

Integral University, Lucknow

Department of Biosciences

B.Sc. (Life Sciences)

(2017-2018)

B. Sc. Life Sciences Semester - III

Course Code	Course Title	Type of Paper	Periods/Week			Evaluation Scheme				Subject Total	Credit Hours	Total Credit
			L	T	P	CT	TA	Total	ESE			
CH-215	Fundamentals of Physical Chemistry	Core	3	1	0	25	15	40	60	100	3:1:0	4
BS 112	Fundamentals of Biochemistry	Core	3	1	0	25	15	40	60	100	3:1:0	4
BS 203	Cell Biology & Genetics	Core	3	1	0	25	15	40	60	100	3:1:0	4
BS 221	Animal Diversity-II "Chordates"	Core	3	1	0	25	15	40	60	100	3:1:0	4
BS 222	Angiosperm Morphology and Taxonomy	Core	3	1	0	25	15	40	60	100	3:1:0	4
BS 223	Biochemistry and Animal Diversity Lab	Practical	0	0	6	25	15	40	60	100	0:0:3	3
BS 224	Elementary biology Lab	Practical	0	0	6	25	15	40	60	100	0:0:3	3
Total										700	26	26

B. Sc. Life Sciences Semester - IV

Course Code	Course Title	Type of Paper	Periods/Week			Evaluation Scheme				Subject Total	Credit Hours	Total Credit
			L	T	P	CT	TA	Total	ESE			
BS 202	Biophysical Chemistry	Core	3	1	0	25	15	40	60	100	3:1:0	4
BS 212	Molecular Biology	Core	3	1	0	25	15	40	60	100	3:1:0	4
BS 231	Ecology & Adaptation	Core	3	1	0	25	15	40	60	100	3:1:0	4
BS 232	Plant Physiology	Core	3	1	0	25	15	40	60	100	3:1:0	4
BS 233	Animal Physiology	Core	3	1	0	25	15	40	60	100	3:1:0	4
BS 234	Molecular Biology & Microbiology Lab	Practical	0	0	6	25	15	40	60	100	0:0:3	3
BS235	Physiology & Ecology Lab	Practical	0	0	6	25	15	40	60	100	0:0:3	3
			Total							700	26	26

INTEGRAL UNIVERSITY
Department of Biosciences

B.Sc. LS II yr
Subject Name: Fundamentals of Physical Chemistry

Semester: III 15
Subject Code: CH215
L T P
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UNIT-I **08**

Chemical kinetics: Rate of a reaction, factors influencing the rate of a reaction concentration, temperature, pressure, solvent, light, catalyst concentration dependence of rates, mathematical characteristics of simple chemical reactions- First & second order, half life. Determination of the order of reaction (integration method). Arrhenius equation, concept of activation energy.

UNIT-II **08**

Thermodynamics: Definition and explanation of terms - System, boundary, surroundings, Homogeneous and heterogeneous system, Isolated system, Closed system, Open system Intensive and extensive properties. First law of thermodynamics; Statement and equation - Cp, Cv relationship - calculation of W, Q, ΔE and ΔH for the expansion of ideal gases under reversible - isothermal and adiabatic conditions.

UNIT-III **08**

Electrochemistry: Galvanic cells, Electrode potential, Standard electrode potential, Nernt's equation, Electrochemical series and its applications; measurement of pH, Solubility and solubility product and its applications.

UNIT-IV **08**

Gaseous state: Ideal and real gases, Causes of deviation from ideal behaviour, van der Waal's equation and their limitations, Kinetic gas equation, deduction of gas laws from the kinetic gas equation, Kinds of velocities; average velocity, root mean square velocity, most probable velocity, Calculation of molecular velocities.

UNIT-V **08**

Colligative Properties: Lowering of vapour pressure, Raoult's law, Determination of molecular mass of solute from lowering of vapour pressure, Elevation of boiling point, Relation between elevation of boiling point and lowering of vapour pressure, Determination of molecular mass of solute from elevation of boiling point, Depression of freezing point, Relation between depression of freezing point and lowering of vapour pressure, Determination of molecular mass of solute from depression of freezing point, Osmosis and osmotic pressure, van't Hoff's equation.

Books recommended:

1. Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd.
2. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co.
3. Simplified course in Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd.
4. Atkin's Physical Chemistry, Atkin, Oxford Press.
5. Physical Chemistry, Vemulapalli, Prentice Hall of India
1. Modern Physical Chemistry, R.P. Rastogi et al. United Book Department, Allahabad.

INTEGRAL UNIVERSITY

Department of Biosciences

B.Sc. LS IIyr

Semester: III

Subject: FUNDAMENTALS OF BIOCHEMISTRY

Subject Code: BS112

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UNIT I- Introduction to Biomolecules. Carbohydrates: Structure, classification and properties of Monosaccharides, Disaccharides, and Polysaccharides (starch, glycogen, peptidoglycan, cellulose).

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UNIT II- Amino acids and Proteins: Structure, classification and properties of amino acids, peptide bond, proteins: primary, secondary (α -Helix, β -pleated sheet), tertiary and quaternary structures, Ramachandran plot, structure of hemoglobin and myoglobin.

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UNIT III – Lipids: Structure, function, classification and properties of Fatty acids, Glycerolipid, Cholesterol, Sphingolipid, phospholipids, lipoproteins, glycoproteins, isoprene

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UNIT IV- Nucleic acids: Purines and pyrimidines, nucleosides, nucleotides, polynucleotides, DNA types: A DNA, B DNA and Z DNA and their function, RNA types: mRNA, rRNA and tRNA and their function, Forces stabilizing nucleic acid structure.

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UNIT V- Structure, sources, dietary requirements, function and deficiency disorders of water (B, C) and fat soluble vitamins (A, D, E and K).

Suggested Reading:

1. Principles of Biochemistry- AlbertL. Lehninger CBS Publishers & Distributors
2. Biochemistry – Lubert stryer Freeman International Edition.
3. Biochemistry – Keshav Trehan Wiley Eastern Publications
4. Fundamentals of Biochemistry-J.L.Jain S.Chand and Company

INTEGRAL UNIVERSITY
Department of Biosciences

B.Sc. LS II yr
Subject Name: Cell Biology & Genetics

Semester: III
Subject Code: BS203

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UNIT I-Cell as a Basic unit of Living Systems: Discovery of cell, The Cell theory Ultrastructure of an eukaryotic cell – (both plant and animal cell). Structure and functions of cell organelles, Cytoskeletal structures (Microtubules, Microfilaments); cell motility.

8

UNIT II-Cell Division: Cell cycle, mitosis and meiosis, Membrane transport: active and passive transport, introduction to signal transduction and its molecular mechanism, cell senescence, Programmed Cell Death.

8

UNIT III-Chromosomes: Structural Organization: centromere, telomere, chromonema, euchromatin and heterochromatin, chemical composition and karyotype, nucleosome model, Special types of chromosomes: Salivary gland and Lampbrush chromosomes, Chromosomal Variations, Chromosome mapping, structural and numerical aberrations.

8

UNIT IV-Mendelism: Mendel's laws of heredity, Test cross, Incomplete dominance and simple problems, Interaction of Genes: Supplementary factors, Comb pattern in fowls, Complementary genes: Flower color in sweet peas, Multiple factors: Skin color in human beings, Epistasis: Plumage colour in poultry, Multiple allelism: Blood groups in human beings, Concepts of allosomes and autosomes, XX-XY, XX-XO, ZW-ZZ, ZO-ZZ type, Linkage and Crossing Over, Mechanism and importance.

8

UNIT V-Mutations: Spontaneous and induced mutations, Physical and chemical mutagens, Mutation at the molecular level, Mutations in plants, animals, and microbes for economic benefit of man. Human Genetics: Karyotype in man, inherited disorders: Allosomal (Klinefelter syndrome and Turner's syndrome), Autosomal (Down syndrome and Cri-Du-Chat syndrome). DNA Damage and Repair: Causes and Types of DNA damage, Major mechanisms of DNA repair: photoreactivation, nucleotide and base excision repairs, mismatch repair, SOS repair.

Suggested Reading:

1. Molecular Biology of cell – Bruce Alberts et al, Garland publications
2. Animal Cytology & Evolution – MJD, White Cambridge University Publications
3. Molecular Cell Biology – Daniel, Scientific American Books.
4. Cell Biology – Jack D. Bruke, The William Twilkins Company.
5. Principles of Gene Manipulations – Old & Primrose, Black Well Scientific Publications.
6. Cell Biology – Ambrose & Dorothy M Easty, ELBS Publications.
7. Fundamentals of Cytology – Sharp, Mc Graw Hill Company
8. Cytology – Wilson & Marrison, Reinform Publications
9. Molecular Biology – Smith Faber & Faber Publications

INTEGRAL UNIVERSITY
Department of Biosciences

B.Sc. LS IInd yr
Subject Name: “Chordates” Animal Diversity-II

Semester: IIIrd
Subject Code: BS221

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UNIT I - **Chordates**: Introduction and origin. Protochordata: Classification and study of habit and general characters of *Balanoglossus*, *Herdmania* and *Amphioxus*.

8

UNIT II- General features of living **Agnatha**; **Pisces**: General characters and classification of different classes of Pisces (up to order) with examples. General account of respiration, locomotion and migration.

8

UNIT III – **Amphibia**: General characters and classification of different classes of Amphibia (up to order) with examples. Origin of tetrapods, parental care, paedomorphosis.

8

UNIT IV- **Reptilia**; General characters and classification of different classes of Reptilia; (up to order) with examples. Origin of reptiles, Poisonous and non- poisonous snakes in India. Aves: Origin of birds, flight adaptation, migration.

8

UNIT V- **Mammalia**: General characters and classification of different classes of mammals, dentition, general features of egg laying mammals, pouched- mammals, aquatic mammals and primates and their interrelationships.

Suggested Reading:

Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press.

Pough H. Vertebrate life, VIII Edition, Pearson International.

Darlington P.J. The Geographical Distribution of Animals, R.E. Krieger Pub Co.

Hall B.K. and Hallgrimsson B. (2008). Strickberger’s Evolution. IV Edition. Jones and Bartlett Publishers Inc.

R.L.Kotpal, 2000. Modern textbook of zoology, Vertebrates. (Rastogi Publ., Meerut).

E.L. Jordan & P.S. Verma, 1998. Chordate zoology. (S. Chand & Co.).

G.S. Sandhu, 2005. Objective Chordate Zoology. Campus Books, vii.

INTEGRAL UNIVERSITY
Department of Biosciences

B.Sc. LS II yr
Subject Name: Angiosperm Morphology and Taxonomy

Semester: III
Subject Code: BS222

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UNIT I Plant systematics: Nomenclature of plants; the international code of botanical nomenclature. Documentation: Herbarium: Functions, preparation and management; important herbaria and botanical gardens of the world and of India; Flora; Keys; Numerical taxonomy and chemotaxonomy.

8

UNIT II- Angiosperm taxonomy: Unique features of angiosperms and diversity; identification, brief reference of Angiosperm Phylogeny Group (APG) Classification: Bentham and Hooker; Comparative account of outline of various systems of classification of angiosperms (Bentham & Hooker, Engler & Prantl and Hutchinson); Origin and evolution of angiosperms.

8

UNIT III – Organization of plant body: Important modifications of stems, leaves and roots, Inflorescence: major types, Flower: Floral whorls, Parts, Flower as a modified shoot, Fruits: major types, Seed: Types.

8

UNIT IV- Angiospermic Families(A): Study of main characters and economic importance of angiospermic families: Brassicaceae, Fabaceae, Euphorbiaceae, Malvaceae, Cucurbitaceae,

8

UNIT V- Angiospermic Families(B): Study of main characters and economic importance of angiospermic families: Asteraceae, Solanaceae Poaceae, Liliaceae, and Orchidaceae.

Suggested Reading:

1. Angiosperm Phylogeny Group An update of the Angiosperm Phylogeny Group classification for the orders and families of the flowering plants: APG II. Botanical Journal of the Linnean Society 141: 399-436.
2. Crawford, D.J. Plant Molecular Systematics. Cambridge University Press, Cambridge, UK.
3. Cronquist, A. An Integrated System of Classification of Flowering Plants. Columbia University Press, New York.
4. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F. and Donoghue, M.J. 5 Stussy, T.F. 1990. Plant Taxonomy, Columbia University Press, USA
6. Gangulee, H.C., Das, K.S, Dutta, C.D. and Kar, A.K. College Botany Vol. III
7. Daniel M. –Taxonomy – Evolution at work
8. Singh, G. Plant Systematics: Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi. 3rd edition.

INTEGRAL UNIVERSITY
Department of Biosciences

B.Sc. LS Iyr
PRACTICALS

Subject Name: Biochemistry and Animal Diversity Lab

Semester: III

Subject Code: BS 223

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1. Spot test for carbohydrates
2. Estimation of reducing sugars by Benedict's Method
3. Spot tests for Amino Acids
4. Protein estimation
5. Salient features and classification up to Orders of the following with special emphasis on their adaptive characters:
 - a. Protochordata: *Herdmania*,
 - b. Pisces: *Scoliodon*, *Labeo*,
 - c. Amphibia: *Rana*, Salamander, *Bufo*,
 - d. Reptilia; *Hemidactylus*, Chameoleon , Tortoise
 - e. Mamalia: Mouse, Rabbit, Bat.
6. Preparation of an album: study of six common birds.
7. Study of poisonous and nonpoisonous snakes.

Subject Name: Elementary biology Lab

Subject Code: BS 224

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1. Use of Micrometer and calibration, measurement of onion epidermal cells and yeast.
2. Cell division: Mitotic and meiotic studies onion root tips and flower bud
3. Chromosomes: Study of polytene chromosomes by slides; Barr bodies
4. Karyotype analysis – with the help of slides
5. Study of vegetative and floral characters of any one representative genus of following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e) Brassicaceae, Fabaceae, Euphorbiaceae, Malvaceae, Cucurbitaceae, Asteraceae and Liliaceae.
6. Morphology study of flower parts, inflorescence, seed, fruit types
7. Mounting of a properly dried and pressed specimen of any twelve wild plants with herbarium label (to be submitted in the record book).

INTEGRAL UNIVERSITY
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B.Sc. LS II yr

Subject Name: Biophysical Chemistry
(Revised w.e.f 2016-2017)

Semester: IV

Subject Code: BS202

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UNIT I-Basics of Biophysics, Chemical bonding – Ionic bond, covalent bond, hydrogen bond and peptide bond, Vander-Waals forces, Principles of thermodynamics.

8

UNIT II- Analytical techniques: Spectrophotometry and colorimetry, Spectroscopic techniques: UV-visible spectroscopy, NMR, IR, Fluorescence and atomic absorption spectroscopy, X-ray crystallography.

8

UNIT III-Chromatography: Paper, thin-layer, column, HPLC, GLC and molecular sieving.

8

UNIT IV- Centrifugation: Principles, types, instrumentation and applications.
Electrophoresis: Principles and applications (PAGE and Agarose gel electrophoresis).

8

UNIT V- Radioactivity: Types, their importance in biological studies, measure of radioactivity, GM counters and Scintillation counting.

8

Suggested Reading:

1. Narayanan, P (2000) Essentials of Biophysics, New Age Int. Pub. New Delhi.
2. Bliss, C.J.K (1967) Statistics in Biology, Vol. I c Graw Hill, New York.
3. Campbell R.C (1974) Statistics for Biologists, Cambridge Univ. Press, Cambridge.
4. Daniel (1999) Biostatistics (3rd Edition) Panima Publishing Corporation.
5. Swardlaw, A.C (1985) Practical Statistics for Experimental Biologists, John Wiley and Sons, Inc. NY
6. Khan (1999) Fundamentals of Biostatistics Publishing Corporation
7. Roy R.N. (1999) A Text Book of Biophysics New Central Book Agency.

INTEGRAL UNIVERSITY
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B.Sc. LS IInd yr

Semester: IV

Subject Name: Molecular Biology

Subject Code: BS212

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UNIT I- Central Dogma of Molecular Biology: Organization of Genetic Material: split genes, overlapping genes; pseudogenes, cryptic genes, Insertion elements and transposons. Gene organization and expression in Mitochondria and Chloroplasts.

8

UNIT II- DNA Replication: Prokaryotic and Eukaryotic – Enzymes and proteins involved in replication, Theta model and Rolling circle model.

8

UNIT III- Transcription: Transcription in prokaryotes and Eukaryotes: Mechanism, Promoters and RNA polymerase, transcription factors, Post-transcriptional modifications of eukaryotic mRNA.

8

UNIT IV- Genetic code: Properties and Wobble hypothesis. Translation: Mechanism of translation in Prokaryotes and Eukaryotes, Post-translational modifications of proteins.

8

UNIT V- Regulation of Gene expression: Regulation of Gene expression in Prokaryotes: Operon concept (Lac), Regulation of Gene expression in Eukaryotes: transcriptional activation, galactose metabolism in yeast.

Suggested Readings:

1. Howe.C. (1995) Gene Cloning and manipulation, Cambridge University Press, USA
2. Lewin, B., Gene VI New York, Oxford University Press.
3. Sambrook et al (2000) Molecular cloning Volumes I, II, & III Cold spring Harbor Laboratory Press, New York, USA
4. Walker J.M. and Gingold, E.B. (1983) Molecular Biology & Biotechnology (Indian Edition) Royal Society of Chemistry U.K
5. Karp.G (2002) Cell & Molecular Biology, 3rd Edition, John Wiley & Sons; INC.

INTEGRAL UNIVERSITY
Department of Biosciences

B.Sc. LS II yr
Subject Name: Ecology and Adaptation

Semester: IV
Subject Code: BS231

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Unit 1. Introduction to Ecology: 8
Inter-relationships between living world and environment, Concept of Biosphere, Biomes, Ecosystem, Food chain, Food web. Introduction to Biogeochemical cycles, Hydrologic cycle. Concept of habitat and niche. Environment related concepts and laws (theory of tolerance, laws of limiting factors).

Unit 2. Biogeography 8
Phytogeography, Phytogeographic realms, major plant communities of the world, Vegetation of India, Community characteristics- organization and concept of habitats and niche. Zoogeography: Zoogeographic realms, Threatened species of animals

Unit 3. Adaptation in plants 8
Plant types: Hydrophytes - *Hydrilla*, *Eichhorina*, *Nymphaea*, *Typha*. Xerophytes – *Nerium*, *Casuarina*, *Saccharum*, *Begonia*. Ecological succession.: Plant succession – xeroseres, hydroseres.

Unit 4. Adaptation in animals: Aquatic, terrestrial, aerial and arboreal. 8
Animal Behavior: Introduction to Ethology, Patterns of behavior (taxes, reflexes, instinct and motivation); biorhythms; learning and memory, Migration of fishes & birds

Unit 5. Population and Community Ecology 8
Population: Characteristics and regulation, Population attributes, density, natality, mortality, age ratio, sex ratio, dispersal and dispersion of population, exponential and logistic growth, life history strategies, population interactions, predation-types, predator-prey system, functional and numerical response, host-parasite interactions, social parasitism, symbiosis

Suggested Readings:

1. Mishra, A. Environmental Studies Selective and Scientific Books, New Delhi
2. Allaby, M. Basics of Environmental Science Routledge
3. Smith, T.M. and Smith, R.C. Elements of Ecology 1st editon Pearson Publications
4. Miller, G.T Environmental Science 11th edition Brooks/Cole
5. Kormondy, E.J. Concepts of Ecology. Prentice Hall, U.S.A. 4th edition.
6. Sharma, P.D. Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.
7. Simpson, M.G. (Plant Systematics. Elsevier Academic Press, San Diego, CA, U.S.A. 4. Singh, G.

INTEGRAL UNIVERSITY
Department of Biosciences

B.Sc. LS II yr
Subject Name: Plant Physiology

Semester: IV
Subject Code: BS232

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UNIT I- Plant-water relations

Importance of water, Diffusion and water potential, Osmosis, Ascent of sap, Transpiration and its significance; Factors affecting transpiration, guttation.

8

UNIT II- Mineral nutrition and transport

Essential elements, macro and micronutrients, Role of essential elements; Absorption of mineral salts, Transport of ions across cell membrane, active and passive transport, carriers, channels and pumps. Translocation in phloem, Composition of phloem sap.

8

UNIT III- C and N metabolism: Photosynthesis Photosynthetic Pigments (Chl a, b); Photosystem I and II, Electron transport and mechanism of ATP synthesis; C₃, C₄ and CAM pathways of carbon fixation; Photorespiration.

Nitrogen metabolism Biological nitrogen fixation; Nitrate and ammonia assimilation.

8

UNIT IV- Plant growth regulators: Enzymes: general structure and properties, Plant growth regulators: Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene. role and applications in agri-horticulture. Seed Physiology: Dormancy, Breaking of dormancy, Germination.

8

UNIT V Growth and Development: Plant response to light and temperature: Photomorphogenesis, Plant movements, Photoperiodism, (SDP, LDP, Day neutral plants); Phytochrome (discovery and structure), red and far red light responses on photomorphogenesis; Growth response to temperature, Vernalization. Introduction to Stress physiology.

Suggested Reading:

1. Taiz, L., Zeiger, E., Plant Physiology. Sinauer Associates Inc., U.S.A. 5th Edition.
2. Hopkins, W.G., Huner, N.P., Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.
- 3 Bajracharya, D., Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.
4. Frank B. Salisbury, Cleon W. Ross: Plant Physiology. Wadsworth Publishing Company

INTEGRAL UNIVERSITY
Department of Biosciences

B.Sc. LS II yr
Subject Name: Animal Physiology

Semester: IV
Subject Code: BS 233

Unit-I -Digestion and absorption: Role of salivary glands, liver, pancreas and intestinal glands.
Digestion and absorption of carbohydrates, lipids and proteins. 8

Unit-II-Blood: Composition of blood, blood cells, plasma proteins and Rh factor; Blood coagulation – mechanism and regulation. 8

Circulatory & Cardiovascular System: Heart and circulation; cardiac cycle. 8

Unit-III -Respiration: Respiratory volumes, Haemoglobin and oxygen transport, carbon dioxide transport, Bohr's effect and chloride shift.

Excretion and osmoregulation: Structure of nephron, urine formation and its regulation ; excretory product. 8

Unit-IV- Muscle system: Muscles and Movement, Skeletal, cardiac and smooth muscle.

Nervous system: central and peripheral nervous system, nerve impulse – its conduction and synaptic transmission, neurotransmitters. 8

Unit-V-Endocrine system : Endocrine glands and their functions; Nature of hormones; Regulation of hormone secretion; Mode of action of hormones.

Reproductive system: testis, ovary, Spermatogenesis, Oogenesis, Totipotency.

Suggested Reading:

1. Textbook of Medical Physiology by Guyton. A.C., H. Sanders Philadelphia. 1988.
2. Physiological basis of Medical practice, West J.B., Best and Taylor.
3. Introduction to Physiology by Davidson H and Segal M.B. Academic Press.
4. Fox S I – Human Physiology, (McGraw Hill, 1998, ISBN: 0071157069)
5. Moffett D and Schauf C L – *Human Physiology: Foundations & Frontiers*, (Mosby, 1993, ISBN: 801669030)
6. Seeley R, Stephens T and Tate P – *Anatomy & Physiology*, (McGraw-Hill, 1999, ISBN: 0071169881)
7. Sherwood L – *Human Physiology: From Cells to Systems*, (Wadsworth Publishing, 2000, ISBN: 0534568262)
8. Tortora G J *Principles of Anatomy & Physiology*, (John Wiley & Sons, 1999, ISBN: 0471366927)

INTEGRAL UNIVERSITY
Department of Biosciences

B.Sc. LS II yr

PRACTICALS

Subject Name: Molecular Biology & Microbiology Lab

Semester: IV

Subject Code: BS 234

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1. Isolation and purification of genomic DNA.
2. Estimation of DNA and RNA
3. Biochemical tests–starch hydrolysis, gelatin liquefaction.
4. Separation of amino acids by paper chromatography.
5. Cleaning and sterilization of glass ware.
6. Study of instruments: Compound microscope, Autoclave, Hot air oven, pH meter, Laminar airflow and centrifuge
7. Media preparation: Nutrients agar, Nutrient broth and LB.
8. Staining Techniques: Simple, Negative staining, Gram staining, Endospore staining, fungal staining.
9. Isolation of bacteria and fungi from soil/ air/water – dilution and pour plate methods
10. Growth curve of bacteria

Subject Name: Physiology & Ecology Lab

Subject Code: BS 235

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1. Determination of osmotic potential of plant cell sap by plasmolytic method.
2. To study the effect of two environmental factors (light and wind) on transpiration by excised twig.
3. Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.
4. Study of xerophytic modification in plants: any three specimens as *Acacia/ Argemone /Asparagus Opuntia/ Calotropis*)
5. Study of hydrophytic modification in plants (any two specimens as *Hydrilla/Echornia/Water lily*).
5. Demonstrate the activity of any enzyme and study the effect of pH and enzyme concentration.
6. To study the effect of light intensity and bicarbonate concentration on O₂ evolution in photosynthesis.
7. Comparison of the rate of respiration in any two parts of a plant.
8. Demonstration of R.Q.