

INTEGRAL UNIVERSITY
DEPARTMENT OF BIOSCIENCES
PROGRAM: B.Sc.-ZBC

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PSO1: To develop the fundamental scientific concepts as effective professionals for basic and applied research in the diverse area of sciences.

PSO2: They will acquire the skills in handling scientific instruments, planning and performing in laboratory experiments.

PSO3: This program provides thorough knowledge with facts and figures which are related to various subjects in pure sciences.

PSO4: This program facilitates students for taking up and shaping a successful carrier in basic sciences.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: An ability to develop scientific outlook, not only with respect to science subjects but also in all aspects related to life.

PSO2: To develop a deeper understanding of natural laws, inquiring about the reasons and logics which govern them through established methods of observation, modeling, experimentation and calculations.

PSO3: To think creatively and scientifically to propose novel ideas, and draw relational conclusions which make them self directed.

PSO4: An in-depth understanding and training in basic sciences for three years which will open a plethora of opportunities for teaching, research, progression to PG education in botany, environmental science, biotechnology, bioinformatics, bio chemistry, microbiology, genetics, as well as lucrative employment opportunities across the globe.

PROGRAMME: B. Sc. Z.B.C. FIRST YEAR

I SEMESTER

COURSE: ESSENTIAL PROFESSIONAL COMMUNICATION

COURSE CODE: LN104

COURSE OBJECTIVES: Develop the basic knowledge, vocabulary, grammar and communication skills in the students-listening, speaking, reading and writing.

COURSE OUTCOME (CO)	DESCRIPTION
CO1	To enhance all the four communication skills in the students-- listening, speaking, reading and writing.
CO2	To familiarize the students with the nature and importance of effective communication skills in their professional life.
CO3	To make the students capable of actively participating in various individual/group communications such as group discussion, debate, meeting, presentation etc.
CO4	To enrich the vocabulary of the students to make them efficient communicators.
CO5	To strengthen the Grammar of the students.

COURSE: NON CHORDATES-I “PROTOZOA TO HELMINTHES”

COURSE CODE: BS161

COURSE OBJECTIVES: This course is designed to enable the students to understand the general taxonomic rules on animal classification and the complex interactions among animals of different phyla. The students will acquire the knowledge about the distinguishing features of lower non chordates.

COURSE OUTCOMES

COURSE OUTCOME (CO)	DESCRIPTION
CO1	The students will learn about the diversity and classification of animals.
CO2	The students will learn about the characteristics of lower non-chordates. They will also learn about the structure, life-cycle and control of <i>Plasmodium</i> , <i>Monocystis</i> , <i>Fasciola hepatica</i> , <i>Taenia solium</i> , <i>Ascaris</i> and <i>Ancylostoma</i> .
CO3	The students will learn about the locomotion in Protozoa, Canal system in sponges, Organization of coelom and its types.
CO4	The expected outcome is to provide the students an in-depth understanding of colonial and social life in invertebrates.
CO5	The students will learn the physiological process of lower invertebrates and relationship of organ system.

COURSE: CELL BIOLOGY AND GENETICS

COURSE CODE: BS-203

COURSE OBJECTIVES: This course is designed to enable the students to understand the cell structure and its functions, signal transduction and genetics.

COURSE OUTCOMES (CO):

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Develop an understanding of the cell structure and their functions, cytoskeleton and prokaryotic and eukaryotic cells
CO2	The students will learn about Cell Division, Membrane transport, transduction and its molecular mechanism, cell senescence and Programmed Cell Death.
CO3	The students will learn about Chromosomes, Chromosomal Variations, Chromosome mapping, structural and numerical aberrations
CO4	The students will learn about basic genetics, epistasis, Concepts of autosomes and autosomes, Linkage and Crossing Over.
CO5	The students will learn about mutations, human Genetics, DNA damage and repair:

SUBJECT: ALGAE, FUNGI, BRYOPHYTA
COURSE CODE: BS162

COURSE OBJECTIVES: This course is designed to enable the students to understand the general characteristics, habit, habitat, anatomy, morphology, thallus organization, reproduction, economic importance and Classification of algae, fungi, Lichens and Bryophytes.

COURSE OUTCOMES (CO):

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Have basic knowledge of classification of algae, Economic importance and life Cycle with special reference to <i>Chlamydomonas</i> , <i>Oedogonium</i> , <i>Vaucheria</i> , <i>Chara</i> and <i>Polysiphonia</i> .
CO2	Learn about general features of fungi, their Classification, range of thallus organization, cell wall composition, Reproduction and economic importance of fungi, life cycle with special reference to <i>Rhizopus</i> (Zygomycota), <i>Alternaria</i> (Ascomycota), <i>Puccinia</i> , <i>Agaricus</i> (Basidiomycota)
CO3	Have basic knowledge of Lichens
CO4	Identify General features of Bryophytes, Classification, Thallus organization, Reproduction and affinities of bryophytes, Economic importance of bryophytes with special reference to <i>Sphagnum</i>
CO5	Study Marchantiophyta – <i>Marchantia</i> ; Bryophyta - <i>Pogonatum</i> ; Anthocerotophyta – <i>Anthoceros</i> .

COURSE: GENERAL CHEMISTRY-I
COURSE CODE: CH117

Available from Chemistry Department

COURSE: ANIMAL DIVERSITY LAB-1

SUBJECT CODE: BS163

COURSE OBJECTIVES: The objective of this course is to have a firm foundation in the fundamentals of different animal phyla and to understand the importance of economic zoology.

COURSE OUTCOMES (CO):

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Understand how to prepare permanent and temporary slides.
CO2	Describe different kinds of protozoans.
CO3	Understand and identify various animals from different phyla through specimens.
CO4	Learn to dissect Prawn and Pila.
CO5	Explain and differentiate between mouth parts of <i>Anopheles</i> and <i>Culex</i> .
CO6	Study and identify permanent slide preparation.

**COURSE: CHEMISTRY PRACTICAL I-
COURSE CODE: CH118**

Available from Chemistry Department

PROGRAMME: B. SC ZBC FIRST YEAR
II SEMESTER

FUNDAMENTALS OF ENVIRONMENTAL SCIENCE

COURSE CODE: ES 115

Available from Environmental Department

COURSE: PTERIDOPHYTES, GYMNOSPERMS, PALAEOBOTANY

COURSE CODE: BS-171

COURSE OBJECTIVES: This paper deals to identify and classify the pteridophytes and gymnosperms. Understand the morphology, anatomy and life cycle of various genera of pteridophytes and gymnosperms along with their economic importance. Importance of studying this paper is highlighted reflecting on the elementary palaeobotany and geological time scale.

COURSE OUTCOMES:

COURSE OUTCOMES (CO)	DESCRIPTION
CO1	On completion of this course, students will be able to understand the general features of pteridophytes, their classification, stelar organization and economic importance.
CO2	To understand the morphology, anatomy, development, vegetative and reproductive parts in various genera of pteridophytes.
CO3	The students will learn about the general characteristics of gymnosperms, classification, resemblances and differences of gymnosperms with pteridophytes and angiosperms.
CO4	To understand the morphology, anatomy, development, vegetative and reproductive parts in Coniferales.
CO5	The students will learn about elementary palaeobotany including general account, types of fossils, methods of fossilization and geological time scale.

COURSE: GENERAL CHEMISTRY-II
COURSE CODE: CH 119

Available from Chemistry Department

COURSE: NON CHORDATES-II “ANNELIDA TO ECHINODERMATA
COURSE CODE: BS172

COURSE OBJECTIVES: This course is designed to enable the students to understand the general taxonomic rules on animal classification and the complex interactions among animals of different phyla. The students will acquire the knowledge about the distinguishing features of higher non chordates.

COURSE OUTCOMES:

COURSE OUTCOMES (CO)	DESCRIPTION
CO1	The students will learn about the phylogeny of invertebrates and vertebrates.
CO2	The students will learn about the characteristics of higher invertebrates and affinities of Protochordates.
CO3	The students will learn about the metamerism in Annelids, concept and types of metamorphosis in Arthropoda, torsion in Gastropods and water-vascular system in Asterozoa.
CO4	The expected outcome is to provide the students an in-depth understanding of higher non chordates and Hemichordates. The students will learn the physiological process of higher non chordates and relationship of organ system.
CO5	The students will understand the general characters of Protochordata, Urochordata and Cephalochordata.

COURSE: ANIMAL PHYSIOLOGY
SUBJECT CODE: BS233

COURSE OBJECTIVE: The students will gain fundamental knowledge of animal physiology.

COURSE OUTCOMES (CO): The student will

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Seeks to understand the process of Digestion and absorption.
CO2	Understand blood and cardiovascular system.
CO3	Students will gain knowledge of muscle system, nervous system.
CO4	Students are taught the detailed concepts of respiration, excretion and osmoregulation.
CO5	Students gain fundamental knowledge of reproductive and endocrine systems

SUBJECT: PLANT DIVERSITY LAB-I
SUBJECT CODE: BS174

COURSE OBJECTIVES: This course is designed to enable the students to understand the general characteristics, habit, habitat, anatomy, morphology, thallus organization of algae, fungi, Lichens, Bryophytes, pteridophytes and gymnosperms. Students will also understand the types and Parts of inflorescence and flower.

COURSE OUTCOMES (CO):

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Identify and analyze dicot and monocot roots, stems and leaves
CO2	Learn about general features of algae and fungi
CO3	Identify and Learn basics of bryophytes, pteridophytes and gymnosperms
CO4	Identify types of seed and fruit .
CO5	Study morphology of flower parts, inflorescence.

COURSE: CHEMISTRY PRACTICAL-II
COURSE CODE: CH 120

Available from Chemistry Department

PROGRAMME: B. Sc ZBC SECOND YEAR

III SEMESTER

COURSE: CHORDATES - "AGNATHA TO MAMMALS"

COURSE CODE: BS263

COURSE OBJECTIVES: This course is designed to enable the students to understand the general organization of Protochordata, Urochordata and Cephalochordata. The students will acquire the knowledge about the classification of various classes of vertebrates i.e. Pisces, Reptiles, Aves and Mammals.

COURSE OUTCOMES:

COURSE OUTCOMES (CO)	DESCRIPTION
CO1	The students will learn Origin and phylogeny of the vertebrates.
CO2	The students will learn about the characteristics of chordates, their adaptations and associations in relation to their environment.
CO3	The students will learn about the parental care and migration in vertebrates, identification of poisonous and non poisonous snakes.
CO4	The expected outcome is to provide the students an in-depth understanding of chordates and their various systems.
CO5	The students will learn about the adaptation and dentition in Mammals.

COURSE: INORGANIC AND PHYSICAL CHEMISTRY-1

COURSE CODE: CH 221

Available from Chemistry Department

COURSE: ANGIOSPERM MORPHOLOGY AND TAXONOMY
SUBJECT CODE: BS-222

COURSE OBJECTIVES: This course aims to impart an insight into the habit, vegetative characters and diversity of plants to understand internal structure and reproduction of the most evolved group of plants, the Angiosperms. This course is designed to help the students to understand the distinguishing features of angiosperm families and get an insight in to the fruit, seed development and inflorescence.

COURSE OUTCOMES:

COURSE OUTCOMES (CO)	DESCRIPTION
CO1	On completion of this course, students will be able to identify and classify the flowering plants
CO2	To know the phylogenetic relationship of angiosperms.
CO3	This course helps to learn the taxonomic evidences from numerical and chemical taxonomy.
CO4	The students will learn about the organization of plant body and important modifications of stems, leaves and roots.
CO5	Detailed description of various dicot and monocot families.

COURSE: FUNDAMENTAL OF MICROBIOLOGY
COURSE CODE: BS113

COURSE OBJECTIVES: The course is designed to develop the understanding of Basics of microbiology, General Classification of microbes, Control of Microorganisms, Microbes in extreme environments and microbial interactions and Basics of Recombination in Prokaryotes

COURSE OUTCOMES (CO):

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Study of Basics of microbiology
CO2	General Classification of microbes
CO3	Basics of Control of Microorganisms
CO4	Study of bacteriophages and microbes in extreme environments and microbial interactions
CO5	Basics of Recombination in Prokaryotes

COURSE: ORGANIC AND PHYSICAL CHEMISTRY-I
COURSE CODE: CH 222

Available from Chemistry Department

COURSE: CHEMISTRY PRACTICAL-III

COURSE CODE: CH 223

Available from Chemistry Department

COURSE: ANIMAL DIVERSITY LAB-II

COURSE CODE: BS262

COURSE OBJECTIVES: The objective of this course is to have a firm foundation in the fundamentals of different animal phyla and to learn slide preparation and identification.

COURSE OUTCOMES (CO):

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Understand how to prepare permanent and temporary slides.
CO2	Understand and identify Embryonic membranes-Whole mount of 72 hr chick embryo.
CO3	Understand and identify various animals from different phyla through specimens.
CO4	Learn to dissect Dogfish.
CO5	Learn to differentiate poisonous and non-poisonous snakes.
CO6	Study and identify permanent slide preparation.

PROGRAMME: B. Sc ZBC SECOND YEAR

IV SEMESTER

COURSE: EVOLUTIONARY BIOLOGY AND WILDLIFE

COURSE CODE: BS271

COURSE OBJECTIVES: The objective of this course is to have a firm foundation in the evolution of fauna and its habitat.

COURSE OUTCOMES (CO):

COURSE OUTCOME (CO)	DESCRIPTION
CO1	The students will learn the animal distribution and the factors which effect their distribution.
CO2	The students will learn about the Origin of life and its various theories.
CO3	The students will learn about the concept of evolution and theory of natural as well as sexual selection.
CO4	The expected outcome is to provide the students an in-depth understanding of species concept.
CO5	The students will learn about the different wild life habitat in natural as well as artificial environment.
CO6	The students will learn the concept of IUCN.

Course: Plant Physiology

Course Code: BS232

Course objective:

- On completion of this course, students will be able to understand:
- The concept of plant water relations.
- The understanding of Nutrition in plants.
- Morphology and physiology of plants and plant growth.
- To study plant hormone and its relation with plant growth and development.

Course outcome:

On completion of course students are able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Study the Importance of water, Diffusion and water potential, Osmosis, Ascent of sap, Transpiration and its significance; Factors affecting transpiration, guttation.
CO2	Have knowledge of 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.
CO3	Understand Photosynthesis Photosynthetic Pigments (Chl a, b); Photosystem I and II, Electron transport and mechanism of ATP synthesis; C ₃ , C ₄ and CAM pathways of carbon fixation; Photorespiration. Nitrogen metabolism Biological nitrogen fixation; Nitrate and ammonia assimilation.
CO4	Have basic knowledge of 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.
CO5	Have basic understanding of 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.

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COURSE: Inorganic and Physical Chemistry-II

COURSE CODE: CH224

Available from Chemistry Department

COURSE: Organic and Physical Chemistry-II

COURSE CODE: CH225

Available from Chemistry Department

COURSE: Chemistry Practical-IV

COURSE CODE: CH226

Available from Chemistry Department