

**STUDY & EVALUATION SCHEMES  
OF  
BACHELOR OF OPTOMETRY (BO)  
(BO - I SEMESTER)**

[Applicable w.e.f. Academic Session 2020-21]



**INTEGRAL UNIVERSITY, LUCKNOW**  
DASAULI, P.O. BAS-HA KURSI ROAD, LUCKNOW – 226026

Website: [www.iul.ac.in](http://www.iul.ac.in)

Syllabus approved by Board of Study, Faculty Board, Academic Council, Executive Council of the Integral University, Lucknow

**INTEGRAL UNIVERSITY, LUCKNOW**  
**INTEGRAL INSTITUTE OF ALLIED HEALTH SCIENCES & RESEARCH**  
**DEPARTMENT OF PARAMEDICAL & HEALTH SCIENCES**

**STUDY & EVALUATION SCHEME**  
**BACHELOR OF OPTOMETRY (BOPTM)**  
**(w.e.f. July 2020)**

**I-Year**

**I-Semester**

S. No	Code	Name of the Subject	Periods			Credits	Evaluation Scheme				Subject Total
			L	T	P		C	Sessional		Exam	
						CT		TA	Total	ESE	
1.	BO101	General Anatomy	2	1	0	3	40	20	60	40	100
2.	BO102	General Physiology	2	1	0	3	40	20	60	40	100
3.	BO103	General Biochemistry	2	1	0	3	40	20	60	40	100
4.	BO104	Community Health Care Issues	2	1	0	3	40	20	60	40	100
5.	PY111	Geometrical Optics	2	1	0	3	40	20	60	40	100
6.	LN101	Basic Professional Communication	2	1	0	3	40	20	60	40	100
7.	CS103	Introduction to Computers	2	1	0	3	40	20	60	40	100
8.	BO105	General Anatomy - Lab	0	0	2	1	40	20	60	40	100
9.	BO106	General Physiology - Lab	0	0	2	1	40	20	60	40	100
10.	BO107	General Biochemistry - Lab	0	0	2	1	40	20	60	40	100
11.	PY112	Geometrical Optics- Lab	0	0	2	1	40	20	60	40	100
		<b>Total</b>	<b>14</b>	<b>07</b>	<b>08</b>	<b>25</b>	<b>440</b>	<b>220</b>	<b>660</b>	<b>440</b>	<b>1100</b>

**L:** Lecture      **T:** Tutorials      **P:** Practical      **C:** Credit      **CT:** Class Test

**TA:** Teacher Assessment      **ESE:** End Semester Examination

**Sessional Total:** Class Test + Teacher Assessment

**Subject Total:** Sessional Total + End Semester Examination (ESE)

**SUBJECT NAME: GENERAL ANATOMY**  
**SUBJECT CODE: BO101**  
**(w.e.f July 2020)**

**L T P**  
**2 1 0**

**UNIT-I: GENERAL ANATOMY:**

**(6 hours)**

1. Introduction and subdivisions of Anatomy
2. Anatomical nomenclature :
  - a. Terms of Planes, Positions
  - b. Body parts and movements.
3. Basic tissues of the body:
  - a. Definition, location and their function

**UNIT-II: OSTEOLOGY & ARTHROLOGY (Brief)**

**(7 hours)**

1. Introduction, axial & appendicular skeleton, classification of bone based on shape and structure, structure of growing and adult long bone, ossification of bone, Types of cartilage, their characteristics features with example.
2. Introduction to Arthrology: Definition and classifications of joints with example. Details of synovial joint - characteristics features, type with example, close pack and loose pack position.

**UNIT-III: SYSTEMIC ANATOMY**

**(7 hours)**

1. Brief About Myology: Classification of muscles and its characteristics features, Gross features of skeletal muscle, classification of muscle according to shape and fascicular architecture, action of muscles.
2. Brief About Neurology: Subdivision of nervous system, structural organization of nervous system including types of neurons, ganglion. Introduction to spinal nerves, cranial nerves and autonomic nervous system.
3. Brief About Cardiovascular System: Components of CVS, types of anastomoses, types of circulation, components of lymphatic systems and its functions.

**UNIT-IV: SUPERIOR EXTREMITY**

**(10 hours)**

1. Surface landmarks and Introduction to superior extremity.
2. Brief about Muscles and fascia, Pectoral region: Pectoral muscles, Scapular region and Back, Muscles of Arm, Forearm and Hand:
3. Brief about Joints of superior extremity: Brief of shoulder joint, brief account of elbow joint & wrist joint and radioulnar joint.

**UNIT-V- INFERIOR EXTREMITY**

**(10 hours)**

1. Introduction and surface landmarks of lower extremity.
2. Brief about Muscles and fascia: Thigh: Brief account of thigh muscles.
3. Brief about Gluteal region: Muscles of gluteal region,
4. Compartment of leg, name of the muscles of leg, their action and nerve supply,
5. Brief about Joints: Details of Hip and Knee joint, subtalar, tibiofibular joints.

**RECOMMENDED 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), Saunder's & C P Prism Publishers, Bangalore.
5. Ester. M. Grishcimer, Physiology & Anatomy with Practical Considerations, J.P. Lippin Cott. Philadelphia.

**SUBJECT NAME: GENERAL PHYSIOLOGY**  
**SUBJECT CODE: BO102**  
**(w.e.f July 2020)**

**L T P**  
**2 1 0**

**UNIT I-GENERAL AND CELL PHYSIOLOGY**

**(8Hours)**

- a. Cell and cell division- Structure, Function and classification of cell
- b. Cellular Movements: Endocytosis and Exocytosis, Molecules of cell
- c. Transport across the cell membrane, Homeostasis
- d. Diffusion, Osmosis, Bonding, Filtration, Dialysis, Surface Tension, Adsorption, Colloid

**UNIT II- BLOOD**

**(8Hours)**

- a. Introduction of blood, Composition and function of blood, Blood cells morphology and development.
- b. Blood cells types and function, Composition and function of blood plasma and Blood clotting factor, Haemoglobin-structure, normal content, function, types. Erythropoiesis.
- 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.

**UNIT III- RESPIRATION**

**(8Hours)**

- a. Respiratory System Introduction, Structure, Function and Mechanics of Breathing
- b. Respiration measures (Vital capacity, Total Volume, Reserve volume, Total lung capacity), Mechanism of respiration
- c. Regulation of respiration, pulmonary function test, physiological changes in altitude & acclimatization, hypoxia

**UNIT IV- CARDIOVASCULAR SYSTEM**

**(8Hours)**

- a. Basic Physiology of Heart, Blood circulation, Arteries and veins, properties and structure of heart muscle.
- b. Cardiac Cycle and heart sounds.
- c. Conductive system of heart, Blood Pressure definition, Regulation factor affecting blood Pressure.

**UNIT V- DIGESTIVE SYSTEM**

**(8Hours)**

- a. Digestive system introduction, structure and function
- b. Basic physiology of organs of digestive systems (Salivary glands, Gastric glands, Pancreas, Liver, Gall bladder).
- c. Composition and function of all digestive juices, Digestion and Absorption of carbohydrate, fat and proteins.

**RECOMMENDED 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 Publishers

**SUBJECT NAME: GENERAL BIOCHEMISTRY**  
**SUBJECT CODE: BO103**  
**(w.e.f July 2020)**

**L T P**  
**2 1 0**

**UNIT-I CELL & CHEMISTRY OF BIMOLECULES: (10 Hours)**

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.

**UNIT-II CARBOHYDRATE: (08 Hours)**

Definition, Classification & Metabolism Glycolysis. Citric Acid cycle, Gluconeogenesis, glycogenesis, Glycogenolysis, Pentose Phosphate Pathway. Blood Sugar level & its homeostasis, glucose tolerance & glycosuria.

**UNIT-III NUCLEIC ACID: (06 Hours)**

Brief about structure of DNA & RNA, DNA Replication, & Transcription, Advances in Genetic Engineering.

**UNIT-IV VITAMINS (FAT & WATER SOLUBLE) & ENZYMES & HORMONES:**

1. **VITAMINS (FAT & WATER SOLUBLE) (06 Hours)**  
Definition, classification, functions dietary sources, daily requirement & Deficiency disorders.
2. **ENZYMES & HORMONES: (10 Hours)**  
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.

**UNIT-V NUTRITION & SPECIAL TOPICS: (10 Hours)**

1. Introduction of Nutrition, Nutrients of their role in human, Nutritional requirements, Balance diet, Nutritional disorder, SDA (special dynamic action).
2. Respiratory quotient (RQ) & Basal Metabolism rate (BMR). Water electrolyte balance & acid base balance.

**RECOMMENDED BOOKS**

1. Fundamentals of Biochemistry-by Dr. Deb Jyoti Das,
2. Biochemistry-by-Dr Satyanarayan
3. Textbook of Biochemistry –Chatterje and Shinde

**SUBJECT NAME: COMMUNITY HEALTH CARE ISSUES**  
**SUBJECT CODE: BO104**  
**(w.e.f July 2020)**

**L T P**  
**2 1 0**

**UNIT I- BASIC CONCEPTS OF COMMUNITY HEALTHCARE (6Hours)**

- a. Definition of Health, Determinants of Health, Health Indicators of India, Health Team Concept
- b. National Health Policy, National Health Programmes (Briefly Objectives and Scope)
- c. Population of India and Family welfare programme in India
- d. Health problem in India, Environment and health

**UNIT II- FAMILY (6Hours)**

- a. Family, meaning and definitions, Functions of types of family, changing family patterns
- b. Influence of family on Individuals Health, family and nutrition
- c. Effects of sickness in the family and psychosomatic disease
- d. Concepts of joint family

**UNIT III- COMMUNITY (6Hours)**

- a. Rural community, Meaning and features
- b. Health hazards to rural communities
- c. Health hazards to tribal community
- d. Urban community, Meaning and features, Health hazards of urbanities

**UNIT IV- CULTURE AND HEALTH DISORDERS (6Hours)**

- a. Social Change: Meaning of social changes, Factors of social changes
- b. Human adaptation and social changes, social changes and stress
- c. Social changes and deviance, Social changes and health programme
- d. Role of social planning in the Improvement of health and rehabilitation

**UNIT V- OBJECTIVE AND ORGANIZATION OF IMPORTANT AGENCIES (6Hours)**

- a. WHO, UNICEF, FAO, ILO
- b. Indian Red cross Society
- c. UNFPA, World Bank
- d. Ford foundation, Rockefeller foundation

**RECOMMENDED BOOKS:**

1. K. Perks, Sunder Lal, Adarsh Pandey, Textbook of Preventive Social Medicine

**SUBJECT NAME: GEOMETRICAL OPTICS**  
**SUBJECT CODE: PY111**  
**(w.e.f July 2020)**

**L T P**  
**3 1 0**

**Objective:** 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.

Unit	Syllabus	No. of Lectures
<b>UNIT I: Elementary Concepts of Light</b>	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, vergence equation, focal points, image point, lateral & axial magnification, Optical Path, Fermat's principle and its application to obtain laws of reflection and refraction.	8
<b>UNIT II: Prisms</b>	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.	8
<b>UNIT III: Thin and Thick Lenses</b>	<b>Thin Lens:</b> Shapes, derivation of lens makers' formula, thin lens vergence 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. <b>Thick Lens:</b> Cardinal points & planes, front & back vertex power, dioptric powers of equivalent lenses.	8
<b>Unit IV: Spherical and Cylindrical Lenses</b>	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 in contact.	8
<b>UNIT V: Aberrations and Illumination</b>	<b>Aberrations in lenses:</b> Spherical aberration, coma, astigmatism, chromatic aberration, Aberration free lenses. <b>Illumination:</b> Luminous flux, candela, solid angle, illumination, utilization factor, depreciation factor, and illumination laws, measurement of illumination.	8

**Recommended Books:**

1. A. 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. Smith and Thomson, *Optics*, John Wiley and Sons, 1973.
6. Brijlal, Subrahmanyam and Avadhanulu, *A Text book of Optics*, S. Chand, 2014.

**SUBJECT NAME: BASIC PROFESSIONAL COMMUNICATION**  
**SUBJECT CODE: LN101**

L T P  
2 1 0

**UNIT- I- PROFESSIONAL COMMUNICATION (6Hours)**

- a. Professional Communication: Meaning & importance
- b. Essentials of Effective Communication
- c. Barriers to Effective Communication

**UNIT- II- LANGUAGE THROUGH LITERATURE (6Hours)**

- a. Essays:
  - “The Effect of the Scientific Temper on Man” by Bertrand Russell
  - “The Aims of Science and Humanities” by Moody E. Prior
- b. Short Stories:
  - “The Meeting Pool” by Ruskin Bond
  - “The Portrait of a Lady” by Khushwant Singh

**UNIT- III- BASIC VOCABULARY (6Hours)**

- a. Euphemism, One-word Substitution, Synonyms, Antonyms
- b. Homophones, Idioms and Phrases, Common mistakes
- c. Confusable words and expressions

**UNIT- IV- BASIC GRAMMAR (6Hours)**

- a. Articles, Prepositions, Tenses
- b. Concord (Subject-Verb agreement), Verbs: kinds & uses
- c. Degrees of Comparison

**UNIT- V- BASIC COMPOSITION (6Hours)**

- a. Report writing: What is a report? Kinds and objectives of reports, writing reports
- b. Business Letter writing: Introduction to business letters, types of business letters, Layout of business letters, Letter of Enquiry / Complaint

**RECOMMENDED BOOKS:**

1. Lata , Pushp & 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)



**SUBJECT NAME: INTRODUCTION TO COMPUTERS**  
**SUBJECT CODE: CS103**

**L T P**  
**2 1 0**

**UNIT-I COMPUTER FUNDAMENTALS: (6 Hours)**

What is a computer? Components of a computer system. Classification of computers. Types of computers. Brief history of evolution of computers and generation of computers. Computer hardware and software. Input/ Output devices.

**UNIT-II DOS: (7 Hours)**

Elementary knowledge of DOS commands DIR, CLS, DATE, TIME, MD, CD, RD, RENAM, DEL, BACKUP, RESTORE, COPY, SCANDISK, CHKDSK.

**UNIT-III WINDOWS: (8 Hours)**

Difference between windows and DOS. Basic Features - Date, Time, Time Zone, Display, Screen Saver, Fonts, Mouse, and mouse pointers. Using accessories such as calculator, paint brush, CD player, etc. Use of Windows Explorer for moving and copying files. Introduction to MS-Office and its integrated nature.

**UNIT-IV MS-WORD: (7 Hours)**

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 printing a document. Mail merge: creating main document and data source. Adding and removing fields from data source.

**UNIT-V POWER POINT (PRESENTATION SOFTWARE): (7 Hours)**

Basic concept of presentation software. Standard, Formatting, and drawing toolbars in power point 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.

**RECOMMENDED 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

**SUBJECT NAME: GENERAL ANATOMY- LAB**  
**SUBJECT CODE: BO105**  
**(w.e.f July 2020)**

**L T P**  
**0 0 2**

**CONTENTS:**

1. Identification and description of all Anatomical structures
2. The learning of Anatomy is by demonstration only through dummy dissected parts, slides, models, charts etc.
3. Demonstration of dummy dissected parts (upper extremity, lower extremity, thoracic & abdominal viscera, face and brain)
4. Demonstration of skeleton - articulated and disarticulated
5. Demo of all bones showing its parts, radiographs of normal bones & joints.  
Demonstration of all muscles of the body
6. Demonstration of heart and vessels in the body
7. Demonstration of parts of respiratory system, Normal radiographs of chest.
8. Demonstration of all plexuses and nerves in the body.
9. Demonstration of all part of brain

**RECOMMENDED 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), Saunder's & C P Prism Publishers, Bangalore.
5. Ester. M. Grishcimer, Physiology & Anatomy with Practical Considerations, J.P. Lippin Cott. Philadelphia.

**SUBJECT NAME: GENERAL PHYSIOLOGY- LAB**  
**SUBJECT CODE: BO106**  
**(w.e.f July 2020)**

**L T P**  
**0 0 2**

**CONTENTS:**

1. Measurement of Pulse rate, Heart rate, Blood Pressure.
2. Auscultation for Heart Sounds and Normal Respiratory sounds.
3. Introduction of Microscope, Identification of blood cells by study of peripheral blood smears.
4. D.L.C Differential Leucocytes count.
5. T.L.C Total Leukocytes Count.
6. R.B.C. Count.
7. Estimation of Haemoglobin.
8. Estimation of bleeding time & clotting time.
9. Blood Group, ABO and Rh factor.
10. Haemoglobinometry, various methods of estimation of Hb, errors involved and standardization of instrument for adaptation for Hb estimation.

**RECOMMENDED 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 Publishers

**SUBJECTS NAME: GENERAL BIOCHEMISTRY- LAB**  
**SUBJECT CODE: BO107**  
**(w.e.f July 2020)**

**L T P**  
**0 0 2**

**CONTENTS:**

1. Basic Introduction, Safety in clinical biochemistry, Laboratory Sample collection, specimen, labelling and routine tests
2. Cleaning of laboratory Glassware, Composition of Glassware and General Glassware.
3. Qualitative estimation of carbohydrates
  - a) Benedict's test
  - b) Molishs
  - c) Phenol Sulfuric Acid
4. Quantitative estimation of proteins.
  - a) Lowry Method
  - b) Bradford test
- 5. Quantitative Estimation of**
  - a) Glucose concentration
  - b) Urea concentration
  - c) Cholesterol Concentration
- 6. Chromatography**
  - a) TLC (Thin layer chromatography) & Paper chromatography

**BOOKS RECOMMENDED:**

1. Fundamentals of Biochemistry-by Dr. Deb Jyoti Das,
2. Biochemistry-by-Dr Satyanarayan
3. Textbook of Medical Biochemistry -Chatterje and Shinde

**SUBJECT NAME: GEOMETRICAL OPTICS LAB**

**SUBJECT CODE: PY112**

**(w.e.f July 2020)**

**L T P**

**0 0 2**

1. Determination of the focal length & hence the power of a convex lens by displacement method.
2. Determination of the refractive index of a transparent liquid by using a traveling microscope.
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.
5. Determination of the focal length of a concave mirror by graphical method.
6. To draw  $i-\delta$  curve of a prism by a spectrometer & hence to find out the angle of minimum deviation.
7. Determination of dispersive power of a prism.
8. Determination of radius of curvature of given lens by using spherometer and to verify lens maker's formula.
9. Determination of refractive index of water using laser.
10. To determine the focal length of combination of two lenses separated by a distance  $d$  with the help of a nodal slide and to verify the formula:

$$\frac{1}{F} = \frac{1}{F_1} + \frac{1}{F_2} - \frac{d}{F_1 F_2}$$