



ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

Course Structure and Syllabus for the First Semester B.Sc. (Zoology) Programme

FIRST SEMESTER (JULY-DECEMBER)

Sl No.	Sub Code	Subject	Hrs / Week			Credits
			L	T	P	C
Theory						
1	BZY171101	Cell Biology	3	2	0	4
2	BZY171102	Chemistry - I	3	2	0	4
3	BZY171103	Animal Physiology & Endocrinology	3	2	0	4
4	HS161104	English Communication & Technical Writing	2	2	0	3
5	BZY171105	Biotechnology - I	3	2	0	4
Practical						
6	BZY171116	Zoology Lab – I	0	0	4	2
7	BZY171115	Biotechnology Lab - I	0	0	4	2
8	BZY171112	Chemistry Lab - I	0	0	4	2
Total			14	10	12	25
Total Contact Hours = 36						
Total Credits = 25						

Subject Code: BZY171101

Subject : CELL BIOLOGY

L-T-P: 3-2-0

Credit - 4

Module	Topics	Course Content	Hours
1.	Cell	Diversity of cell size and shape.	3
2.	Cell theory	Cell theory.	4
3.	Types of cell	Structure of prokaryotic and eukaryotic cells.	4
4.	Protoplasm	Physical and chemical properties of protoplasm.	3
5.	Plasma membrane	Structure of plasma membrane, its modifications and Functions, Cell junctions: Occluding junctions (Tight junctions), Anchoring junctions (desmosomes), Communicating junctions (gap junctions) and Plasmodesmata	6
6.	Chromosome	Chromosome- structure and functions, Chromosomal DNA and its packaging	4
7.	Cell cycle	Cell division - Cell division cycles. Mechanics of cell cycle, Regulation of cell cycle; Signaling molecules and their receptors.	6
8.	Cell organelle	Ultra structure and function of Mitochondria, Golgi bodies, Endoplasmic reticulum, Ribosome, Lysosome.	6
9.	Cytoskeleton	Cytoskeleton: Structure and function of centriole, Microtubules and Microfilaments - structure and dynamics.	4
10.	Cilia and flagella	Cilia and flagella- Structure and cell movement.	4
11.	Apoptosis and Cancer	Extrinsic (Death Receptor) Pathway and Intrinsic (Mitochondrial) Pathway; Growth and development of tumors and Metastasis	4
		Total	48

Text Books/ Reference Books

1. The World of Cell – W. M. Becker, L. J. Kleinsmith, J. Hardin (Pearson)
2. Cell Biology- Cooper
3. Bruce Albert, Bray Dennis, Levis Julian, Raff Martin, Roberts Keith and Watson James (2008) Molecular Biology of the Cell. 5th Edition. Garland publishing Inc., New York.
4. Cooper GM and Hausman RE (2009) The Cell: A Molecular Approach. 5th Edition. ASM Press, Washington D.C.
5. De Robertis EDP and De Robertis EMF (2006) Cell and Molecular Biology. 8th Edition. Lippincott Williams and Wilkins, Philadelphia.
6. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley and Sons. Inc., USA.
7. Mohanty PK (2000) Illustrated Dictionary of Biology. Kalyani Publishers, Ludhiana.

Subject Code: BZY171102

Subject : Chemistry – I

L-T-P: 3-2-0

Credit - 4

Modules	Topics	Course Content	Hours
1	Hydrocarbons I	<p>(a). Introduction to classification and nomenclature of organic compounds on the basis of their functional groups</p> <p>(b). Alkanes : Preparation (Wurtz, Kolbe, Corey-House reactions) and their properties and reactions. Homolytic bond fission. Free radical generation and reactivity. Photochlorination of alkanes.</p> <p>(c). Cycloalkanes : preparation of cyclopropane, cyclobutane, cyclopentane, cyclohexane. Strain theory and stability. Reactions of cyclopropane. Conformations of cyclohexane, disubstituted cyclohexane. Free rotation of σ-bonds, rotamers of n-butane, their nomenclature and stability.</p> <p>(d). Alkenes : Preparation (elimination of alkyl halides, alcohols, Wittig reaction, pyrolysis of esters). Reactions of alkenes. π-diastereomerism, stability and interconversion. Markownikov and Zaitzeff rule. Mechanism of electrophilic addition reaction.</p> <p>(e). Alkynes and alkadienes : Preparation, properties, reactions of alkynes (ethyne, propyne, butyne as example). Addition reactions of alkynes with polar reagents, ozonolysis, catalytic hydrogenation (Lindlar's catalyst). Preparation of 1,3-butadiene and isoprene. 1,2- and 1,4-addition of conjugated dienes.</p>	18
2	Hydrocarbons II	<p>(a). Reactive intermediates: carbocations and carbanions – their shape, generation, stability and reactions</p> <p>Stereochemistry : Classification – geometrical (simple examples involving alkenes, cis-trans and E-Z nomenclature) optical and conformational isomers. Basic concepts of erythro and threo isomers, asymmetry, enantiomerism, diastereomerism, dissymmetry, meso structures. Chirality and prochirality. Racemization, racemic mixtures, resolution of racemic mixtures. D-L and R-S notation.</p> <p>(b). Alkyl halides and 1,2-dihalides : Preparation, properties and reactions of alkyl halides. Mechanism of SN1 and SN2 reactions, E1 and E2 reactions. Effect of solvent, substrate and other factors on the mechanism. Substitution vs elimination. Conversion of alkyl halides to</p>	10

		alcohols, ethers, amines, thioethers and thiols. Preparation and synthetic uses of Grignard reagent. Unit	
3	Hydrocarbon III	(a). Preparation and synthetic uses of diazomethane, ketene. (b). Aromatic hydrocarbons : IUPAC nomenclature. Aromaticity. Preparation and reactions of benzene. Mechanism of electrophilic aromatic substitution. Activation, deactivation and directive influence of groups. Conversion of benzene to its derivatives and vice versa. Preparation and properties of naphthalene, anthracene.	10
4	Atomic structure	Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrödinger wave equation, significance of ψ and ψ^2 , quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p, and d orbitals. Aufbau and Pauli's exclusion principles, Hund's multiplicity rules. Electronic configurations of the elements, effective nuclear charge and shielding or screening effect	10
Total			48

Text Books/Reference Books:

- 1) Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- 2) Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- 3) Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- 4) Lee, J.D. Concise Inorganic Chemistry, ELBS, 1991.

Subject Code: BZY171103

Subject: ANIMAL PHYSIOLOGY & ENDOCRINOLOGY

L-T-P: 3-2-0

Credit - 4

Module	Topics	Course Content	Hours
1	Nutrition	Nutritional requirements, Digestion and absorption of dietary components (Carbohydrates, fats, proteins, vitamins, and minerals), Functions of liver and pancreas.	7
2	Respiration	Types of respiration- Anaerobic and aerobic, Properties and function of respiratory pigments, Exchange of gases, Breathing, Control of breathing.	7
3	Body Fluids	Type of body fluids, Composition and function of different bodyfluids, Haemopoiesis, Buffer system in blood, Blood groups and transfusion, Blood clotting mechanism	7
4	Heart and circulation	Types of heart- Myogenic and Neurogenic, Origin, conduction and regulation of heart beat, Cardiac cycle, Blood pressure.	7
5	Excretion	Types of nitrogenous wastes- ammonotelic, ureotelic and uricotelic, Physiology of urine formation. Regulation of urine formation. Osmoregulation in vertebrates.	6
6	Endocrinology	Brief account of structural features histological structure and function of endocrine glands -Pituitary, Thyroid, Pancreas Adrenal and Gonads.	2
7	Hypothalamus	Hypothalmo- hypophysial axis.	2
8	Classification	Classification of hormones.	2
9	Mechanism	Mechanism of hormone action.	2
10	Pancreatic hormones	Pancreatic hormones and metabolic regulation, physiological action of insulin and glucagon.	4
11	Regulation	Hormonal control of calcium homeostasis, chemistry and control of secretion of parathormone, calcium and vitamin D.	2
		Total	48

Text Books/ Reference Books

1. Animal Physiology – Prosser and Brown
2. Animal Physiology- Adaptation & Environment- Schmidt & Neilson
3. Essential of Animal Physiology- S. C. Rastogi
4. Endocrinology- M. E. Hadley and J. E. Levine (Pearson)
5. General Endocrinology- Turner & Bagnara 3. Text book of Endocrinology- Gorman & Wilson
6. Essential Endocrinology- Charles, Book and Marshall
7. Endocrinology (Vol. 1, 2, 3)- L. J. Degroot
8. Endocrinology and Reproductive Biology- K. V. Shastri

Subject code: HS161104

Subject: English Communication and Technical Writing

L-T-P: 2-2-0

Credit- 3

Modules	Topics	Course Content	Hours
1	Basic of Communications	Need of Communication skills; Channels, Forms and dimension of communication, oral and written communication, internal and external communication, verbal and non-verbal communication, barriers to communication, principles of effective communication.	4
2	Writing skills	Letters, reports, notes, memos, Language and format of various types of business letters, language and style of reports, reports writing strategies, analysis of a sample report	8
3	Grammar and vocabulary	Tenses and concepts of time, active and passive constructions, direct-indirect speeches, preposition, conditionals, parallel structure, modifiers, sentence transformation, vocabulary (idioms, confusable, one word substitute, Synonyms-antonyms)	8
4	Career oriental communication	Resume writing, curriculum vitae, statement of purpose, team talks, group discussion and interviews	5
5	Advanced techniques in technical communication	Interview through telephone/video conferencing, power point presentation, structure and format, using email for business communication, standard email practices, language in email, using internet for collecting information, referencing while using internet materials for project reports.	6
6	Language Laboratory	a. Emphasizing Listening and comprehension skill, reading skill, sound structure of English and intonation patterns b. Language laboratory training in speaking skills covering oral presentations, mock interviews and model group discussion through the choice of appropriate programs.	5
		Total	36

Text Books/Reference Books:

- 1) P. Balasubramaniam- Phonetics for English Students
- 2) David Crystal- Cambridge Encyclopedia of English Language
- 3) V. Sasikumar and P.V. Dhamija- Spoken English
- 4) Ludlow And Pantheon- The Essence of Effective Communication

Subject code: BZY171105

Subject : BIOTECHNOLOGY- I (Microbiology and Microbial Genetics)

L-T-P: 3-2-0

Credit - 4

Module	Topics	Course Content	Hours
1	Overview and classification	Biogenesis and abiogenesis, Contributions of Redi, Spallanzani, Pasteur, Koch [Germ Theory], Edward Jenner and Fleming [Penicillin], Scope of Microbiology, Systems of classification, General properties and principles of classification of microorganisms, Nutritional types [Definition and examples]. Classification on the basis of oxygen requirement.	7
2	Concept of Sterilization	Definition of sterilization, dry and moist heat, pasteurization, tyndalization; radiation, ultrasonication, filtration. Physical and Chemical methods of sterilization; disinfection sanitization, antisepsis sterilants and fumigation. Determination of phenol coefficient of disinfectant	7
3	Stains and staining techniques	Definition of auxochrome, chromophores, dyes, Classification of stains, Theories of staining, Mechanism of gram staining, acid fast staining, negative staining, capsule staining, flagella staining, endospore staining.	6
4	Microbes in Extreme Environment and Pathogenic Microorganisms	Nature, special features of the thermophilic, methanogenic and halophilic Archaea; photosynthetic bacteria, Cyanobacteria some Archaea who live in extreme conditions like cold, and space. List of common bacterial, fungal and viral diseases of human beings [Name of the disease, causative pathogen, parts affected]	8
5	Basic concepts of Virology	General characteristics of viruses, differences between bacteria and viruses. Classification of viruses Physical and chemical Structures of different Viruses on the basis of capsid symmetry - enveloped (Herpes virus), helical (TMV) and icosahedral (Polyoma viruses), Capsids, complex (Bacteriophage, and Virion size, enveloped (Herpes).	8
6	Prokaryotic Genomes, replication and gene regulation	Physical organization of bacterial genomes, Plasmid and bacterial sex, Types of plasmids (F Plasmid: a Conjugate plasmid', R plasmid, Col plasmid Copy number and incompatibility), Episomes. Transposable elements (Insertion sequence and transposons, transformation, transduction, Transcriptional regulation in prokaryotes (inducible and repressible system, positive regulation and negative regulation); Operon concept – lac, trp operons.	12
		Total	48

Text books/Reference Books

1. Microbiology by Prescott.
2. Microbiology – An introduction by Gerard.
3. Molecular biology of the Gene by Watson.

Subject Code: BZY171116

Subject : ZOOLOGY LAB-I

L-T-P: 0-0-4

Credit - 2

Unit	Experiments	Hours
1	Study of different types of cell (Representatives of prokaryotic and eukaryotic cell)	4
2	Staining techniques of nucleus and nucleolus.	4
3	Preparation of histological slides from tissues as liver, Lung Stomach, Intestine, Kidney, Pancreas, testes and Ovary.	4
4	Study of different tissue through permanent slides : Epithelial ,Simple, squamous, cuboidal, columnar, Compound, stratified, transitional, muscular, bone, cartilage areolar, tendon, adipose, reticular and nervous	4
5	Haemoglobin estimation.	2
6	Human blood grouping, ABO and Rh factor.	2
7	Total count of RBC and WBC and differential count of WBC	2
8	Preparation of Haemin crystal from blood.	2
10	Viva Voce	
	Total	24

Text books/Reference Books

1. Advanced Practical Zoology by Verma P.S. and Srivastava P.C.

Subject Code: BZY171115

Subject: BIOTECHNOLOGY LAB - I

L-T-P: 0-0-4

Credit -2

Unit	Experiments	Hours
1.	Basic sterilization techniques required for Media preparation	4
2.	Media preparation technique	4
3.	Isolation of bacteria Streak plate, spread plate, pour plate, serial dilution]	6
4.	Methods of inoculation of different microbes in selective media.	6
5.	Staining of Slides	4
6.	Viva-voce	
	Total	24

Subject Code: BZY171112

Subject: CHEMISTRY LAB - I

L-T-P : 0-0-4

Credit -2

Unit	Experiments	Hours
1	Purification of benzoic acid by crystallization	4
2	Chromatography: Thin layer chromatography of plant pigments	4
3	Separation of components from a mixture of Red and Blue inks by paper chromatography	4
4	Preparation of pure sample of potash alum	6
5	Preparation of pure sample of ferrous ammonium sulfate	6
6	Viva-voce	
	Total	24

Text books/Reference Books

1. A textbook of Practical Chemistry, *Sudarsan Barua.*, Kalyani publishers
