CODE: BOT-103

L	T	P	C
2	-	2	4

Learning Objective- To enable the students to understand the Structure, function and inter-relationship of bimolecules and consequences of deviation from normal.

UNIT 1

Carbohydrates-

Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function)

UNIT 2

Proteins –

Amino acids, peptides, and proteins (general properties & tests with a few examples like glycine, trytophan, glutathione, albumin, hemoglobin, collagen)

UNIT 3

Lipids-

Fatty acids, saturated and unsaturated, cholesterol and triacyglycerol, phospholipids and plasma membrane

UNIT 4

Vitamins

General with emphasis on A,B2, C, E and inositol (requirements, assimilation and properties)

UNIT 5

Minerals--Na, K, Ca, P, Fe, Cu and Se.(requirements, availability and properties)

Practical

Learning outcome- At the end of the course, the students should be able to demonstrate his knowledge and understanding on various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data.

1. Reactions of monosaccharides, disaccharides and starch:

i.Glucose Fructose
ii .Galactose Maltose, lactose
iii.Sucrose Starch

2. Analysis of Unknown Sugars

Estimation:

i.Photometry Biofluid of choice – blood, plasma, serum

ii.Standard graphs Glucose

iii. Proteins Urea

iv.Creatinine Bilirubin

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, 2ndedition, 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/1st Semester
Course Name	**General Biochemistry**	**Course Code:**	**BOT-103**	**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	• This course will be taught in two consecutive semesters. General Biochemistry deals with the biochemical nature of • Carbohydrates, proteins, minerals, vitamins, lipids etc. A detailed study of these, • Emphasizing on their chemical composition and their role in metabolism is the required aim of this course.				
Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*					
Course Outcome (CO)	To familiarize students with fundamental principles of biomolecules, enzymes, and metabolic pathways, emphasizing their role in cellular function, disease mechanisms, and therapeutic interventions. **Attributes**				
CO1	Introduce the fundamental principles of biochemistry, including biomolecules, enzymes, and metabolic pathways.				
CO2	Explore the structure and function of macromolecules such as proteins, nucleic acids, lipids, and carbohydrates.				
CO3	Explain the mechanisms of enzyme catalysis and regulation in biological systems.				
CO4	Emphasize the relevance of biochemistry in understanding disease mechanisms and developing therapeutic interventions.				
CO5	Discuss the integration of biochemical processes in cellular function, signaling, and gene expression.				
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	• Carbohydrates: • Glucose; fructose; galactose; lactose; sucrose; starch and • glycogen (properties andtests, Structure and function)	06	CO1
Unit 2	• Proteins: • Amino acids, peptides, and proteins (general properties & tests • with a few exampleslike glycine, trytophan, glutathione, • albumin, hemoglobin, collagen)	10	CO2
Unit 3	• Lipids: • Fatty acids, saturated and unsaturated, cholesterol and triacylglycerol, phospholipids and plasma membrane	10	CO3
Unit 4	• Vitamins: • General with emphasis on A,B2, C, E and inositol (requirements, assimilation andproperties)	08	CO4
Unit 5	• Minerals: • Na, K, Ca, P, Fe, Cu and Se.(requirements, availability and properties)	06	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	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, OrientLongman, Madras, 1990 • 2. D.R. Whikehart: Biochemistry of the Eye, 2ndedition, • 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 :**

FIRST SEMESTER

COURSE/PAPER - GEOMETRICAL OPTICS I

PAPER CODE: BOT-104

L	T	P	C
3	-	2	4

Learning Objective- The objective of this course is to equip the students with a thorough knowledge nature of light, and properties of mirrors and lenses.

UNIT 1

Nature of light- light as electromagnetic oscillation; speed of light in vacuum and other media;.Wavefronts spherical, elliptical and plane.

Reflection and refraction of light- laws of reflection and refraction. Totalinternal reflection.

Refractive index -Its relation with wavelength, Fermat's and Huygen's Principle, Derivation of laws of reflection and refraction (Snell's law) from these principles

UNIT 2

- Plane mirror and spherical mirror- convex and concave mirror
- Reflection by a spherical mirror
- paraxial approximation; sign convention
- Imaging by concave mirror and convex mirror
- Reflectivity; transmissivity ; Snell's Law, Refraction at a plane surface Glass slab

UNIT 3

Definition of crown and flint glasses; materials of high refractive index

Prism- Angle of prism; deviation produced by a prism; refractive index of the prism , definition of Prism dioptre and application of prism.

Dispersion - Angular dispersion; dispersive power

UNIT 4

- Vergence of light – convergence and divergence

- Vergence at a distance formula ; effectivity of a refracting surface 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

UNIT 5

- Imaging by a thin convex lens and thin concave lens; image properties (real/virtual; erect/inverted magnified/minified) for various object positions
- 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

Practical

Learning Outcome- At the end of the course, the students will be able to differentiate between

Different types of the lenses and different lens system with their application.

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

TEXT BOOK:

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

REFERENCE BOOKS:

1. Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.

2. Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw-Hill, New York, USA, 2002.

Department of OPTOMETRY

Era University, Lucknow

Course Outline

Effective From: 2024-25

Name of the Program	**B.Sc. (OPTOMETRY)**			**Year/ Semester:**	**1st Semester**
Course Name	**GEOMETRICAL OPTICS - I**	**Course Code:**	**BOT-104**	**Type:**	**Practical**
Credits	**01 (L-0, T-0, P-2)**			**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	To impart detailed knowledge about the basic concepts and principals involved in the formation of image through various lenses and prisms and the different types of defects associated with the lenses.				
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	Understanding concepts and theories of light, its nature & properties.				
CO2	Understanding concepts and properties of mirror & lenses..				
CO3	Identifying various of lens & mirror during practical.				
CO4	Applying formula calculation related to vengeance.				
CO5	Applying the concepts of Physics in Optometry.				
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	• Elementary Concepts of Light Prisms • Determination of the focal length & hence the power of a convex lens by displacement method	6	CO1
Unit 2	• Thin and Thick Lenses Spherical Determination of the refractive index of a transparent liquid by using a • traveling microscope.	6	CO2
Unit 3	• Cylindrical Lenses Aberrations and Illumination. • Determination of refractive index of a material of a prism by minimum deviation method. • Determination of the refractive index of the material of a convex lens measuring its focallength, using the lens & a plane mirror.	6	CO3
Unit 4	• Determination of the focal length of a concave mirror by graphical method.	6	CO4
Unit 5	• To draw I -δ curve of a prism by a spectrometer & hence to find out the angle of • Minimum deviation.	6	CO5

CO-PO and PSO Mapping

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

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

• K. Ghatak, *Optics,* Tata McGrew Hill, 2008

• Loshin D. S., *The Geometric Optics Workbook*, Butterworth-Heinemann, Boston, USA,1991.

• Born and Wolf, *Optics*, Cambridge University Press, 1999.

• . Jenkins and White, *Fundamental of Optics*,

	McGraw-Hill,2011. • Smith and Thomson, *Optics*, John Wiley and Sons, 1973. • Brijlal, Subrahmanyam and Avadhanulu, *A Text book of Optics*, S. Chand, 2014.
	e-Learning Source: 1. https://youtu.be/Xf_VZ8GxU1Y 2. https://youtu.be/AIdgVKZWHgg 3. **https://youtu.be/pzQdsg2Tugo**

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. & Icharge** **Signature :**

FIRST SEMESTER

COURSE/PAPER - NUTRITION

PAPER CODE : BOT-105

L	T	P	C
2	-	-	2

Learning Objective - To enable the students to understand the basic aspects of Nutrition for good health. It also includes nutrients & nutrient derivatives relevant to health, nutrition deficiency and disease. At the end of this course, the student will gain the knowledge of Balanced Diet, Protein, Carbohydrates, Vitamins, minerals, etc.

UNIT 1

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

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

UNIT 2

Proteins - Sources and functions, Essential and non- essential amino- acids Incomplete and complete proteins, Supplementary foods. PEM and the eye, Nitrogen balance, Changes in protein requirement

Fat - Sources and function, Essential fat, Excess and deficiency, Lipids and the eye. Hyperlipidemia, heart diseases, atherosclerosis.

UNIT 3

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

UNIT 4

Vitamin, General functions, and food sources, Vitamin deficiencies and associated eye

disorders with particular emphasis to Vitamin A, Promoting sound habits in pregnancy, lactation and infancy. Nutrient with antioxidant.

Properties-Digestion of Proteins, carbohydrates & lipids

UNIT 5

Essential amino acids and Miscellaneous

Measles and associated eye disorders, low birth weight

TEXT BOOK:

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

REFERENCE BOOKS:

1. No recommendation. It is left to the faculty.

Department of OPTOMETRY

Era University, Lucknow

Course Outline

Effective From: 2024-25

Name of the Program	**B.Sc. (OPTOMETRY)**			**Year/ Semester:**	1st Year/1st Semester
Course Name	**NUTRITION**	**Course Code:**	**BOT - 105**	**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	• This course covers the basic aspect of Nutrition for good health. It Also includes nutrients and nutrient derivatives relevant to ocular health, nutrition deficiency and ocular disease, Nutrition and ocular aging, and contraindications, adverse reactions and ocular nutritional supplements.. • At the end of the course student would have gained the knowledge of the following: • Balanced diet. • Protein, carbohydrates, vitamins, Minerals, carotenoids and eye. • Nutrition and Ocular aging • Adverse effects of ocular nutritional supplements.				
Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*					
Course Outcome (CO)	The Nutrition course aims to provide a comprehensive understanding of essential nutrients, their sources, and functions, with a focus on the relationship between nutrition and human health. It explores dietary patterns, their impact on health across various life stages, and the prevention of diet-related diseases. Through critical analysis of nutrition research, students develop the skills to make informed dietary choices and promote healthy eating habit. **Attributes**				
CO1	Explore the relationship between nutrition and human health, including the prevention of diet-related diseases.				
CO2	Analyze dietary patterns and their impact on individual health and well-being..				
CO3	Examine the role of nutrition in different life stages, from infancy to old age..				
CO4	Provide foundational knowledge of essential nutrients, their functions, and dietary sources.				
CO5	Promote awareness of global nutrition issues and the importance of sustainable food systems.				
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	• **Introduction.** • 1.1 History of Nutrition • 1.2 Nutrition as a science • 1.3 Food groups, RDA • 1.4 Balanced diet, diet planning. • 1.5 Assessment of nutritional status	06	CO1
Unit 2	• **Energy** • 2.1 Units of energy. • 2.2 Measurements of energy and value of food • 2.3 Energy expenditure. • 2.4 Total energy/calorie requirement for different age groups and diseases. • 2.5 Satiety value • 2.6 Energy imbalance- obesity, starvation. • 2.7 Limitations of the daily food guide.	10	CO2
Unit 3	• **Proteins** • 3.1 Sources and functions • 3.2 Essential and non- essential amino- acids. • 3.3 Incomplete and complete proteins • 3.4 Supplementary foods. • 3.5 PEM and the eye • 3.6 Nitrogen balance • 3.7 Changes in protein requirement.	10	CO3
Unit 4	• **Fats** • 4.1 Sources and functions • 4.2 Essential fatty acids • 4.3 Excess and deficiency • 4.4 Lipids and the eye. • 4.5 Hyperlipidemia, heart diseases, atherosclerosis.	08	CO4
Unit 5	• **Minerals** • **Vitamins** • General functions, and food sources • Vitamin deficiencies and associated eye disorders with particular emphasis to VitaminA • Promoting sound habits in pregnancy, lactation and infancy. • **Nutrient with antioxidant**. • **Essential amino acids.**	06	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:

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

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 :**

FIRST SEMESTER

COURSE/PAPER- ENGLISH COMMUNICATION

PAPER CODE: ENG-101

L	T	P	C
2	-	-	2

(15 Hours =1 Credit)

Objective: The objectives of this foundation course of English are:-

1. Understand the importance of English Language, in present era of competition
2. To understand basic concepts and strategies to analyze global opportunities and local problems and issues.
3. To make them efficient in all four domains: Speaking, Listening, Reading & Writing.
4. To learn about the role of Language in overall sustainable development.
5. Being language of "International Communication" it will enable students in socializing as well as professional success

'.

Learning Outcome:

After the completion of this course, students will:

1. Have a critical understanding of using language skills in different situation
2. Understand the dynamic nature of subject and its dimensions
3. Learn about global contemporary issues with focus on Indian scenario

UNIT 1: Introduction to English language (6 Lectures)

1. 'What', 'Why' and 'How'

2. Development of Course

3. Introduction to basics of Language

[Note: As part of classroom activity, a guest lecture from an industry representative/Director (CRC) and maintaining progress card for each student on LSRW for future reference]

UNIT 2: Essentials of Language -

(10 Lectures)

1.Parts of speech

2.Figure of speech

3.Phrasal usage/idiom/modifiers & advance wor

[Note: As part of classroom activity, language games, tongue & jaw exercises, simple passages from the newspapers for oral drills in the classroom and practice tests (written and oral)]

UNIT 3: Language Skills Building -

(10 Lectures)

1. Cloze test.
2. Para jumble & para completion.
3. Reading comprehension & sentence completion.
4. Vocabulary/Word Association.
5. Error spotting.
6. Multiple meaning.

[Note: As part of classroom activity, use the Work book for reference for classroom and home assignments, carry out practice tests (written and oral)]

UNIT 4: Language Framework -

(10 Lectures)

- 1. Language Analysis - Lexis and semantics, phonetics, phonology and prosodics, pragmatics and discourse.
- 2. Text Variation & Representation.
- 3. Language diversity and discourses.
4. Language in Action : Investigating Language.

[Note: As part of classroom activity, refer Work book for classroom and home assignments, carry out practice tests (written and oral)]

Reference Books:

1. Communication Beginnings- Della Jean Abrahams [Pdf available]
2. Advance skills for communication in English - [Pdf available]
3. English Grammar & Composition Wren & Martin

4. English Grammar in Use - Raymond Murphy

Apps :

- Duolingo
- Quiz your English
- The British Council
- 6,000 Words [Vocabulary]

- Hello Talk [For speaking]
- Grammarly [For writing]
- BBC Learning English

Para Text	**Suggested Articles/ Movies/Short Film/ Videos** • https://youtu.be/gFWsTsvJ8Xw • https://youtu.be/Cft7DXRklvM • https:ljyoutu.be/gCfzeONu3Mo • https://youtu.be/D-YHC8b6Hjk • ***Note - Each topic hasa video*** .....

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 MSOffice, 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)

Department of OPTOMETRY

Era University, Lucknow

Course Outline

Effective From: 2024-25

Name of the Program	**B.Sc. (OPTOMETRY)**			**Year/ Semester:**	1st Year/1st Semester
Course Name	**ENGLISH AND COMMUNICATION SKILL**	**Course Code:**	**ENG-101**	**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	• This course deals with essential functional English aspects and nuances of the communication skills essential for the health care Professionals. • 1. This course trains the students in oral presentations, expository writing, logical organization and structural support. • 2. By acquiring skills in the use of communication techniques the students will be able to express better, grow personally and professionally, • Develop poise and confidence and achieve success.				
Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*					
Course Outcome (CO)	Develop proficiency in English language skills including reading, writing, speaking, and listening.. **Attributes**				
CO1	Introduce the Cultivate effective communication strategies for various contexts, including academic, professional, and interpersonal communication.				
CO2	Explore the principles of rhetoric and persuasion to facilitate persuasive writing and public speaking.				
CO3	Enhance critical thinking and analytical skills through literary analysis and interpretation.				
CO4	Provide opportunities for collaborative learning and teamwork to improve interpersonal communication skills.				
CO5	Equip students with the skills necessary for successful communication in diverse and dynamic environments.				
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	**Topic**	**Hours**	**Mapped CO**

Details			
Unit 1	• Basics of Grammar- **Vocabulary** • Synonyms, Antonyms, Prefix and Suffix, • Homonyms, Analogies and Portmanteau words	06	CO1
Unit 2	• Basics of Grammar – Part II • Active, Passive, Direct and Indirect speech, Prepositions, • Conjunctions and Euphemisms	10	CO2
Unit 3	• Writing Skills • Letter Writing, Email, Essay, Articles, Memos, one • word • substitutes, note making and Comprehension	10	CO3
Unit 4	• Writing and Reading • Summary writing, Creative writing, newspaper reading	08	CO4
Unit 5	• Practical Exercise • Formal speech, Phonetics, semantics and pronunciation	06	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:

Reference Books

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

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**
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TOTAL	30	

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