



INTEGRAL UNIVERSITY, LUCKNOW

INTEGRAL INSTITUTE OF ALLIED HEALTH SCIENCES & RESEARCH

DEPARTMENT OF PARAMEDICAL SCIENCES

**BACHELOR OF OPTOMETRY
(B.OPTOM)**

SYLLABUS

YEAR/ SEMESTER: I/I



Integral University, Lucknow
Department of Paramedical Sciences
Study and Evaluation Scheme

Program: BOPT

Semester-I

S. N.	Course code	Course Title	Type of Paper	Period Per hr/week/sem			Evaluation Scheme				Sub. Total	Credit	Total Credits
				L	T	P	CT	TA	Total	ESE			
THEORIES													
1	BO101	General Anatomy	Core	3	1	0	40	20	60	40	100	3:1:0	4
2	BO102	General Physiology	Core	3	1	0	40	20	60	40	100	3:1:0	4
3	BO103	General Biochemistry	Core	3	1	0	40	20	60	40	100	3:1:0	4
4	PY111	Geometrical Optics	Core	2	1	0	40	20	60	40	100	2:1:0	3
5	LN101	Basic Professional Communication	Core	2	1	0	40	20	60	40	100	2:1:0	3
6	CS103	Introduction to Computers	Core	2	1	0	40	20	60	40	100	2:1:0	3
PRACTICAL													
1	BO105	General Anatomy - Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
2	BO106	General Physiology - Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
3	BO107	General Biochemistry - Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
4	PY112	Geometrical Optics- Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
Total				15	06	08	400	200	600	400	1000	25	25

S. N.	Course code	Course Title	Type of Paper	Attributes							United Nation Sustainable Development Goal (SDGs)
				Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
THEORIES											
1	BO101	General Anatomy	Core	√	√	√	√		√	√	3,4
2	BO102	General Physiology	Core	√	√	√	√		√	√	3,4
3	BO103	General Biochemistry	Core	√	√	√	√		√	√	3,4
4	PY111	Geometrical Optics	Core	√	√	√	√		√	√	3,4
5	LN101	Basic Professional Communication	Core			√					3,4, 11
6	CS103	Introduction to Computers	Core			√					3,4, 11
PRACTICAL											
1	BO105	General Anatomy - Lab	Core	√	√	√	√		√	√	3,4
2	BO106	General Physiology - Lab	Core	√	√	√	√		√	√	3,4
3	BO107	General Biochemistry - Lab	Core	√	√	√	√		√	√	3,4
4	PY112	Geometrical Optics- Lab	Core	√	√	√	√		√	√	3,4

L: Lecture **T:** Tutorials **P:** Practical **CT:** Class Test **TA:** Teacher Assessment **ESE:** End Semester Examination,
 AE= Ability enhancement, DSE- Discipline Specific Elective, **Sessional Total:** Class Test + Teacher Assessment **Subject Total:** Sessional Total + End Semester Examination (ESE)



Integral University, Lucknow

Effective from Session: 2023-24							
Course Code	BO101	Title of the Course	GENERAL ANATOMY	L	T	P	C
Year	I	Semester	I	3	1	0	4
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	The student will be able to demonstrate knowledge in human anatomy as needed for the study and practice of Optometry.						

Course Outcomes	
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 Muscles, nervous & cardiovascular system
CO4	To learn about superior extremity muscles & superior extremity joints.
CO5	To learn about inferior extremity muscles & inferior extremity joints.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	GENERAL ANATOMY	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. 5. Anatomical nomenclature, Body Planes, Positions, Body Membranes, Body cavities and movements.	6	CO1
2	OSTEOLOGY & ARTHROLOGY(Brief)	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 axial & appendicular skeleton with bone features. 5. Introduction to Arthrology: Definition and classifications of joints with examples in detail. 6. Brief about Joints of superior extremity like shoulder joint, elbow joint, wrist joint and radioulnar joint. 7. Brief about Joints: Hip and Knee joint, subtalar, tibiofibular joints.	10	CO2
3	SYSTEMIC ANATOMY	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. 3. Introduction to surface landmarks of the lower extremity. Brief about Muscles and fascia of Thigh region, Gluteal region, Compartment of the leg, name of the muscles of leg, their action and nerve supply.	10	CO3
4	SUPERIOREXTREMIT Y	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.	8	CO4
5	INFERIOREXTREMIT Y	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. 5. Breast structure with blood and nerve supply.	6	CO5

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. Principles of Anatomy & Physiology – Tortora Gerard J.
7. Ranganathan, T.S., A Text Book of Human Anatomy.
8. Ross and Wilson- Anatomy and Physiology in health and illness.

e-Learning Source:

1. <https://youtu.be/X5RUFXXZBH4>
2. https://youtu.be/06o_XNKwuOE
3. <https://youtu.be/4Sab-2E4ZDI>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO4	PSO5

C01	1	3	1	2	-	-	-	1	2	1	-	2	2	1	2	-
C02	2	3	2	2	-	-	-	1	3	1	-	3	2	2	1	-
C03	1	3	1	2	-	-	-	1	2	-	-	2	2	1	2	-
C04	2	3	1	2	-	-	-	1	3	-	-	3	2	2	3	-
C05	1	3	1	2	-	-	-	1	2	1	-	2	2	1	2	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation
Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
BO101	GENERAL ANATOMY	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
		√	√	√	√		√	√	3,4



Integral University, Lucknow

Effective from Session: 2023-24

Course Code	BO102	Title of the Course	GENERAL PHYSIOLOGY	L	T	P	C
Year	I	Semester	I	3	1	0	4
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	The student will be able to demonstrate knowledge in human physiology as needed for the study and practice of Optometry.						

Course Outcomes

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.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	GENERAL AND CELL PHYSIOLOGY	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
2	BLOOD	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
3	NERVOUS SYSTEM	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
4	CARDIOVASCULAR SYSTEM	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
5	DIGESTIVESYSTEM	1. Introduction of Reproductive Systems in human. 2. Spermatogenesis and Oogenesis. 3. Physiological functions of Reproductive Hormones. 4. Menstrual Cycle. 5. 5. Placental Hormone (Physiological Function).	8	CO5

Reference Books:

1. Human Physiology: A.K. Jain.
2. Essentials of Medical Physiology: K. Sembulingam, Jaypee Publishers
3. Textbook of Physiology: Guyton.
4. Textbook of Physiology: Ganong

e-Learning Source:

1. <https://youtu.be/JuhDx9hQAx8>
2. https://youtu.be/Ta_vWU5rjho
3. <https://youtu.be/h1qSFZ9aw94>
4. https://youtu.be/uYm4l_alVV0
5. <https://youtu.be/VWamhZ8vTL4>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	1	2	-	-	-	1	2	-	-	2	2	1	-	1	-
CO2	1	3	1	3	-	-	-	1	3	-	-	3	3	2	-	2	-
CO3	1	3	1	2	-	-	-	1	2	-	-	2	3	1	-	1	-
CO4	1	3	1	2	-	-	-	1	3	-	-	3	2	1	-	1	-
CO5	1	3	1	2	-	-	-	1	2	-	-	2	2	1	-	1	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
BO102	GENERAL PHYSIOLOGY	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	3,4
		√	√	√	√		√	√	



Integral University, Lucknow

Effective from Session: 2023-24

Course Code	BO103	Title of the Course	GENERAL BIOCHEMISTRY	L	T	P	C
Year	I	Semester	I	3	1	0	4
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	The student will be able to demonstrate knowledge in clinical Biochemistry as needed for the study and practice of Optometry.						

Course Outcomes: After the successful course completion, learners will develop following attributes:

CO1	Introduction, Molecular & Functional organization of cells, Amino acid, Lipids, Proteins
CO2	To study about classification definition and metabolism of carbohydrates
CO3	To learn about RNS & DNA, Advances in Genetic Engineering.
CO4	To learn about Definition, classification & function of fat & water-soluble vitamins, classification of enzyme, definition and classification of hormones.
CO5	To learn about Introduction, role and requirement of nutrition.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	CELL & CHEMISTRY OF BIMOLECULES	1. Introduction, Molecular & functional organization of a cell & its sub cellular components- Cell membrane, Cytosol, Endoplasmic reticulum, Golgi apparatus, Lysosomes, Peroxisomes, Mitochondria & Nucleus. 2. Definition, Classification, properties & functions of amino acids. 3. Brief about Definition, Classification & functions of lipids. 4. Brief about structure of proteins, Amino acid & protein metabolism.	8	CO1
2	CARBOHYDRATE	Definition, Classification & Metabolism Glycolysis. Citric Acid cycle, Gluconeogenesis, glycogenesis, Glycogenolysis, Pentose Phosphate Pathway. Blood Sugar level & its homeostasis, glucose tolerance & glycosuria.	10	CO2
3	NUCLEIC ACID	Brief about structure of DNA & RNA, DNA Replication, & Transcription, Advances in Genetic Engineering.	8	CO3
4	VITAMINS (FAT & WATER SOLUBLE) & ENZYMES & HORMONES	1. VITAMINS (FAT & WATER SOLUBLE): Definition, classification, functions dietary sources, daily requirement & Deficiency disorders. 2. ENZYMES & HORMONES: Definition, Classification of enzymes, properties, mechanism of action, Clinical importance & regulation of activity. Introduction Definition & Classification of hormones. Mechanism of hormone action, Effects of hormones on various metabolism & hormonal disorders.	6	CO4
5	NUTRITION & SPECIAL TOPICS	1. Introduction of Nutrition, Nutrients of their role in human, Nutritional requirements, Balance diet, Nutritional disorder, SDA (special dynamic action). Respiratory quotient (RQ) & Basal Metabolism rate (BMR). Water electrolyte balance & acid base balance.	8	CO5

Reference Books:

1. Fundamentals of Biochemistry-by Dr. Deb Jyoti Das,
2. Essentials of Bio-chemistry by U. Satyanarayan, 1st Edition, Books and Allied Publications.
3. Textbook of Biochemistry – Chatterje and Shinde
4. Text book of Medical Bio-Chemistry – Dr. M.N. Chatterjee, 5th Edition, Jaypee Publication.
5. Fundamental of Bio-Chemistry – Dr. A. C. Deb, 5th Edition, Central Publication.
6. Bio-Chemistry introduction – Meke, 2nd Edition, McGraw-Hill Publication.

e-Learning Source:

1. <https://youtu.be/t5DvF5OVr1Y>
2. <https://youtu.be/gggC9vctvBQ>
3. <https://youtu.be/ufvZ8bYtyO8>
4. <https://youtu.be/Q6R4o-oECxs>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	2	2	-	-	-	1	2	1	-	2	2	1	-	1	-
CO2	1	3	1	3	-	-	-	2	3	-	-	3	3	2	-	2	-
CO3	1	3	1	2	-	-	-	1	2	2	-	2	3	1	-	1	-
CO4	1	3	1	2	-	-	-	1	3	-	-	3	2	1	-	1	-
CO5	1	3	1	2	-	-	-	1	2	1	-	2	2	1	-	1	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
BO103	GENERAL BIOCHEMISTRY	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	3,4
		√	√	√	√		√	√	



Integral University, Lucknow

Effective from Session: 2019-20							
Course Code	PY111	Title of the Course	GEOMETRICAL OPTICS	L	T	P	C
Year	I	Semester	I	2	1	0	3
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	To impart detailed knowledge about the basic concepts and principles involved in the formation of image through various lenses and prisms and the different types of defects associated with the lenses.						

Course Outcomes	
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

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	ELEMENTARY CONCEPTS OF LIGHT	Introduction, properties and nature of light, laws of reflection and refraction at plane and spherical Surfaces, Snells' law, relative and absolute refractive indices, total internal reflection and critical angle, refraction by plane parallel slab of glass, Refraction by spherical surfaces: convex & concave, vengeance equation, focal points, image point, lateral & axial magnification, Optical Path, Fermat's principle and its application to obtain laws of reflection and refraction.	6	CO1
2	PRISMS	Power of Prism, Unit of measurement (prism diopter), deviation in prism, combination of thin prisms, dispersive power of prism, achromatic prism, prismatic effect, decentration, uses of decentration, Prentice rule.	6	CO2
3	THIN AND THICK LENSES	Thin Lens: Shapes, derivation of lens makers' formula, thin lens vengeance equation, equivalent focal length of two thin lenses separated by a distance & placed in contact, lateral magnification of thin lenses in contact, concept of reduced systems. Thick Lens: Cardinal points & planes, front & back vertex power, dioptric powers of equivalent lenses.	6	CO3
4	SPHERICAL AND CYLINDRICAL LENSES	Spherical lenses and cylindrical lenses, image formation, relation between cylinder axis and line image orientation. Imaging due to (a) two cylinders in contact (b) spherical and cylindrical lens incontact.	6	CO4
5	ABERRATIONS AND ILLUMINATION	Aberrations in lenses: Spherical aberration, coma, astigmatism, chromatic aberration, Aberrationfree lenses. Illumination: Luminous flux, candela, solid angle, illumination, utilization factor, depreciation factor, and illumination laws, measurement of illumination.	6	CO5

Reference Books:

1. K. Ghatak, *Optics*, Tata McGraw Hill, 2008
2. Loshin D. S., *The Geometric Optics Workbook*, Butterworth-Heinemann, Boston, USA, 1991.
3. Born and Wolf, *Optics*, Cambridge University Press, 1999.
4. Jenkins and White, *Fundamental of Optics*, McGraw-Hill, 2011.
5. Jenkins and White, *Fundamental of Optics*, McGraw-Hill, 2011.
6. Smith and Thomson, *Optics*, John Wiley and Sons, 1973.
7. Brijlal, Subrahmanyam and Avadhanulu, *A Text book of Optics*, S. Chand, 2014.

e-Learning Source:

1. https://youtu.be/Xf_VZ8GxUIY
2. <https://youtu.be/AldgVKZWHgg>
3. <https://youtu.be/pzQdsg2Tugo>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	1	2	-	-	-	1	2	1	-	2	-	1	2	-	3
CO2	2	3	2	2	-	-	-	1	3	1	-	3	-	2	1	-	2
CO3	1	3	1	2	-	-	-	1	2	-	-	2	-	1	2	-	3
CO4	2	3	1	2	-	-	-	1	3	-	-	3	-	2	3	-	3
CO5	1	3	1	2	-	-	-	1	2	1	-	2	-	1	2	-	3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Course Code	Course Title	Attributes							SDGs No.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
PY111	GEOMETRICAL OPTICS	√	√	√	√		√	√	3,4



Integral University, Lucknow

Effective from Session: 2019-20

Course Code	LN101	Title of the Course	BASICS OF PROFESSIONAL COMMUNICATION	L	T	P	C
Year	I	Semester	I	2	1	0	3
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	The major objective of the course is to develop professional communication skills among the students.						

Course Outcomes

CO1	After studying this course, the students will know –The meaning & importance of professional communication as well as effective professional communication.
CO2	After studying this course, the students will know –Understanding the language through literature like essays and short stories.
CO3	After studying this course, the students will know –Basic concepts and knowledge of vocabulary.
CO4	After studying this course, the students will know –Understanding and practice of basic grammar.
CO5	After studying this course, the students will know –Knowledge, understanding, and skills in report writing & business letter writing.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	PROFESSIONAL COMMUNICATION	1. Professional Communication: Meaning & importance 2. Essentials of Effective Communication 3. Barriers to Effective Communication	6	CO1
2	LANGUAGE THROUGH LITERATURE	1. Essays: “The Effect of the Scientific Temper on Man” by Bertrand Russell “The Aims of Science and Humanities” by Moody E. Prior 2. Short Stories: “The Meeting Pool” by Ruskin Bond “The Portrait of a Lady” by Khushwant Singh	6	CO2
3	BASIC VOCABULARY	1. Euphemism, One-word Substitution, Synonyms, Antonyms 2. Homophones, Idioms and Phrases, Common mistakes 3. Confusable words and expressions	6	CO3
4	BASIC GRAMMAR	1. Articles, Prepositions, Tenses 2. Concord (Subject-Verb agreement), Verbs: kinds & uses 3. Degrees of Comparison	6	CO4
5	BASIC COMPOSITION	1. Report writing: What is a report? Kinds and objectives of reports, writing reports 2. Business Letter Writing: Introduction to business letters, types of business letters, Layout of business letters, Letter of Enquiry / Complaint	6	CO5

Reference Books:

1. Lata, Pushpa & Kumar, Sanjay. Communication Skills, Oxford University Press-2012
2. Quintanilla, Kelly M. & Wahl, Shawn T. Business and Professional Communication, Sage Publications India Pvt. Ltd-2011
3. Juneja, Om P & Mujumdar, Aarati. Business Communication: Techniques and Methods, Orient Black Swan-2010
4. Arora, V. N. & Chandra, Lakshmi. Improve Your Writing: From Comprehensive to Effective Writing, Oxford University Press-2010 (For the prescribed essays- “The Effect of the Scientific Temper on Man” by Bertrand Russell & “The Aims of Science and Humanities” by Moody E. Prior)

e-Learning Source:

1. https://www.youtube.com/watch?v=jQx_jZxdCbs
2. <https://www.sciencedirect.com/topics/psychology/linguistictheory#:~:text=Linguistic%20Theory%20was%20formed%20by,to%20all%20typically%20developing%20humans>
3. <https://linguistics.ucla.edu/undergraduate/what-is-linguistics/>
4. <https://www.thoughtco.com/noam-chomsky-4769113>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	-	-	2	-	2	-	-	-	2	-	-	-	-	-
CO2	-	-	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-
CO3	-	-	-	-	-	2	-	1	-	1	-	2	-	-	-	-	-
CO4	-	-	-	-	-	2	2	-	-	-	-	2	-	-	-	-	-
CO5	-	-	-	-	-	2	1	1	-	-	1	2	-	-	-	1	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
LN101	BASICS OF PROFESSIONAL COMMUNICATION	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	3,4,11
				√					



Integral University, Lucknow

Effective from Session: 2019-20

Course Code	CS103	Title of the Course	INTRODUCTION TO COMPUTERS	L	T	P	C
Year	I	Semester	I	2	1	0	3
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	The main objective of the course is to provide fundamental knowledge of computers, windows, MS word, and Power point.						

Course Outcomes	
CO1	After studying this course, the students will know –The fundamentals of computers and computer systems.
CO2	After studying this course, the students will know –Understanding the basic concepts of DOS commands.
CO3	After studying this course, the students will know –A Basic understanding of the windows.
CO4	After studying this course, the students will know –Understanding MS Word.
CO5	After studying this course, the students will know –Knowledge, understanding, and basic concepts of presentation software.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	COMPUTER FUNDAMENTALS	What is a computer? Components of a computer system. Classification of computers. Types of computers. A brief history of the evolution of computers and generation of computers. Computer hardware and software. Input/ Output devices.	6	CO1
2	DOS	Elementary knowledge of DOS commands DIR, CLS, DATE, TIME, MD, CD, RD, RENAME, DEL, BACKUP, RESTORE, COPY, SCANDISK, CHKDSK.	6	CO2
3	WINDOWS	Difference between windows and DOS. Basic Features - Date, Time, Time Zone, Display, Screen Saver, Fonts, Mouse, and mouse pointers. Using accessories such as a calculator, paintbrush, CD player, etc. Use of Windows Explorer for moving and copying files. Introduction to MS Office and its integrated nature.	6	CO3
4	MS-WORD	Starting Word, new documents, entering text, changing text, aligning, underlining, and justifying text. Use of tabs. Tables - creation, adding rows and columns, splitting, and combining cells, Borders. Saving, closing, and operating documents. Adding headers and footers. Print preview, and print a document. Mail merge: creating main document and data source. Adding and removing fields from the data source.	6	CO4
5	POWERPOINT (PRESENTATION SOFTWARE)	The basic concept of presentation software. Standard, Formatting, and drawing toolbars in PowerPoint and their use. Creating and opening a presentation. Creating, deleting, opening, and copying slides. Closing and saving a presentation. Use of slide sorter, adding header/footer. Use of master slides and color box. Use of animation features. Inserting pictures, resizing pictures. Inserting organization chart. Use of auto content wizard.	6	CO5

Reference Books:

1. A First Course in Computers: Saxena, Vikas Publishing House.
2. Fundamentals of Computer science - M. Afshar Alam.
3. Fundamental of Information Technology by D. S. Yadav- New age International.

e-Learning Source:

1. https://youtu.be/ME_F9yypzsw
2. <https://youtu.be/FZqKyhfD7-E>
3. <https://youtu.be/S4Zio60b8P8>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	2	2	-	-	-	1	2	1	-	2	-	2	2	1	-
CO2	1	-	1	3	-	-	-	2	3	-	-	3	-	1	1	1	-
CO3	1	3	1	2	-	-	-	1	2	2	-	2	-	1	1	1	-
CO4	1	2	1	2	-	-	-	1	3	-	-	3	-	1	2	1	-
CO5	1	2	1	2	-	-	-	1	2	1	-	2	-	1	1	1	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
CS103	INTRODUCTION TO COMPUTERS	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	3,4, 11



Integral University, Lucknow

Effective from Session:2023-24

Course Code	BO105	Title of the Course	GENERAL ANATOMY- LAB	L	T	P	C
Year	I	Semester	I	0	0	2	1
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives							

Course Outcomes

CO1	To identify anatomical aspect of the level of organization of the human body practically & its application in practice of Optometry.
CO2	To identify anatomical and functional aspect of muscles, bones and joints of the various regions practically& its application in practice of Optometry.
CO3	To identify and practically apply various terms related to human different system of the body & its application in practice of Optometry.
CO4	To identify anatomical and functional aspect of neuromusculoskeletal structure of superior extremity& its application in practice of Optometry.
CO5	To identify anatomical and functional aspect of neuromusculoskeletal structure of inferior extremity & its application in practice of Optometry.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1.	GENERAL ANATOMY	1. Identification and description of all Anatomical structures. 2. Demonstration of Cells and tissues.	6	CO1
2.	OSTEOLOGY & ARTHROLOGY (Brief)	1. Demonstration of Skull. 2. Demonstration of Vertebrae. 3. Demonstration of Thoracic bones.	6	CO2
3.	SYSTEMIC ANATOMY	1. Demonstration of the Shoulder joint, Scapula, clavicle and Humerus. 2. Demonstration of Elbow joint, radius and Ulna.	6	CO3
4.	SUPERIOR EXTREMITY	1. Demonstration of Wrist joint, Carpals, Metacarpals Phalanges and joints of hand. 2. Demonstration of Pelvis and lower extremity with joints.	6	CO4
5.	INFERIOR EXTREMITY	1. Demonstration of the cardiovascular system. 2. Demonstration of Nervous system. 3. Demonstration of the Reproductive system.	6	CO5

Reference Books:

1. Principles of Anatomy & Physiology – Tortora Gerard J.
2. Chaurasia's, A Text Book of Anatomy.
3. Ranganathan, T.S., A Text Book of Human Anatomy.
4. Fattana, Human Anatomy, (Description and Applied), Sunder's & C P Prism Publishers, Bangalore.
5. Ester. M. Grishcimer, Physiology & Anatomy with Practical Considerations, J.P. Lippin Cott. Philadelphia.

e-Learning Source:

1. <https://youtu.be/X5RUFXZZBH4>
2. https://youtu.be/06o_XNKwuOE
3. <https://youtu.be/4Sab-2E4ZDI>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	1	2	-	-	-	1	2	1	-	2	-	1	2	-	3
CO2	2	3	2	2	-	-	-	1	3	1	-	3	-	2	1	-	2
CO3	1	3	1	2	-	-	-	1	2	-	-	2	-	1	2	-	3
CO4	2	3	1	2	-	-	-	1	3	-	-	3	-	2	3	-	3
CO5	1	3	1	2	-	-	-	1	2	1	-	2	-	1	2	-	3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
BO105	GENERAL ANATOMY-LAB	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	3,4
		√	√	√	√		√	√	



Integral University, Lucknow

Effective from Session: 2023-24

Course Code	BO106	Title of the Course	GENERAL PHYSIOLOGY- LAB	L	T	P	C
Year	I	Semester	I	0	0	2	1
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	The student will be able to demonstrate the practical knowledge in human anatomy as needed for the study and practice of Optometry.						

Course Outcomes

CO1	To understand about general physiology& its application in practice of Optometry.
CO2	To understand the nerve, muscle physiology& its application in practice of Optometry.
CO3	To understand about basics of hematology& its application in practice of Optometry.
CO4	To understand about respiratory system & its application in practice of Optometry.
CO5	To understand about cardiovascular system and its application in practice of Optometry.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	GENERAL AND CELL PHYSIOLOGY BLOOD RESPIRATION CARDIOVASCULAR SYSTEM DIGESTIVE SYSTEM	1. Demonstration of Pulse Rate. 2. Demonstration of Heart Rate.	6	CO1
2		1. Demonstration of Blood Pressure. 2. Demonstration of Body Temperature measurement.	6	CO2
3		1. Demonstration of Microscope. 2. Blood collection through various methods. 3. Estimation of Hemoglobin through Sahli Method and Tube method.	6	CO3
4		1. Identification of Blood cells by study of Peripheral blood smears. 2. Demonstration of TLC. 3. Demonstration of DLC.	6	CO4
5		1. Demonstration of RBCs. 2. Demonstration of Platelet counts. 3. Demonstration of Blood group.	6	CO5

Reference Books:

1. Textbook of Physiology: Guyton.
2. Textbook of Physiology: Ganong.
3. Human Physiology: A.K. Jain.
4. Essentials of Medical Physiology: K.Semubulingam, Jaypee Publisher

e-Learning Source:

1. <https://youtu.be/X5RUFXXZBH4>
2. https://youtu.be/06o_XNKwuOE
3. <https://youtu.be/4Sab-2E4ZDI>
4. https://youtu.be/uYm4l_alVV0
5. <https://youtu.be/VWamhZ8vTL4>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	1	2	-	-	-	1	2	-	-	2	-	1	-	1	-
CO2	1	3	1	3	-	-	-	1	3	-	-	3	-	2	-	2	-
CO3	1	3	1	2	-	-	-	1	2	-	-	2	-	1	-	1	-
CO4	1	3	1	2	-	-	-	1	3	-	-	3	-	1	-	1	-
CO5	1	3	1	2	-	-	-	1	2	-	-	2	-	1	-	1	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
BO106	GENERAL PHYSIOLOGY- LAB	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	3,4
		√	√	√	√		√	√	



Integral University, Lucknow

Effective from Session: 2019-20

Course Code	BO107	Title of the Course	GENERAL BIOCHEMISTRY- LAB	L	0	T	0	P	2	C	1
Year	I	Semester	I								
Pre-Requisite	Nil	Co-requisite	Nil								
Course Objectives	The student will be able to demonstrate knowledge in clinical Biochemistry as needed for the study and practice of Optometry.										

Course Outcomes

CO1	Introduction, Molecular & Functional organization of cells, Amino acid, Lipids, Proteins
CO2	To study about classification definition and metabolism of carbohydrates
CO3	To learn about RNS & DNA, Advances in Genetic Engineering.
CO4	To learn about Definition, classification & function of fat & water-soluble vitamins, classification of enzyme, definition and classification of hormones.
CO5	To learn about Introduction, role and requirement of nutrition.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	CELL & CHEMISTRY OF BIMOLECULES CARBOHYDRATE NUCLEIC ACID VITAMINS (FAT & WATER SOLUBLE) & ENZYMES & HORMONES NUTRITION & SPECIALTOPICS	Basic Introduction, Safety in clinical biochemistry, Laboratory Sample collection, specimen, labelling and routine tests.	6	CO1
2		Cleaning of laboratory Glassware, Composition of Glassware and General Glassware.	6	
3		Qualitative estimation of carbohydrates • Benedict's test • Molishs Phenol Sulfuric Acid	6	CO2
4		Quantitative estimation of proteins • Lowry Method Bradford test	6	CO3
5		<i>Quantitative Estimation of</i> • Glucose concentration • Urea concentration Cholesterol Concentration	6	CO4
6		<i>Chromatography</i> TLC (Thin layer chromatography) & Paper chromatography	6	CO5

Reference Books:

1. Fundamentals of Biochemistry-by Dr. Deb Jyoti Das
2. Biochemistry-by-Dr Satyanarayana
3. Textbook of Medical Biochemistry -Chatterjee and Shinde

e-Learning Source:

1. <https://youtu.be/t5DvF5OVr1Y>
2. <https://youtu.be/gggC9vctvBQ>
3. <https://youtu.be/ufvZ8bYtyO8>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	2	2	-	-	-	1	2	1	-	2	-	2	2	1	-
CO2	1	3	1	3	-	-	-	2	3	-	-	3	-	1	1	1	-
CO3	1	3	1	2	-	-	-	1	2	2	-	2	-	1	1	1	-
CO4	1	3	1	2	-	-	-	1	3	-	-	3	-	1	2	1	-
CO5	1	3	1	2	-	-	-	1	2	1	-	2	-	1	1	1	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
BO107	GENERAL BIOCHEMISTRY- LAB	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	3,4
		√	√	√	√		√	√	



Integral University, Lucknow

Effective from Session: 2019-20

Course Code	PY112	Title of the Course	GEOMETRICAL OPTICS LAB	L	T	P	C
Year	I	Semester	I	0	0	2	1
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	To impart detailed knowledge about the basic concepts and principles involved in the formation of image through various lenses and prisms and the different types of defects associated with the lenses.						

Course Outcomes	
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

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Elementary Concepts of Light Prisms Thin and Thick Lenses Spherical and Cylindrical Lenses Aberrations and Illumination	1. Determination of the focal length & hence the power of a convex lens by displacement method.	6	CO1
2		2. Determination of the refractive index of a transparent liquid by using a traveling microscope.	6	CO2
3		3. Determination of refractive index of a material of a prism by minimum deviation method. 4. Determination of the refractive index of the material of a convex lens measuring its focal length, using the lens & a plane mirror.	6	CO3
4		5. Determination of the focal length of a concave mirror by graphical method.	6	CO4
5		6. To draw I- δ curve of a prism by a spectrometer & hence to find out the angle of minimum deviation.	6	CO5

Reference Books:

1. K. Ghatak, *Optics*, Tata McGraw Hill, 2008
2. Loshin D. S., *The Geometric Optics Workbook*, Butterworth-Heinemann, Boston, USA, 1991.
3. Born and Wolf, *Optics*, Cambridge University Press, 1999.
4. Jenkins and White, *Fundamental of Optics*, McGraw-Hill, 2011.
5. Jenkins and White, *Fundamental of Optics*, McGraw-Hill, 2011.
6. Smith and Thomson, *Optics*, John Wiley and Sons, 1973.
7. Brijlal, Subrahmanyam and Avadhanulu, *A Text book of Optics*, S. Chand, 2014.

e-Learning Source:

1. https://youtu.be/Xf_VZ8GxUIY
2. <https://youtu.be/AldgVKZWHgg>
3. <https://youtu.be/pzQdsg2Tugo>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	2	2	-	-	-	1	2	1	-	2	-	2	2	1	-
CO2	1	3	1	3	-	-	-	2	3	-	-	3	-	1	1	1	-
CO3	1	3	1	2	-	-	-	1	2	2	-	2	-	1	1	1	-
CO4	1	3	1	2	-	-	-	1	3	-	-	3	-	1	2	1	-
CO5	1	3	1	2	-	-	-	1	2	1	-	2	-	1	1	1	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Course Code		Course Title		Attributes & SDGs							SDGs No.	
				Attributes								
PY112		GEOMETRICAL OPTICS LAB		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics		
				√	√	√	√		√	√	3,4	



INTEGRAL UNIVERSITY, LUCKNOW
INTEGRAL INSTITUTE OF ALLIED HEALTH SCIENCES & RESEARCH

DEPARTMENT OF PARAMEDICAL SCIENCES

**BACHELOR OF OPTOMETRY
(B.OPTOM)**

SYLLABUS

YEAR/ SEMESTER: I/II



Integral University, Lucknow
Department of Paramedical Sciences
Study and Evaluation Scheme

Program: BOPT

Semester-II

S. N.	Course code	Course Title	Type of Paper	Period Per hr./week/Sem			Evaluation Scheme				Sub. Total	Credit	Total Credits
				L	T	P	CT	TA	Total	ESE			
THEORIES													
1	BO108	Ocular Anatomy	Core	3	1	0	40	20	60	40	100	31:0	4
2	BO109	Ocular Physiology	Core	3	1	0	40	20	60	40	100	3:1:0	4
3	BO110	Ocular Biochemistry	Core	3	1	0	40	20	60	40	100	3:1:0	4
4	BO111	Optometric Optics-I	Core	2	1	0	40	20	60	40	100	2:1:0	3
5	BO112	Medical Law & Ethics	Core	2	1	0	40	20	60	40	100	2:1:0	3
6	BO113	Nutrition and Eye	Core	2	1	0	40	20	60	40	100	2:1:0	3
PRACTICAL													
1	BO114	Ocular Anatomy - Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
2	BO115	Ocular Physiology - Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
3	BO116	Ocular Biochemistry - Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
4	BO117	Optometric Optics- I- Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
Total				15	06	08	400	200	600	400	1000	25	25

S. N.	Course code	Course Title	Type of Paper	Attributes							United Nation Sustainable Development Goal (SDGs)
				Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
THEORIES											
1	B0108	Ocular Anatomy	Core	√	√	√	√		√	√	3,4
2	B0109	Ocular Physiology	Core	√	√	√	√		√	√	3,4
3	B0110	Ocular Biochemistry	Core	√	√	√	√		√	√	3,4
4	B0111	Optometric Optics-I	Core	√	√	√	√		√	√	3,4
5	B0112	Medical Law & Ethics	Core	√	√	√	√		√	√	3,4, 6
6	B0113	Nutrition and Eye	Core	√	√	√	√		√	√	3,4
PRACTICAL											
1	B0114	Ocular Anatomy - Lab	Core	√	√	√	√		√	√	3,4
2	B0115	Ocular Physiology - Lab	Core	√	√	√	√		√	√	3,4
3	B0116	Ocular Biochemistry - Lab	Core	√	√	√	√		√	√	3,4
4	B0117	Optometric Optics- I- Lab	Core	√	√	√	√		√	√	3,4

L: Lecture **T:** Tutorials **P:** Practical **CT:** Class Test **TA:** Teacher Assessment **ESE:** End Semester Examination,
AE= Ability enhancement, **DSE-** Discipline Specific Elective, **Sessional Total:** Class Test + Teacher Assessment **Subject Total:** Sessional Total + End Semester Examination (ESE)



Integral University, Lucknow

Effective from Session: 2023-24

Course Code	BO108	Title of the Course	OCULAR ANATOMY	L	T	P	C
Year	I	Semester	II	3	1	0	4
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	At the end of the course, the student should be able to:						
	1. Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa.						
	2. Identify the microscopic structures of various tissues in the eye and correlate the structure with the functions.						
	3. Comprehend the basic structure and connections between the various parts of the central nervous system and the eye so as to understand the neural connections and distribution.						
	4. To understand the basic principles of ocular embryology.						

Course Outcomes	
CO1	Understanding concepts and theories normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa.
CO2	Identifying the microscopic structures of various tissues in the eye and correlate the structure with the functions.
CO3	Identifying 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.
CO4	Understanding the basic principles of ocular embryology.
CO5	Understanding the Milestone of the Visual System.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Visual Development	1. Outline of Visual system - overall view. 2. Anatomical parts – terminology, anterior and posterior segments and chambers. 3. Adnexa and the orbit – constituent bones 4. Embryology of eye 5. Visual Development of eye	8	CO1
2	Ocular Adnexa	1. Tear Film – layers 2. Three coats of the eyeball – Outer, Middle, Inner 3. Muscles of eye – Extra Ocular and Intra Ocular 4. Eye Lid- Anatomical features	8	CO2
3	Anterior Segment	1. Conjunctiva – regions, layers. 2. Sclera – regions, layers. 3. Cornea – regions, layers. 4. Limbus – regions, layers. 5. Middle coat – Uvea - Choroid, Iris, Pupil. a. Choroid – regions, layers. b. Ciliary body, ciliary muscles, processes – layers. c. Iris – regions, structure.	8	CO3
4	Chamber of Eye	1. Anterior chamber – structure, depth significance, Anterior chamber angle – regions. 2. Intra-Ocular-Pressure – significance, normal features, age variations. 3. Crystalline Lens – anatomical structure, layers.	8	CO4
5	Posterior Segment	1. Vitreous humor – anatomical relevance 2. Retina - anatomical structure, layers. 3. Visual pathway – complete structure, significance. 4. Optic tract, Optic chiasma, Lateral geniculate body, Optic radiations, Area 17. 5. Blood supply to all parts of eye and adnexa. 6. Cranial nerve supply to the eye.	8	CO5

Reference Books:

1. Physiology of the eye - Adler H - 4th edition 1980
2. Functional Anatomy and Histology of Eye – Gordon Ruskell, Butterworth Heinemann.
3. Ocular Anatomy – Arvind Eye Hospital, Madurai.
4. Diagnosis of Defective colour vision – Jennie Birch
5. Clinical Anatomy of Visual system – Lee Ann Remington, Butterworth Heinemann.
6. Clinical Ocular Physiology – Nagi Hang Victor Chong, Butterworth Heinemann

e-Learning Source:

- 1 <https://youtu.be/USQsEPot-yE>
- 2 <https://youtu.be/8GpDRSWUnFs>
- 3 https://youtu.be/WcB6_IX3pS4

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	1	2	-	-	-	1	1	1	-	3	2	2	1	1	1
CO2	1	3	2	2	-	-	-	1	1	1	-	3	2	2	1	1	1
CO3	1	3	1	2	-	-	-	1	1	1	-	3	2	1	1	1	1
CO4	2	3	1	2	-	-	-	1	1	1	-	3	2	2	1	1	1
CO5	1	3	1	2	-	-	-	1	1	1	-	3	2	1	1	1	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
BO108	OCULAR ANATOMY	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	3,4
		√	√	√	√		√	√	



Integral University, Lucknow

Effective from Session: 2023-24

Course Code	BO109	Title of the Course	OCULAR PHYSIOLOGY	L	T	P	C
Year	I	Semester	II	3	1	0	4
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	<p>At the end of the course, the student should be able to:</p> <ul style="list-style-type: none"> • Explain the normal functioning of all structures of the eye and their interactions. • Elucidate the physiological aspects of normal growth and development of the eye. • Understand the phenomenon of vision. • List the physiological principles underlying pathogenesis and treatment of diseases of the eye. 						

Course Outcomes	
CO1	Understanding concepts & terminology of Ocular physiology
CO2	Enlisting and memorizing the functions & structure of Eyes
CO3	Understanding function of various ocular structures and applying this knowledge to identify diseases related to them.
CO 4	Identifying and explaining the interrelationships between different Ocular structures
CO5	Differentiating various Ocular structures.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Eye Protective Mechanism	1. Protective mechanisms in the eye: Eye lids and Eyebrows 2. Extrinsic eye muscles, their actions and control of their movements, Fundamental laws of ocular motility and ocular movements. 3. Cornea: Functions of cornea, biochemical composition of cornea, corneal transparency and corneal hydration 4. Aqueous humor: functions, physiochemical and biochemical properties. Formation of Aqueous humor, Aqueous humor dynamics and blood –ocular barrier.	8	CO1
2	Ocular Mechanism	5. Iris: Iris specifications and functions of iris. And Pupil: Light reflex, Near reflex and dark reflex and abnormalities of pupil. 6. Crystalline lens: Biochemical composition of lens, Kreb's Cycle, Lens transparency and changes in ageing lens. 7. Accommodation: definition, ocular changes in accommodation and age related changes in accommodation. 8. Intraocular pressure: Vitreous humor- Composition & distribution of vitreous humour, Physiology & function of vitreous humor, Optical role of vitreous humour.	8	CO2
3	Visual Mechanism	9. Visual acuity: components of visual acuity and measurement of visual acuity for different age groups and Vernier acuity. 10. Visual perception – An overview of Binocular vision 11. Visual pathway and its defects 12. Contrast Sensitivity: types, measurements and its recordings	8	CO3
4	Visual Sensitivity	13. Light and Dark Adaptation- adaptation curve, Mechanism of dark and light adaptation, Factors influencing dark adaptation and light adaptation, Time course of light and dark adaptation, Rod vs. cone adaptation. 14. Scotopic and Photopic vision 15. Color Vision: Physiological, Photochemical & neurological basis of color vision. 16. Electrophysiology of color vision. Theories of color vision. Types of color defects and Color blindness 17. Retina: layers and its functions, arrangement of nerve fibre layer in retina, blood supply, blood retinal barrier and neurosensory retina.	8	CO4
5	Ocular Movement	18. Extra-Ocular Muscles: Physiology of ocular movement), Ocular Movement (monocular and Binocular), their function & nerve supply 19. Position of Gaze – Basic Kinematics, (position of gaze, Fick's axes) 20. Saccades & Pursuit 21. Fixatory eye movement	8	CO5

Reference Books:

1. AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006].
2. RD Ravindran: Physiology of the eye, Arvind eye hospitals, Pondicherry, 2001.
3. PL Kaufman, A Alm: Adler's Physiology of the eye clinical application, 10th edition, Mosby, 2002.
- L A Remington: Clinical Anatomy of the Visual System, Second edition, Elsevier Butterworth Heinemann, Missouri, USA, 2005.

e-Learning Source:

1. <https://youtu.be/GOMU2NUg97g>
2. <https://youtu.be/jW7ADI7rLMc>
3. <https://youtu.be/IWKkHWWDEI>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	1	2	-	-	-	1	2	-	-	2	2	1	-	1	1



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CO2	1	3	1	3	-	-	-	1	3	-	-	3	3	2	-	1	1
CO3	1	3	1	2	-	-	-	1	2	-	-	2	3	1	-	1	1
CO4	1	3	1	2	-	-	-	1	3	-	-	3	2	1	-	1	1
CO5	1	3	1	2	-	-	-	1	2	-	-	2	2	1	-	1	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
BO109	OCULAR PHYSIOLOGY	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
		√	√	√	√		√	√	3,4



Integral University, Lucknow

Effective from Session: 2019-20							
Course Code	BO110	Title of the Course	OCULAR BIOCHEMISTRY	L	T	P	C
Year	I	Semester	II	3	1	0	4
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	At theend of the course, thestudent should be able to demonstrate his knowledge and understanding on 1. Structure, function and interrelationship of biomolecules and consequences of deviation from the normal. 2. Integration of various aspects of metabolism and their regulatory pathways. 3. Principles o f various conventional and specialized laboratory. 4. Investigations and instrumentation, analysis and interpretation of a given data. 5. Understand metabolic processes taking place in different ocular structures.						

Course Outcomes	
CO1	Understanding the concepts and theories of Ocular Biochemistry
CO2	Understanding the chemistry of carbohydrates, proteins, lipids and amino acids related to eye
CO3	Understanding the basic metabolism of biomolecules and their energetic related to eye
CO4	Understanding the role of Minerals with respect to eyes
CO5	Understanding the process of biochemical testing and analyzing the test result.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Biochemistry of Tear Meniscus	Tear film- composition, lipid layer, aqueous layer, mucoid layer, functions, diagnostic tests, tear, substitutes, and recent development	8	CO1
2	Biochemistry of Cornea	Cornea, biochemical composition of epithelium, Bowman's membrane, stroma, Descemet's membrane, endothelium, functions, corneal metabolism nutrient uptake energy, transparency, barrier mechanism, pump action, irrigating solutions, aging and other anomalies, recent developments.	8	CO2
3	Biochemistry of Crystalline Lens	Lens- Composition metabolism, glucose utilization, sorbitol pathways, glutathione and ascorbic acid transport, transparency, cataract formation, aging photooxidation, sugar cataract, cataract and ascorbic acid act, medical therapy and recent developments, Vitreous humor- structure, composition, functions, vitreous biochemical pathology, intraocular gels.	8	CO3
4	Photo-receptors	Retina, pigment epithelium, structure, composition, photoreceptor cells, rhodopsin, lipids renewal and inner segment. Pigment epithelium-choroid, metabolism and function, phagocytosis, Vitamin A, retinal function and metabolism, Renal neurochemistry, monoamines, acetyl choline, GABA, amino acids, taurine, neuropeptides, Biochemical correlates of retinal diseases.	8	CO4
5	Monosaccharides	Reactions of monosaccharides, disaccharides, starch Glucose, Fructose, galactose, maltose, lactose, sucrose, starch, Analysis of unknown sugars. Abnormal constituents in urine, sugar, proteins, ketones, blood and bile salts. Detection of abnormal constituents in urine.	8	CO5

Reference Books:

1. S. Ramakrishnan, K G Prasanna and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990.
2. D R Whitehat: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003
3. S. Ramakrishnan: Essentials of biochemistry and ocular biochemistry, Annamalai University Publications, Chidambaram, India, 1992.

e-Learning Source:

1. <https://www.youtube.com/watch?v=7ZFr9xiAt94>
2. <https://www.youtube.com/watch?v=OZENK4UbE80>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	-	2	1	-	-	-	1	1	-	1	2	1	3	2	1
CO2	1	3	-	2	-	-	-	-	1	-	-	1	2	1	3	2	1
CO3	2	3	-	2	-	-	-	-	1	1	-	1	2	1	3	2	1
CO4	1	3	-	1	-	-	-	-	1	-	-	1	2	1	3	2	1
CO5	2	3	-	1	-	-	-	-	1	-	-	1	2	1	3	2	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Course Code	Course Title	Attributes							SDGs No.
BO110	OCULAR BIOCHEMISTRY	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	3,4
		√	√	√	√		√	√	



Integral University, Lucknow

Effective from Session: 2019-20

Course Code	BO111	Title of the Course	OPTOMETRIC OPTICS-I	L	T	P	C
Year	I	Semester	II	3	1	0	4
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	Skills/knowledge to be acquired at the end of this course: <ul style="list-style-type: none"> • Measurement of lens power, lens centration using conventional techniques • Transposition of various types of lenses • Knowledge to identify different forms of lenses (equi-convex, planoconvex, periscopic, etc.) • Knowledge to select the tool power for grinding process • Measurement of surface powers using lens measure • Method of laying off the lens for glazing process • Ophthalmic prism knowledge –effects, units, base-apex notation, compounding and resolving prisms. 						

Course Outcomes	
CO1	Understanding the concept of different phenomenon of light & basic of ophthalmic prism.
CO2	Understanding the concept & terminology use to describe the ophthalmic lenses
CO3	Understanding the concept of different types & design of ophthalmic lenses
CO4	Understanding the concept of Prismatic effect
CO5	Applying the Prentice's Rule

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Light and its Properties	1. Introduction – Light, mirror, reflection, refraction & absorption. 2. Definitions – Prisms, lenses, frames, spectacles. 3. Prisms – definition, properties, refraction through prisms units. 4. Prisms – uses of prisms. Nomenclature prisms. 5. Thickness difference and base – apex notation. 6. Sign Conventions.	8	CO1
2	Types of Lenses	1. Lenses – Definition, Terminology used to describe lenses. 2. Form of Lenses – Convex lenses & concave lenses 3. Refraction & image formation through convex and concave lenses 4. Determination of focal length and dioptric power of Lens. 5. Surface power and radius, refractive index values 6. Vertex distance and vertex power. 7. Effective power and effectivity	8	CO2
3	Properties of Lenses	1. Lens shape, size, Types i.e., Spherical, Cylindrical, Sphero cylindrical. 2. Toric surfaces and their significance, Toric lenses. 3. Sturm's conoid, Neutralization of lenses. 4. Spherometer and sag formula. 5. Focimeter or Lensometer – power of lens and prisms. 6. Center marking & Axis marking by focimeter. 7. Transposition, Simple and Toric.	8	CO3
4	Prisms	1. Prismatic effect, Centration. Decentration, Prentice's rule. 2. Prismatic effect of sphero-cylinders and Plano cylinders. 3. Differential prismatic effects. 4. Decentration of lenses and edge thickness, Decentration examples. 5. Components and interpretation of spectacles prescription. 6. Prescription mistakes commonly made, Prismatic effect of sphero-cylindrical lenses. 7. Aberrations in Ophthalmic lenses, Tilt induced power in spectacles lenses. 8. Magnification in high minus lenses.	8	CO4
5	Spectacles	1. History of spectacles, Nomenclature and terminology. 2. Classification of frames- Materials (in detail), Types and Parts of spectacle frames. 3. Spectacles frames –colors, sides and joints, Spectacle frame bridge. 4. Shapes of spectacle frames – advantages and disadvantages. 5. Special purpose frames – sports, kids, reading. 6. Datum System & Boxing System of Frame Measurement.	8	CO5

Reference Books:

1. David Wilson: Practical Optical Dispensing, OTEN- DE, NSW TAFE Commission, 1999.
2. C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth- Heinemann, USA, 1996.
3. Jalie M: The principles of Ophthalmic Lenses, The Association of Dispensing Opticians, London, 1994.

e-Learning Source:

1. <https://www.youtube.com/watch?v=xHb1vwAZswA>
2. <https://www.youtube.com/watch?v=jkaakYZZjbM>
3. <https://www.youtube.com/watch?v=AShrGxUjWuk>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	-	-	1	-	3	3	2	2	-	2	2	-	-	-	-	1
CO2	2	-	-	2	-	3	2	2	1	-	2	3	-	-	-	-	2
CO3	2	-	-	1	-	3	3	1	2	-	1	2	-	-	-	-	1
CO4	2	-	-	1	-	3	3	2	1	-	2	3	-	-	-	-	1
CO5	2	-	-	2	-	3	2	2	1	-	2	2	-	-	-	-	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation
Attributes & SDGs



Integral University, Lucknow

Course Code	Course Title	Attributes							SDGs No.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
BO111	OPTOMETRIC OPTICS-I	√	√	√	√		√	√	3,4



Integral University, Lucknow

Effective from Session: 2019-20

Effective from Session: 2019-20							
Course Code	BO112	Title of the Course	MEDICAL LAW & ETHICS	L	T	P	C
Year	I	Semester	I	2	1	0	3
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.						

Course Outcomes	
CO1	Students will abide by the rule and regulation of the medicine and have abundant knowledge on professional attitude and communication among the colleague and patients.
CO2	Students will abide by the rule and regulation of the medicine and have abundant knowledge on professional attitude and communication among the colleague and patients.
CO3	Students will abide by the rule and regulation of the medicine and have abundant knowledge on professional attitude and communication among the colleague and patients.
CO4	Students will abide by the rule and regulation of the medicine and have abundant knowledge on professional attitude and communication among the colleague and patients..
CO5	Students will abide by the rule and regulation of the medicine and have abundant knowledge on professional attitude and communication among the colleague and patients.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	MEDICAL ETHICS	1. Medical ethics, Definition, Goal, Scope. 2. Introduction to Code of conduct. 3. Basic principles of medical ethics, Confidentiality. 4. Malpractice and negligence, Rational and irrational drug therapy.	6	CO1
2	RIGHT OF PATIENT	1. Autonomy and informed consent. 2. Right of patients Care of the terminally ill 3. Euthanasia Organ transplantation, ethics and law	6	CO2
3	MEDICO LEGAL ASPECTS	1. Medico legal aspects of medical records, Medico legal case and type. 2. Records and document related to MLC ownership of medical records. 3. Confidentiality Privilege communication, Release of medical information. 4. Unauthorized disclosure, retention of medical records, other various aspects	6	CO3
4	PROFESSIONAL INDEMNITY INSURANCE POLICY	1. Professional Indemnity insurance policy. 2. Development of standardized protocol to avoid near miss or sentinel events obtaining aninformed consent.	6	CO4
5	EMERGENCY CARE AND LIFE SUPPORT	1. Basics of emergency care and life support skill. 2. Vital signs and primary assessment, Basic emergency care, first aid and triage. 3. Ventilations including use of bag-valve-masks (BVMs), Choking, rescue breathing methods. 4. One and Two rescuer CPR, using an AED (Automated external defibrillator), Managing an emergency including moving a patient.	6	CO5

Reference Books:

1. Kennedy I, Grubb A. Medical law. London: Butterworths; 2000.
2. Jackson E. Medical law: text, cases, and materials. Oxford University Press.
3. Recent Trends in Medical Imaging (CT, MRI and USG).
4. Bontrager KL, Lampugnano J. Bontrager's Handbook of Radiographic Positioning and Techniques-E-BOOK. Elsevier Health Sciences; 2017 Feb 10.
5. Frank ED, Long BW, Smith BJ. Merrill's Atlas of Radiographic Positioning and Procedures-E-Book. Elsevier Health Sciences; 2013 Aug 13.

e-Learning Source:

1. <https://www.karger.com/Article/FullText/509119>
2. <https://www.gov.uk/government/publications/nhs-screening-programmes-duty-of-candour/medico-legal-aspects>
3. [https://www.physio-pedia.com/Basic_Life_Support_\(BLS\)](https://www.physio-pedia.com/Basic_Life_Support_(BLS))

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	-	-	2	-	2	-	-	-	2	-	-	-	-	-
CO2	-	-	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-
CO3	-	-	-	-	-	2	-	1	-	1	-	2	-	-	-	-	-
CO4	-	-	-	-	-	2	2	-	-	-	-	2	-	-	-	-	-
CO5	-	-	-	-	-	2	1	1	-	-	1	2	-	-	-	1	1

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Course Code		Course Title		Attributes & SDGs						SDGs No.	
				Attributes							
BO112		MEDICAL LAW & ETHICS		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	3,4, 11
						√					



Integral University, Lucknow

Effective from Session: 2019-20

Effective from Session: 2019-20							
Course Code	BO113	Title of the Course	NUTRITION AND EYE	L	T	P	C
Year	I	Semester	II	2	1	0	3
Pre-Requisite	NIL	Co-requisite	Nil				
Course Objectives	At the end of the course student would have gained the knowledge of the following: • Balanced diet. • Protein, carbohydrates, vitamins, Minerals, carotenoids and eye. • Nutrition and Ocular aging • Adverse effects of ocular nutritional supplements.						

Course Outcomes

CO1	Understanding the concept of Food, Nutrition and Recommended Dietary Allowances.
CO2	Understanding the concept of Emery requirement and Value of food.
CO3	Analyzing the daily requirement of different food and nutrients.
CO4	Applying the knowledge to estimate daily requirement of various Marco and micro elements for Ocular Health.
CO5	Understanding and applying the concept of Nutrition in RDA in Various Eye disease due to deficiency.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	INTRODUCTION TO NUTRITION	1. History of Nutrition. 2. Nutrition as a science. 3. Food groups, RDA. 4. Balanced diet, diet planning. 5. Assessment of nutritional status.	6	CO1
2	ENERGY	1. Units of energy. 2. Measurements of energy and value of food. 3. Energy expenditure. 4. Total energy/calorie requirement for different age groups and diseases. 5. Satiety value. 6. Energy imbalance- obesity, starvation. 7. Limitations of the daily food guide.	6	CO2
3	PROTEINS	1. Sources and functions 2. Essential and non- essential amino- acids 3. Incomplete and complete proteins 4. Supplementary foods 5. PEM and the eye 6. Nitrogen balance. 7. 7. Changes in protein requirement	6	CO3
4	FATS & MINERALS	1. Sources and functions. 2. Essential fatty acids. 3. Excess and deficiency. 4. Lipids and the eye. 5. Hyperlipidemia, heart diseases, atherosclerosis. 6. Minerals. 7. General functions and sources. 8. Macro and micro minerals associated with the eye. 9. Deficiencies and excess—ophthalmic complications (e.g., iron, calcium, iodine etc.).	6	CO4
5	VITAMINS	1. General functions, and food sources. 2. Vitamin deficiencies and associated eye disorders with particular emphasis to Vitamin A. 3. Promoting sound habits in pregnancy, lactation and infancy. 4. Nutrient with antioxidant. 5. Properties. 6. Digestion of Proteins, carbohydrates & lipids.	6	CO5

Reference Books:

1. M Swaminathan: Hand book of Food and Nutrition, fifth edition, Bangalore printing & publishing Co. Ltd, Bangalore, 2004.
2. C Gopalan, BV Rama Shastri, 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.

e-Learning Source:

1. <https://www.youtube.com/watch?v=nOLq4JtUv9o>
2. <https://www.youtube.com/watch?v=E4RiaAHhKvM>
3. <https://www.youtube.com/watch?v=0YN0tclndsk>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	1	2	-	-	-	1	1	1	-	3	2	2	1	1	1
CO2	1	3	2	2	-	-	-	1	1	1	-	3	2	2	1	1	1
CO3	1	3	1	2	-	-	-	1	1	1	-	3	2	1	1	1	1
CO4	2	3	1	2	-	-	-	1	1	1	-	3	2	2	1	1	1
CO5	1	3	1	2	-	-	-	1	1	1	-	3	2	1	1	1	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
BO113	NUTRITION AND EYE	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	



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		√	√	√	√		√	√	3,4
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Integral University, Lucknow

Effective from Session: 2023-24

Effective from Session: 2023-24							
Course Code	BO114	Title of the Course	OCULAR ANATOMY- LAB	L	T	P	C
Year	I	Semester	II	0	0	2	1
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	At the end of the course student would have gained the knowledge of the Coats of the Eyeball, the anterior and posterior chambers and segments, the Ocular Adnexa and Ocular Movements.						

Course Outcomes

CO1	Understanding concepts and theories normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa.
CO2	Identifying the microscopic structures of various tissues in the eye and correlate the structure with the functions.
CO3	Identifying 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.
CO4	Understanding the basic principles of ocular embryology.
CO5	Understanding the Milestone of the Visual System.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1.	VISUAL DEVELOPMENT OCULAR ADNEXA ANTERIOR SEGMENT CHAMBER OF EYE POSTERIOR SEGMENT	1. Dissection of the Bull's Eye	6	CO1
		2. Layers of Tear Film		
		3. Layers of Cornea		
2.		4. Parts of the Crystalline Lens	6	CO2
		5. Anatomy of Vitreous		
		6. Parts of Uvea		
3.		7. Layers of Retina	6	CO3
		8. Blood Supply to the Various structures of the Eye.		
4..		9. Nerve Supply to the Eye	6	CO4
		10. Extra Ocular Muscles		
5.		11. Demonstration of Orbital Structure	6	CO5

Reference Books:

1. Principles of Anatomy & Physiology – Tortora Gerard J.
2. Chaurasia's, A Text Book of Anatomy.
3. Ranganathan, T.S., A Text Book of Human Anatomy
4. Fattana, Human Anatomy, (Description and Applied), Saunders's & C P Prism Publishers, Bangalore.
5. Ester. M. Grishcimer, Physiology & Anatomy with Practical Considerations, J.P. Lippin Cott. Philadelphia.

e-Learning Source:

- 1 <https://youtu.be/USQsEPot-yE>
- 2 <https://youtu.be/8GpDRSWUnFs>
- 3 https://youtu.be/WcB6_IX3pS4

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	1	2	-	-	-	1	2	-	-	2	2	1	-	1	1
CO2	1	3	1	3	-	-	-	1	3	-	-	3	3	2	-	1	1
CO3	1	3	1	2	-	-	-	1	2	-	-	2	3	1	-	1	1
CO4	1	3	1	2	-	-	-	1	3	-	-	3	2	1	-	1	1
CO5	1	3	1	2	-	-	-	1	2	-	-	2	2	1	-	1	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
BO114	OCULAR ANATOMY- LAB	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	3,4
		√	√	√	√		√	√	



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Effective from Session: 2019-20							
Course Code	BO115	Title of the Course	OCULAR PHYSIOLOGY- LAB	L	T	P	C
Year	I	Semester	II	0	0	2	1
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	At the end of the course, the student should be able to:						
	<ul style="list-style-type: none">• Explain the normal functioning of all structures of the eye and their interactions.• Elucidate the physiological aspects of normal growth and development of the eye.• Understand the phenomenon of vision.• List the physiological principles underlying pathogenesis and treatment of diseases of the eye.						

Course Outcomes: After the successful course completion, learners will develop following attributes: Physiology of Tear film, Cornea, Lens, Retina and the Visual Pathway.	
CO1	Understanding concepts & terminology of Ocular physiology
CO2	Understanding the function of Protective Mechanism of the Eye
CO3	Understanding function of various ocular structures and applying to understand Ocular Disease
CO4	Identifying and explaining the interrelationships between the function of various structures
CO5	Understanding the concept of Binocular Vision and its grades.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	EYE PROTECTIVE MECHANISM OCULAR MECHANISM VISUAL MECHANISM VISUAL SENSITIVITY OCULAR MOVEMENT	1. Lid movements	6	CO1
		2. Tests for lacrimation tests		
		3. Extra ocular movements		
2		4. Break up time	6	CO2
		5. Pupillary reflex		
		6. Applanation tonometry		
3		7. Schiottz tonometry.	6	CO3
		8. Measurement of accommodation and convergence		
		9. Visual acuity measurement.		
4		10. Direct ophthalmoscope	6	CO4
		11. Indirect ophthalmoscopy		
5		12. Retinoscopy	6	CO5
		13. Light and dark adaptation.		
		14. Binocular vision (Stereopsis)		

Reference Books:

1. AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New .Delhi, 2006
2. RD Ravindran: Physiology of the eye, Arvind eye hospitals, Pondicherry, 2001.
3. PL Kaufman, A Alm: Adler's Physiology of the eye clinical application, 10th edition, Mosby, 2002.

e-Learning Source:

1. <https://youtu.be/GOMU2NUg97g>
2. <https://youtu.be/jW7ADI7rLMc>
3. <https://youtu.be/IWKkHWWDIIEI>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	-	2	1	-	-	-	1	1	-	1	2	1	3	2	1
CO2	1	3	-	2	-	-	-	-	1	-	-	1	2	1	3	2	1
CO3	2	3	-	2	-	-	-	-	1	1	-	1	2	1	3	2	1
CO4	1	3	-	1	-	-	-	-	1	-	-	1	2	1	3	2	1
CO5	2	3	-	1	-	-	-	-	1	-	-	1	2	1	3	2	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
BO115	OCULAR PHYSIOLOGY- LAB	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	3,4
		√	√	√	√		√	√	



Integral University, Lucknow

Effective from Session: 2019-20

Course Code	BO116	Title of the Course	OCULAR BIOCHEMISTRY- LAB	L	0	T	0	P	2	C	1
Year	I	Semester	II								
Pre-Requisite	Nil	Co-requisite	Nil								
Course Objectives	At the end of the course, the student should be able to demonstrate his knowledge and understanding on 1. Structure, function and interrelationship of biomolecules and consequences of deviation from the normal. 2. Integration of various aspects of metabolism and their regulatory pathways. 3. Principles of various conventional and specialized laboratory. 4. Investigations and instrumentation, analysis and interpretation of a given data. 5. Understand metabolic processes taking place in different ocular structures.										

Course Outcomes: After the successful course completion, learners will develop following attributes: Various aspects of Ocular Biochemistry

CO1	Understanding the Practical concepts of Ocular Biochemistry
CO2	Understanding the chemistry of carbohydrates, proteins, lipids and amino acids related to eye
CO3	Understanding the basic metabolism of biomolecules related to eye
CO4	Understanding the role of Minerals with respect to eyes
CO5	Understanding the process of biochemical testing and analyzing the test result.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Biochemistry of Tear Meniscus Biochemistry of Cornea Biochemistry of Crystalline Lens Photo-receptors Monosaccharides	1. Quantitative analysis.	6	CO1
2		2. Abnormal constituents in urine, sugar proteins, ketones, blood and bile salts	6	CO2
3		3. Techniques of detection of abnormal constituents of urine.	6	CO3
4		4. Electrophoresis • Chromatography • Preparation of normal, molar and percentage solutions. • Preparation of buffers, pH determination	6	CO4
5		5. Demonstration • Estimation of blood cholesterol • Estimation of alkaline phosphatase. • Salivary amylase (effect of ph., etc.) • Milk analysis	6	CO5

Reference Books:

1. Fundamentals of Biochemistry-by Dr. Deb Jyoti Das.
2. Biochemistry-by-Dr. Satyanarayana.
3. Textbook of Medical Biochemistry -Chatterjee and Shinde

e-Learning Source:

1. <https://www.youtube.com/watch?v=7ZFr9xiAt94>
2. <https://www.youtube.com/watch?v=OZENK4UeE80>
3. <https://www.youtube.com/watch?v=7ZFr9xiAt94>

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	-	2	1	-	-	-	1	1	-	1	2	1	3	2	1
CO2	1	3	-	2	-	-	-	-	1	-	-	1	2	1	3	2	1
CO3	2	3	-	2	-	-	-	-	1	1	-	1	2	1	3	2	1
CO4	1	3	-	1	-	-	-	-	1	-	-	1	2	1	3	2	1
CO5	2	3	-	1	-	-	-	-	1	-	-	1	2	1	3	2	1

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
BO116	OCULAR BIOCHEMISTRY- LAB	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	3,4
		√	√	√	√		√	√	



Integral University, Lucknow

Effective from Session: 2019-20							
Course Code	BO117	Title of the Course	OPTOMETRIC OPTICS- I LAB	L	T	P	C
Year	I	Semester	II	0	0	2	1
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	Skills/knowledge to be acquired at the end of this course:						
	<ul style="list-style-type: none">• Measurement of lens power, lens centration using conventional techniques• Transposition of various types of lenses • Knowledge to identify different forms of lenses (equi-convex, planoconvex, periscopic, etc.)• Knowledge to select the tool power for grinding process• Measurement of surface powers using lens measure• Method of laying off the lens for glazing process• Ophthalmic prism knowledge – effects, units, base-apex notation, compounding and resolving prisms.						

Course Outcomes: After the successful course completion, learners will develop following attributes: various aspects of Light and its properties related to Eye, The properties, types and manufacturing of Ophthalmic Lens and spectacles.	
CO1	Understanding the concept and application of Light.
CO2	Understanding the concept & terminology use to describe the ophthalmic lenses
CO3	Understanding the concept of different types & design of ophthalmic lenses
CO4	Understanding the concept of Prismatic effect
CO5	Applying the Prentice's Rule

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	LIGHT AND ITS PROPERTIES TYPES OF LENSES PROPERTIES OF LENSES PRISMS SPECTACLES	1. Prescription laboratory in action 2. Instruments for making lenses 3. Outline of lens surfacing and polishing	6	CO1
2		1. Recording and ordering of Ophthalmic lenses 2. Terminology used in Lens workshops 3. Manufacturing of Ophthalmic blanks – Glass & Plastic	6	CO2
3		1. Glass lenses – material types and characteristics 2. Glass working – spherical surfaces 3. Glass working – Toric and Aspherical	6	CO3
4		1. ISI Standards for lenses 2. Ophthalmic lens designs – best form lenses 3. Design of high-powered lenses	6	CO4
5		1. Bifocal design and manufacture 2. Faults in lenses – description 3. Faults in lenses – detection	6	CO5

Reference Books:

1. Jalie M: The principles of Ophthalmic Lenses, The Association of Dispensing Opticians, London, 1994.
2. David Wilson: Practical Optical Dispensing, OTEN- DE, NSW TAFE Commission, 1999.
3. C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth-Heinemann, USA, 1996.

e-Learning Source:

1. <https://www.youtube.com/watch?v=xHb1vwAZswA>
2. <https://www.youtube.com/watch?v=jkaakYZZjbM>
3. <https://www.youtube.com/watch?v=AShrGXujWuk>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	-	2	1	-	-	-	1	1	-	1	2	1	3	2	1
CO2	1	3	-	2	-	-	-	-	1	-	-	1	2	1	3	2	1
CO3	2	3	-	2	-	-	-	-	1	1	-	1	2	1	3	2	1
CO4	1	3	-	1	-	-	-	-	1	-	-	1	2	1	3	2	1
CO5	2	3	-	1	-	-	-	-	1	-	-	1	2	1	3	2	1

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	Course Title	Attributes								SDGs No.
BO117	OPTOMETRIC OPTICS-	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics		

	I LAB	√	√	√	√		√	√	3,4
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